L'Anse Creuse Amateur Radio Club

Volume 42, Number 10, June 2022

The Tuned Circuit

Club Website: http://www.n8lc.org

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The Deadline for the next TC: Monday August 29th

Next Meeting - **7:00 PM June 1st 2022** at the Tucker Senior Center (see last page for map and address) with Zoom video conference access.

Meeting Program - The program for our meeting will be as reported on page 6!

The NEXT board meeting will be on Wednesday, June 8th, 2022 via Zoom. Click here for details .

The Prez Sez

Well, as I write this, it is just after Dayton Hamvention. For those that did not make it this year, it was nice to have Hamvention happen again after a two-year delay.

The Hamvention people are saying they believe there were about 30,000 in attendance. From my perspective it seemed like it might have been slightly less attended than I remember in 2019, but I am not sure about that. Friday started out with rain right up to about the time we arrived at flea market area. After that, Friday improved and got warm, but a steady breeze kept it comfortable. Right on queue it started to rain on the way back to my daughter's home. It continued to be a on and off rain for the rest of the evening. Saturday was warm and overcast, but the rain held off till around 3 pm or so, but everyone in our group had stuff packed up and left before any rain. Great timing at least. We took a lot of the equipment that was stored at the repeater shack. We sold a good bit of it, and I think we made some money but I'm sure Gregg/N8GEO will have a better report by the meeting. All in all, I think everyone had a good time.

June 4th will bring another siren test weekend. I hope to have more details available at the meeting, but anyone that can, start setting aside the time for that. It doesn't take much time, and even if you don't have the equipment to get on the repeater, you can call, text, or email your report. Please consider participating, if not this month, then in the future.

The June meeting activity will be the transmitter hunt. You don't need to have fancy equipment. A directional antenna does great. I have even found a hidden transmitter just by watching signal strength with my mobile antenna, although admittedly that involves a lot of luck. There are always room for some extra people in most of the vehicles participating.

And of course, the big activity coming up on June 24th, 25th & 26th is the ARRL Field Day exercise. Again, we will be out at Addison Oaks County Park. Please come out and participate by operating, helping set up and/or tear down, or just visiting to see what it is all about. A great time to visit is always Friday evening or Saturday morning, lots of social activity going on during those times. The operation starts at 2pm Saturday local time and runs till 2pm Sunday. The club pays for the whole site, so you do not need to pay to get into the park. You do need to go the registration office and tell them you're with the radio club up on 'Tower Hill'. If you are not sure how to get to the actual site, they can direct you, and we should have signs up.

Hopefully we will see you at the meeting and/or Field Day.

Dale / K8RO

Report of the Secretary

Submitted by Ken Janicki / KD8RJN

Meeting Call to Order:

President, Dale/K8RO, called the May 4th, 2022, LCARC general membership meeting to order at approximately 7:00 PM at the Tucker Senior Center. A Zoom session was also available for those not able to attend in person.

Roll Call:

The following members were in attendance:

Dale/K8RO, Marty/K8HVI, Gregg/N8GEO, Ken/KD8RJN, Fritz/KE8BFW, Doug/N8PYN, Mike/N5WCS, John/N8FYL, Dennis/N8MKG, Matt/KD8LLT, Rick/K8RWM, John/N8NXW, Dennis/AC8JH, Ken/N8KC, Russ/N8HAR, Keith/W8KD, Lito/K8AJJ, Bill/K8WWH, and via Zoom Bob/KA8VSI, Joe/KE8SKF, Vince/WA8BIJ, Don/K7SDF. Bill/WX8Y arrived after roll call.

Visitors: Andy/WX8NN

FCC license upgrades: None

April Meeting Minute:s

Mike/N5WCS made a motion to approve the prior month's (April 2022) meeting minutes as posted in *The Tuned Circuit*. It was seconded by Keith/W8KD. The motion was approved by all. The motion passed.

Treasurer's Report: by Gregg/N8GEO:

Total amount in the account is	$7126.63
The Youth Fund has	$115.50
The Repeater Fund has	$874.85
Antenna Project has	$3190.96
Total available (unallocated) is	$2942.32

A check was written to the Knight of Columbus for $1,760.00 for the Radio Raffle. The check is held by them for one month to account for the printing of tickets and the license from the state for the raffle. We have not received the funds yet.

Dennis/N8MKG made a motion to approve the Treasurer's Report. It was seconded by Rick/K8RWM. Motion passed.

Where's Doug: by Doug/N8PYN:

Dayton Hamvention is May 20 weekend. The GM club moved the date of their trunk swap at the Packard Proving Ground parking lot from the Dayton weekend to week prior, May 14. Their trunk swaps

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will run monthly. Chelsea Swap will be June 5th. The Monroe swap will be June 19th. Several upcoming swaps are listed in *The Tuned Circuit*.

Technical Committee Report: Doug/N8PYN

Doug/N8PYN stated it is like the 2-meter machine is down on power. Dale/K8RO stated we need a technical meeting at the repeater to check things out and get the items from the shack ready for Dayton. The meeting is planned for Wednesday after breakfast.

ARRL Liaison report: Keith/W8KD

- The ARRL will no longer list trunk swaps. They will be called hamfest or ham swap meets.
- Beginning May 1st ARRL will only sanction two hamfest events per year per club and they must be four months apart.
- ARRL is back processing licenses, but it is going slow due to the $35.00 charge.
- There are 18 hamfests in our division between now and July 11th. Eleven of those are in Michigan.
- The ARRL will pay the $35.00 FCC application fee for new hams under 18 years of age.
- The Orlando Hamcation in Florida had 19,000 attendees.
- ARRL has asked that amateurs join the Mars exercise beginning on May 2nd.

Net Points – No report this month

QSL Report: Dale/K8RO

Only 5 QSL this month of which one rejected as it may not have been logged.

Membership and Tuned Circuit Report: John/N8FYL

One new member this month which brings us to 75 of which 5 are life members, 8 are first year free and 62 are paid members.

Tuned Circuit: by John/N8FYL

The May Tuned Circuit deadline is Monday May 23rd, 2022.

Old Business:

Ken/KD8RJN gave an overview of his meeting with Macomb County on siren testing. Marty/K8HVI will be coordinating at this time. We will begin monitoring the sirens starting this weekend which is the first Saturday in May.

Tuned Circuit US mail:

John/N8FYL presented the second reading of the planned changes to the bylaws related to the mailing of *The Turned Circuit*. John moved to amend the club By-Laws, section 3, Dues to delete the following text:

> "If a member wishes to receive a printed copy via US Mail, a fee of $10.00 per year to cover the charge for printing and mailing will be applied in addition to the member dues stated above."

Motion seconded by Dennis/N8MKG. The motion was passed.

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Macomb Community College Antenna:

John/N8NXW provided an overview on the removal of the radio tower and antenna at the college. All items have been removed and no further work is required at the college.

Coffee Break:

A break was taken from 7:45 to 8:00 PM by the members to purchase door prize tickets.

Dayton Youth Forum:

Dale/K8RO will be managing the club presence at the Dayton Youth Forum this year. Ken/KD8RJN made a motion to increase the amount for the Youth Forum support to a total of $500.00. Russ / N8HAR second the motion. It was voted on by the members and the motion passed.

Swap Meet:

Russ/N8HAR provided an update on the hall for the swap in December. He was able to get the hall rental reduced by $100.00 for this year. Russ will be placing a deposit to lock in the date and price.

Testing:

Gregg/N8GEO will set up a meeting with the volunteer examiners to review a video on testing improvements.

New Business:

Gregg/N8GEO provided an update on Field Day.

John/N8FYL displayed his certificates for the 2021 ARRL Sweepstakes contests in the Single Operator, Unlimited, Low Power class. In the CW event he was1st in Michigan and 4th in the Great Lakes Division and on Phone he was 1st in Michigan and won the division.

June Meeting:

The plans were made for the June meeting Fox Hunt and dinner afterwards.

Cards to Members:

No cards are needed to be sent this month.

Board Meeting

Dale/K8RO stated there will be a board meeting for the month of May. It will be held on Zoom on May 11th.

Club Evening Out:

Gregg/N8GEO has planned the May evening out for May 24th at Ike's Restaurant in Sterling Heights.

Close Meeting:

A motion was made to close the meeting and the meeting was closed at 8:35 PM.

Evening Program: The presentation for this meeting was canceled because the scheduled presenter was not able to make it to the meeting.

JUNE 1ST MEETING!!!

The June program will be a "Fox Hunt", which most of us know is an exercise in locating a hidden 2–meter transmitter. John/N8FYL and Matt/KD8LLT will be the "fox" this year. Following the hunt we will gather at Bentley's Roadhouse on S. River Road for results, rag-chewing, food and beverages.

Meeting time is 7:00 PM

Membership Report

If you participated in the May meeting you know we welcomed Andy/WX8NN as our newest member!

We now have 76 members: 71 regular members of whom 6 are "first year free" members, and five Life members.

John / N8FYL — 05/26/2022

Zoom Meeting Details

Dale McGorman is inviting you to a scheduled Zoom meeting.

Topic: LCARC Club Meeting

Time: Feb 2, 2022 07:00 PM Eastern Time (US and Canada)

Every month on the First Wed, until Dec 7, 2022, 11 occurrence(s)

~~Feb 2, 2022 07:00 PM~~
~~Mar 2, 2022 07:00 PM~~
~~Apr 6, 2022 07:00 PM~~
~~May 4, 2022 07:00 PM~~
Jun 1, 2022 07:00 PM
~~Jul 6, 2022 07:00 PM~~ NO club meeting
~~Aug 3, 2022 07:00 PM~~ NO club meeting
Sep 7, 2022 07:00 PM
Oct 5, 2022 07:00 PM
Nov 2, 2022 07:00 PM
Dec 7, 2022 07:00 PM

Please download and import the following iCalendar (.ics) files to your calendar system.

Monthly: https://us04web.zoom.us/meeting/upYufuCvqz0oG9d00ltr7tsbF0eoNqovelOh/ics?icsToken=98tyKu6qrTIjHdGTshiER7YQA4r4Xe3wmCFBjfpZzE_pFzIEdhD0EM1HPZxuH87V

Join Zoom Meeting

https://us04web.zoom.us/j/72399756213?pwd=f-U40lfrRV1S4NYAv3zI5mQthbj8N3.1

Meeting ID: 723 9975 6213

Passcode: RJP4Zx

The first link is to enable you to import them into your calendar if you are so inclined. The second one is the link for the actual meetings. With this link, you should be able to create a bookmark in your browser, and then you can use that each month, as this link will not change for the rest of the year.

Club Member Scores Well in ARRL Sweepstakes Events

As mentioned in the May meeting minutes, John/N8FYL had a good result with his 2021 ARRL Sweepstakes operations in his class. You can see his call listed in the SSB results in the June QST, pages 70-72. Also in those SSB results you will find the L'Anse Creuse ARC aggregated score.

End Fed Half Wave Antennas

Perhaps better called End Fed Multi-Band Antennas

By: Carl Davis, W8WZ with thanks to John Brier, KG4AKV for assistance with editing

March 2022

History

Some of the earliest antennas used in radio communications were "end fed" or voltage coupled antennas. This was because it was simple to attach the antenna directly to the transmitter's final RF output section and get on the air. You can see this usage of antennas in radio literature from the 1920's. This was before a lot was known about antenna design. These early antennas were not particularly efficient and would not work with today's transmitters which require a low standing wave ratio given by a nominal 50-ohm impedance. However, they are part of our radio heritage and show us that the idea of an end-fed antenna is not new. An end fed antenna design that came along later than those early end fed wires, but still relatively early in the history of radio, and is still in use today, is the "Zep", which is short for "Zeppelin" antenna. This antenna was originally designed during the days of the zeppelin airships and was designed to be trailed behind the airship as it flew and was end fed from the transmitter located on the airship. Like the other early end-fed antennas, the Zep had no feedline. The antenna itself connected to the radio. The Zep antenna consists of a half wave resonator fed against a quarter wave counterpoise which is parallel to the resonator. These antennas are still used on HF occasionally but are most often used these days on VHF and UHF in a vertical configuration known as the "J-Pole" and, unlike their airship ancestors, do accept a feedline for the sake of practicality. However, other than the J-Pole or Zep, end-fed antenna systems fell out of favor as radio technology evolved. During the 1930s to 1950s we learned that resonant antennas fed at voltage nulls (and therefore current maximums) were generally more efficient and our newer radio designs began to require effective RF coupling to preserve their final amplifier stages. Therefore, end-fed antennas that were voltage coupled fell out of favor around the 1950's. With those who still used them having to use impedance matching networks (aka antenna tuners) and often deal with issues such as "RF in the shack" and increased likelihood of RFI to household electronics. I am reminded of a fellow ham I knew when we were both in high school whose antenna was an end fed random wire. He kept a rubber kitchen dishwashing glove on the radio desk and put it on when he used the radio so that he didn't get an RF burn from his D-104 microphone. End-Fed antennas came to have a bad reputation due to these realities. All of this changed recently as technological advancements in metallurgy allowed the development of new transformers using toroid cores that allow us to effectively voltage feed an antenna with great efficiency.

Nomenclature

Sometimes it is confusing to talk about antennas because different people use the same term to mean different things. For the sake of clarity, I will address the terms I am using.

Coupling: One benefit of looking at the early radio station diagrams in my late grandfather's radio books from the 1920's, is that they show (rightly) that the antenna is an integral part of the radio station. Today we tend to think in terms of "radio" and "antenna" as separate things that merely get connected using some sort of feedline. I think it is better to keep the older, more holistic, view that the entire station from AC input into the power supply to RF output via the antenna into the ionosphere is one big system. It was easier to see this reality with older type transmitters. When we look at one of those transmitters we begin with the power supply, then move to the oscillator where an RF signal is created.

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Then that signal gets coupled into the next RF stage for amplification (or perhaps doubling), then the RF may get coupled to another stage for further amplification (or doubling), and the signal then goes into the final amplifier stage where the RF is at its maximum value and ready to go into the antenna system. Coupling between stages occurred by adjusting the values of inductance (L) and capacitance (C) in the circuit to achieve resonance. All of this being fundamentally based on the formula: Resonant Frequency equals 1 divided by 2 times pi times the square root of L times C. Therefore, we can couple RF from one stage to the next by making adjustments to L (inductance) and/or C (capacitance) in each stage of the circuit. As the RF generated in the oscillator was coupled to the next stage of the transmitter, we could see that this this coupling happened from one stage to the next by looking at the rig's ammeter and observing the dip in current as the energy moved from stage to stage. Finally, we used the same method of adjusting L and C values to couple the RF into the antenna system, and again observed a dip in current when the RF coupled from the transmitter into the antenna system (which consists of the antenna and, when used, the feedline). If the RF didn't couple into the antenna system, adjustments to the antenna system needed to be made to allow coupling by the L and C component values used in our matching networks. Radios today function in the same basic way. However, because now all we do is press a button on a radio and instantly have 100W coming out the back of the radio, it is easy to overlook this process of RF coupling from stage to stage and thereby think of the radio as one unit that simply "makes RF" and the antenna system as an entirely different unit. However, when designing an antenna system, it is helpful to think in terms of RF coupling from stage to stage in the radio station. The antenna is simply the final stage in the system into which RF must be effectively coupled. Today we need to effectively couple the RF from the back of our transceiver into an antenna system. The science behind how that RF is coupled is the same as it has always been. The old formulas remain the same. When the antenna is resonant on a given frequency we are able to effectively couple RF into it and this occurrence can be observed by measuring a low voltage standing wave ratio. This is why hams are always looking for a "low SWR". It is also very possible to couple RF into non-resonant antennas as well, but that is beyond the scope of this article. Too often hams use the terms "low SWR" and "resonance" to mean that RF is effectively coupled. While those can be indicators of effective RF coupling into the antenna system, none of these terms are truly synonyms and should not be interchanged.

Current Coupled vs. Voltage Coupled (also called Current Fed or Voltage Fed): Voltage and Current have an inverse relationship. That means when one is high the other is low and vice versa. In a half wave antenna, voltage is high at the ends and low in the center. Current is high in the center and low at the ends. Therefore, when this antenna is fed in the middle it is said to be current fed and when it is fed at the end it is said to be voltage fed.

Dipole: Historically this term has been used to mean a half wave antenna that is current fed (in the center) with one quarter wavelength on each side of the feed point. This is the "gold standard" antenna against which all other antennas are historically compared. Traditionally, this antenna is hung parallel to the earth with its feedline hanging perpendicular to the antenna. It can be hung in other configurations such as an "Inverted V" where the feedline is the highest point and both legs of the dipole taper down to the earth forming the shape of an inverted V. This changes the radiation pattern but has minimal effect on RF coupling. The antenna, when used in this configuration, is generally called an "Inverted V" not a simply a "dipole". Also, this antenna can also be hung with one leg higher than the other, but still in a flat top configuration. This is called a "sloper" and has a different radiation pattern, but generally couples RF into it like a normal dipole does. When we talk about an antenna's gain, unless otherwise specified, we mean, compared to a half wave center fed, dipole, hung parallel to the earth with the feedline hanging perpendicularly. Recently, however, the word dipole has been used to refer to any half wave antenna. I do not like this new use of term as it makes the term less effective by allowing it to

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mean more than one thing. Not every half wave antenna is a dipole. Therefore, I do not consider end-fed half wave antennas to be a dipole and will not refer to them as such, although others do.

Enter the End-Fed Half Wave Antenna

It is hard to couple RF into the end of a half wave antenna where the voltage is at its maximum. The impedance is very high. The exact impedance will fluctuate depending on many, variables including, feed point elevation, proximity to other objects, soil conductivity and more. It is generally understood to be in the range of 2,000 to 4,000 ohms in most cases. Since our modern transmitters are expecting an approximate impedance of 50 ohms, an impedance matching network is needed to transform the radio's 50 ohms to the antenna's 2K ohms or more. There are several different options to do this. The most common being the 49:1 transformer as 49 * 50 = 2,450. The transformer consists of 2 primary windings and 14 secondary windings. This gives us a ratio of 1 to 7. The voltage coming out of the transformer is therefore seven times higher than the source voltage and the current is seven times lower than the source current. This results in an impedance transformation of 7 * 7 which is 49. As noted above, 49 * 50 = 2,450. Therefore, our matching transformer increases the impedance of 50 ohms by a factor of 49 for a total of 2,450 ohms, thus allowing the RF from our radio to couple into our End-Fed (voltage coupled) antenna with great efficiency.

Thanks to modern ferrite core transformers, we can do this easily. The days of end fed antennas being hard to couple are over. It is worth pausing here to note that antenna and radio impedances do not need to be perfectly identical in order to match. They just have to be close enough. For instance, the gold standard dipole has an impedance of just above 70 ohms at its feed point when mounted at a textbook half wave elevation in free space. However, we couple it directly to a 50-ohm radio with no problem as that difference is very small, so they still are considered to be "impedance matched" and the RF couples without any issue, even though one is nominally 72 ohms, and the other is nominally 50 ohms.

The Magic of Related Harmonics

Since the amateur bands are harmonically related this End-Fed Half Wave antenna can actually be used on bands higher than its designed frequency. We call it an end-fed half wave but that name is only accurate when using it on its designed frequency. If you have a half wave on 80 meters, you have a full wave on 40 meters, two full waves on 20 meters, etc. This mathematical relationship allows this antenna to effectively couple RF on the antenna's designed frequency where it is a half wave long, and also the higher bands where there is a harmonic relationship. This is what makes this antenna very special. One wire, can be used on many bands with ease. RF couples well as the impedance remains high on those higher bands so the transformer works. It is important to know that while the antenna will couple RF on the different bands, it will have different radiation patterns on the different frequencies as lobes will form differently along the wire as the RF is at different wavelengths. It might be more accurate to call this antenna an "End-Fed Multi band Antenna" as it is only an "End-Fed Half Wave" when using it on its lowest designed frequency.

Here is a chart of the SWR on various frequencies as created by the myantennas.com company followed by a table showing my own SWR measurements of the antenna installed at my home.

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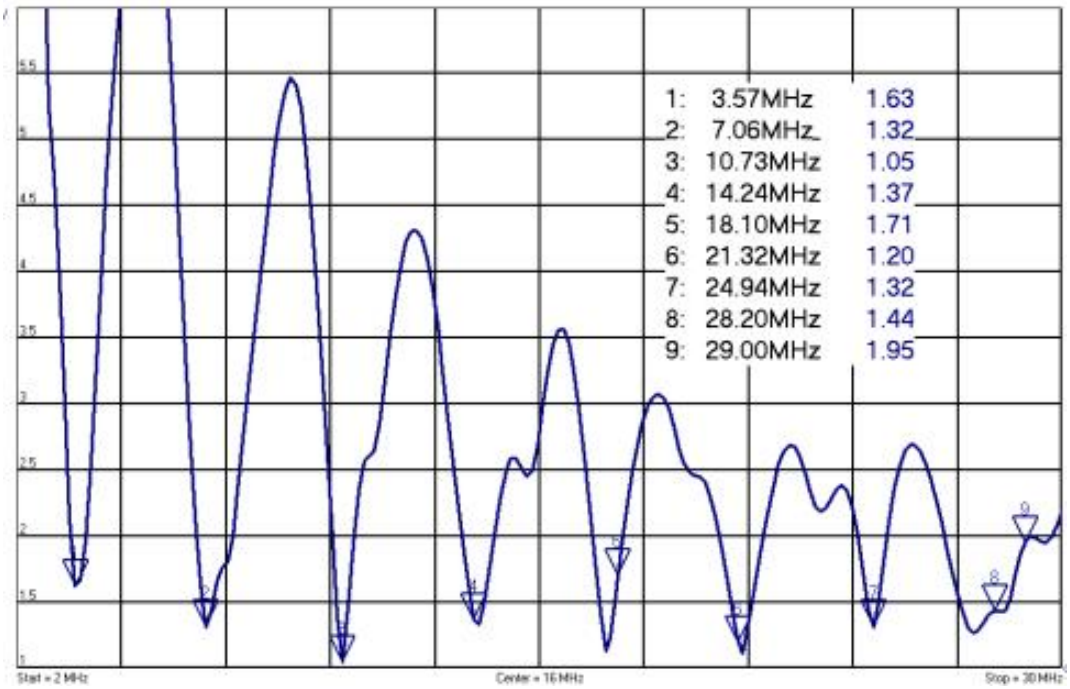

The data table below is as it is measured at W8WZ:		
Frequency (Mhz)	SWR from webpage	SWR Measured
3.57	1.63	1.2
7.06	1.32	1.8
10.73	1.05	Not a ham band
10.10	Not on webpage	3.1
14.24	1.37	1.0
18.10	1.71	1.7
21.32	1.20	1.5
24.94	1.32	1.2
28.20	1.44	1.5
29.00	1.95	3.5

As you can see my measurements closely align with the predicted results from the myantennas.com webpage. Obviously, each installation will have some slight variation.

The Devil is in the Details

As you might imagine, not all impedance matching transformers are created equally. There are several issues to consider when choosing a transformer. The first is power handling capability. Different types of ferrite materials have different power ratings. As you might expect, the ones that handle more

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power are more expensive. FT43 cores are lower cost but handle less power. FT52 cores are more expensive but handle more power. Multiple cores can be glued together with super glue, or tied together with zip ties to increase their power handling ability. Steve Ellington, N4LQ has excellent explanations on how to build these transformers on YouTube and on his "End Fed Antennas" Facebook Group. I followed his instructions using three type 52 cores for maximum power handling abilities. The kit available from the ARRL uses only one torrid and I do not know if it uses a 43 or 52 mix. I would be cautious when using it with more than 100 Watts SSB. But since many hams are SSB only users and run only 100 Watts, that transformer should meet their needs well at a relatively low price point, and is therefore a good product to have in the marketplace. But contesters who run 10 hours of CW might find it lacking.

I have observed that the transformers purchased from myantennas.com seem to be less impacted by different installation details and are more broad banded in that they provide wider portions of the band where the RF will couple than the ones I have made. Both work extremely well, however after many different experiments, the transformer from myantennas.com always seems to be less impacted in its ability to effectively couple RF into the wire by things such as the height of the matching transformer above ground, or by the height or pattern of the radiating wire. Also the window of usable bandwidth tends to be bigger. I believe this may be because myantennas.com uses larger sized toroid cores. Their toroid cores are 2.9 inches in diameter as opposed to the 2.4 inch diameter toroid cores used in my home made units. Other than that, they appear almost identical, so that is the only explanation I have for their slightly different performance. My advice to people looking for this type of antenna is, if you just want an antenna that works and don't mind paying for it, buy the antenna from myantennas.com. However, if you enjoy building, like experimenting and tinkering, then by all means build away, as this is a very fun unit to build and use.

Power Handling

One question that almost always arises when talking about antennas is "How much power can it handle?" This is a hard question to answer because we don't have a single, universally used definition of power rating. We really can't have such a definition because different modes and different duty cycles impact the answer dramatically. Traditionally, radio parts are rated either using "ICAS" or "CCS" labels. Myantennas.com, like many other manufacturers, uses the ICAS rating on their product's power rating. ICAS stands for "Intermittent Commercial and Amateur Service." Two-way radios in a taxi cab would be an example of an intermittent commercial service. We are, of course, familiar with the Amateur Service. Radio parts for these applications get labeled using an ICAS rating. The idea is that in these services the radios do not transmit nonstop as they do in a broadcast transmitter that transmits 24 hours a day, 7 days a week, thus the phrase intermittent is in the title. The Broadcast service would be rated CCS or "Continuous Commercial Service". ICAS assumes that no single transmission will ever be longer than 5 minutes and that every transmission will be followed by a period of no transmission of an equal or longer length than the transmission was. For instance, it assumes that we will transmit for 3 minutes then not transmit for at least 3 minutes. However long we transmit, we will immediately rest for the same or greater length, and we will never transmit for more than 5 minutes at any time. For many amateurs, these assumptions will be accurate. However, for many of us they will not be. Many hams transmit much longer than 5 minutes at a time. Many, especially contesters, certainly do not wait long at all between their transmissions. Therefore, many amateurs will find that the ICAS definition doesn't really

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apply to their station even though they are in the Amateur Service. This has resulted in some folks jokingly saying that the ICAS rating stands for "I Can Assume Something". To show you just how inadequate the ICAS rating can be for some hams, consider that my antenna has a 2 KW ICAS rating, yet it started to overheat and lose performance in a contest when I was only using 500 watts! This happened because my duty cycle was almost 100% for those five hours. I only paused long enough to hear the other station's call sign, and then immediately transmitted to respond, and then on to the next. Luckily, the antenna was not permanently damaged because I switched to another antenna for an hour to let it cool off, and then it worked fine for hours more. An old rule of thumb was to consider that a CCS rating would be 25% of an ICAS rating. So if you had a rating of 100W ICAS you could say that same part had a rating of 25W CCS. Also, different modes have different duty cycles. SSB will be much less stressing than CW or a carrier mode of operation. Therefore, things can have a higher power rating for SSB than they do for true AM, or CW or digital modes. This is one of the great advantages to the efficiency of SSB and one reason it became so popular. All this is to say, that before the question "How much power can it take?" is answered, other variables must be known such as mode type and duty cycle.

Antenna Performance

Being able to effectively couple RF into an antenna system is only part of what makes the antenna system effective. A dummy load accepts RF readily. To be a good antenna, the antenna must also radiate well. How the End Fed Half Wave or End Fed Multiband Antenna performs will depend greatly on how it is installed. This antenna is versatile in that it may be installed in many different configurations. Obviously, different performance will be had with different installation configurations. It is important to remember that when people make claims such as "this antenna can be used in a horizontal configuration close to the ground" that they are talking about the antenna's ability to couple RF into itself from the feedline, not the antenna's ability to radiate well. Any low horizontally polarized antenna will have a high angle of radiation regardless of if it is a monoband or multiband antenna and regardless of how it is fed.

I chose to install mine as an inverted L. The reasons I choose this installation technique are several. First, one of the greatest benefits of an end-fed antenna is that the feed point can be closer to the radio, reducing the amount of feedline required. Unlike a dipole, this antenna does not require coax to hang high in the air, which can be an ugly logistical challenge. By installing the antenna as an Inverted L the feed point can be near the ground and easy to work with. I mount mine about 4 feet above the ground on a wooden fence post. This makes it easy to ground. If the feed point is high in the air, grounding becomes a challenge, not so when it is only 4 feet above the earth. When feeding it near the ground vertical polarization is ideal because if the antenna is horizontally polarized at less than a half wavelength above ground the radiation pattern will be poor and ground losses high (as is the case for any horizontally polarized antenna). I am not interested in Near Vertical Incidence Sky wave (NVIS) propagation. However, I do like to have some of my signal horizontally polarized because when I work groundwave nets on 80 meters for the NTS and for our local QCWA and club lets, many of the other stations I'm working are using horizontally polarized antennas. By going vertical for 80 feet, then folding the wire over an oak tree branch and going horizontal for the remaining 54 feet I accomplish the goal of having some of my signal radiate from a horizontal antenna, and that horizontal section is 80 feet above ground which is an adequate height to give good performance for a horizontal antenna. An end fed

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multi band antenna like this fed as an inverted L does not have the same radiation pattern as the old fashioned ¼ wave inverted L that we are all familiar with. A typical, old fashioned ¼ wave inverted L is a ¼ wave antenna that is partly vertical and partly horizontal, fed against ground (and ideally ground radials). It has (mostly) vertical polarization with the horizontal portion mostly serving as a capacity hat, slightly reducing the length of wire needed. It is usually used when there is not enough vertical support to bring the entire ¼ wave straight up. This antenna, an 80-meter end fed half wave as an inverted L is actually a ¼ wave traditional inverted L on 160 meters. I use it with great effect that way by simply disconnecting the coax from the matching transformer and connecting the center pin of the coax directly to the radiator wire by using an S0-239 connector soldered to some jumper wire with an alligator clip on the end of it. I then use a large alligator clip to connect the shield side of the feedline's PL-259 connector to my ground cable. However, when the antenna is used with the matching transformer on bands 80 and higher, it performs differently. Many different lobes form along the antenna, some will be vertically polarized, and some will be horizontally polarized. The number and shape of the lobes will be different on each band. I have found that I get good overall omnidirectional performance from this antenna and have slightly stronger signals and more contacts to the northeast and southwest. The favoritism shown towards those directions, I believe comes from the fact that the horizontal section of my antenna is broadside to those directions. Most of my activity consists of contesting and rag chewing, with a few nets thrown in. This antenna works very well for all of those as it works well on 160 to 10 meters, is automatically band switching on bands 80 and higher.

At the base of my antenna, I drove an 8-foot copper clad steel ground rod. I then connected the ground lug on my matching transformer to that ground rod using #4 solid copper wire. I then buried 100 feet of solid #4 copper wire connecting that ground rod to my house's ground rod where the rest of my station is grounded. Thus, comply with electric code to bond all grounds, and giving me one buried radial, which is helpful when I use the antenna as a traditional inverted L on 160 meters. In the same trench as the ground wire, I buried my coax. I am feeding it with DX engineering's version of LMR 400. After being buried for 100 feet the coax comes out of the ground next to my house where it enters a waterproof panel box on the side of my house. There it connects to a polyphaser lightning arrester which is grounded to the house ground rod system at that point. The coax then goes to an A/B switch. In the A position a section of coax leads to my back porch where I will occasionally sit with a radio and make contacts in nice weather. The B position connects to another 50 feet of coax which goes up stairs into my radio room where it connects to another switch that allows me to connect any of several different transceivers into it.

The End Fed Half Wave Multi Band Antenna can be installed in several different configurations, and while different installation methods may have only minimal effect on the ability to couple RF into the antenna, they will have significant impact on the antenna's radiation pattern. Additionally, it is always important to remember that this antenna will have a different radiation pattern on each band because it is a different wavelength long on each band. For instance, it is a half wave antenna on 80 meters, but is a full wave antenna on 40 meters and is two full waves on 20 meters, etc. That means, for instance, not only will the antenna have a different number of radiation lobes depending on how many wave lengths (or portions of wavelengths) long it is on any given band, but also if the antenna was mounted horizontally at 66 feet, it would be ¼ wave length high when it is used on 80, but would ½ wave length high when used on 40, and a full wavelength high when used on 20, etc. This reality impacts the radiation pattern on the different bands. This is part of the compromise found when using one antenna to work on multiple bands. It may work better on some bands than others, and it may work well on all

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bands, but it will not work identically on all bands.

One way to test an antenna's radiation performance is to make many contacts and do an A/B test comparing the antenna under review with a different antenna to see how they compare. Thanks to the Reverse Beacon Network (RBN) this is very easy to do. I simply called CQ via CW using antenna A, looked at how RBN recorded my signal strength, then quickly switched to antenna B and did the same thing. I put it on an A/B coax switch and compared it against an inverted Vee at 70 feet. It compared very favorably. Sometimes the End Fed was better and sometimes the Inverted Vee was better. There was no clear winner. The Inverted Vee often gave me higher signal strengths but a less desirable signal to noise ratio than the End Fed gave. Other times one was clearly better. Next, I decided to call CQ on 40 CW on both antennas and see what numbers the Reverse Beacon Network system gave me. Here are the results of that initial test. As you can see, they matched my observation that there was no clear winner.

RBN Station	EFHW	INV VEE
W1NT/6	14	37
WE9V	24	20
K9TM-4	8	0
KQ8M	19	20
K2DB	13	0

Saying that the End Fed antenna is at least equal to the inverted Vee in terms of radiation was great news because Inverted Vee a is a very solid performer. The End Fed antenna has advantages beyond its actual performance too, namely; ease of use. The Inverted Vee fed with ladder line requires me to adjust the tuner and sometimes the amplifier load control whenever I change frequencies. While this is not a hardship for most operations, it does slow me down in contests and cannot be operated via remote control. I estimate that it costs me 1 to 2 QSOs every time I need to change bands based on my average QSO rate. The End Fed antenna can be much easier to install than a dipole (even a dipole hung as an Inverted Vee). Additionally, the ability to use coax as a feedline on the multi band antenna allows the installer to run the feedline in ways that ladder line cannot be installed (such as being buried or next to other wires) and it allows the use of a polyphaser for lightning protection with great ease.

I have found that this antenna accepts RF well on many different bands and radiates well on all of them. It can be fed with coax directly from my transceiver. It is, therefore, the best single wire, multi band antenna I have found so far.

June 25 and 26. Participate with the club at Addison Oaks County Park (32 Mile or Romeo Road west of Rochester Road) or from your home station, or both! Set up will begin on Friday afternoon. Be sure to identify our club in you log submittal to contribute to the club aggregate score. Find the rules and other information at https://www.arrl.org/field-day. To see the exact location in the park on Google maps, see the entry on the ARRL Field Day Locator. Search for N8LC and zoom (enlarge) the map in satellite view and you can see exactly where the N8LC action will be! .

Flex 3000 SDR Transceiver For Sale!

90% of the sale price of this radio goes to LCARC Treasury sub account for Youth Activities.

FLEX Radio Model 3000 SDR Transceiver (covers 160M - 6M, most any mode). 100 watts output.

FLEX hand microphone and several interconnect cables (some are Firewire) for one's computer and a multiport Firewire PCI plug-in card

FLEX power cable

Radio Shack 25/30A switching power supply included.

Manual on CD-ROM (and available at https://www.flexradio.com/documentation/?_categories_dropdown=flex-3000)

Asking $450 but offers are not out of the question. The buyer can make out two checks or deal direct with the L'Anse Creuse treasurer, etc. Very 'FLEXible' on this.

73, Ralph / W8ROI 586-913-5811 and w8roi@wowway.com

Future Programs & Activities

Dennis/WC8C — Activities Manager

June 1 , 2022	Regular Meeting and Fox Hunt!
June 20, 2022	Volunteer Examiner (VE) session at Tucker Senior Center
June 25-26, 2022	ARRL Field Day — LCARC will be at Addison Oaks County Park, as usual
September 7, 2022	First regular meeting after the summer break.
September 19, 2022	Volunteer Examiner (VE) session at Tucker Senior Center
October 5, 2022	Regular Meeting—Next year's dues are payable now!
November 2, 2022	Regular Meeting
Nov 5-6, 2022	ARRL Sweepstakes Contest, CW
Nov 19-20, 2022	ARRL Sweepstakes Contest, SSB
December 4, 2022	L'Anse Creuse Swap!
December 7, 2022	Regular Meeting

L'Anse Creuse ARC Board Members – 2022

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N8LC

Analog FM

LC Echo 2 Meter Repeater
Yaesu DR-1X 147.080 MHz
100 HZ PL

Fusion Digital Only

LC Echo 70 cm Repeater
Yaesu DR-1X 442.925 MHz
100 HZ PL

Board Meeting Time and Location

Board Meetings are held on the Wednesday after the regular membership meeting at a time determined by the President. Board meetings will be held via Zoom video conferencing. Click here for the Zoom details. All club members are welcome to attend. Should a board meeting have a planned cancellation, this cancellation will be announced in the newsletter.

Club Founder - Art Ellis W8PBO SK

Club Committee Chairmen

ARRL HF Awards Manager		
ARRL HF Awards Assistant		
ARRL VHF/UHF Awards Manager		
Call Sign ID Tags	Gregg Crump	N8GEO
Christmas Party	Mark Castiglione	N8REZ
Club Apparel & Patches	Scott Hernalsteen	W8CQD
Club Call Trustee - N8LC	Marty Folz	K8HVI
Code Proficiency Awards	Vince Cuker	WA8BIJ
Dayton Trip	Gregg Crump	N8GEO
Door Prizes—Buyer	Doug Chauvin	N8PYN
Door Prizes—Tickets	TBD	
Echo Repeater Trustee	Marty Folz	K8HVI
Field Day	Gregg Crump	N8GEO
Health & Welfare		
Licensing Classes	TBD	
Little Bay Awards	Dale McGorman	K8RO
Meeting Refreshments	Russ Price John Slobodnik	N8HAR N8NXW
Membership Chairman TC email distribution	John Huber	N8FYL
Net Points Manager	Tom Mathison	WU8C
Net Points Upgrade Awards	Clem Duval	W8VO
TC Postal Distribution	John Huber	N8FYL
Outgoing QSL Manager	Dale McGorman	K8RO
QSL Cards	Dale McGorman	K8RO
Swap Chairman	Russ Price	N8HAR
Tuned Circuit Editor	John Huber	N8FYL
Volunteer Exams	Gregg Crump	N8GEO
Webpage (n8lc.org)	Doug Chauvin	N8PYN
Webpage Assistant	Marty Folz	K8HVI
Youth Forum (50/50) [Alternate]	Ralph Irish John Slobodnik	W8ROI N8NXW

The Tuned Circuit

This publication of the L'Anse Creuse Amateur Radio Club is issued for the months of September through June of each year. We welcome any comments, concerns, corrections, congratulations, or complaints. Please submit such communications to the Editor:

John H. Huber N8FYL
Email: n8fyl@arrl.net or editor@n8lc.org
Phone: (248) 740-2693

Submissions will be accepted in any of the standard PC formats. Microsoft Office, Open Office, plain text, rich text, PDFs, and any type of image format. Unfortunately audio files and movies cannot be accepted, as they cannot be reproduced on paper, but links can be reproduced to these types of media if you'd like to provide a link.

VE Testing Locations

LCARC has scheduled 2022 VE sessions at the Tucker Senior Center on June 20, and September 19. Doors open at 6 PM, and testing begins at 6:30 PM. Contact Gregg Crump n8geo.ham@gmail.com

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The current COVID-19 pandemic situation has disrupted many of the regular VE testing sessions. There ARE some testing opportunities available in our area according to the ARRL web site.

Go to http://www.arrl.org/find-an-amateur-radio-license-exam-session. Enter your Zip Code and the "within" distance, and click SEARCH. When I did it with Zip 48045 (the zip code for the Tucker Senior Center), and a "within 50 miles", it reported a number of sessions spanning the time until a year from now.

Online Practice Exams:

https://www.eham.net/exams

https://www.qrz.com/hamtest/

http://www.hameducation.org/

Morse Code Resources:

Learn CW Online https://lcwo.net/

http://www.g4fon.net

http://www.pdarrl.org/k6rau/

http://www.ac6v.com/morseaids.htm

http://morsecodemasters.com/trainer/Examples/hct.html

Upcoming Swaps

06/05/2022 | Chelsea Amateur Radio Swapmeet

Location: Chelsea, MI
Type: ARRL Hamfest AND Vintage Electronics Expo
Sponsor: Chelsea Amateur Radio Club
Website: http://wd8iel.com Learn More

06/18/2022 - GMARC Trunk Swap

Location: Shelby Township, MI
Type: ARRL Hamfest
Sponsor: GM Amateur Radio Club
Website: http://www.gmarc.org Learn More

06/18/2022 - Midland Amateur Radio Club Hamfest

Location: Midland, MI
Type: ARRL Hamfest
Sponsor: Midland Amateur Radio Club
Website: http://www.w8kea.org Learn More

06/19/2022 | Monroe Hamfest

Location: Monroe, MI
Type: ARRL Hamfest
Sponsor: Monroe County radio Comm Assoc
Website: http://mcrca.org/ Learn More

07/10/2022 - Flying Beers International Hamfest

Location: Ferndale, MI
Type: ARRL Hamfest
Sponsor: K8FBI Radio Club
Website: http://flyingbeers.org Learn More

07/16/2022 - GMARC Trunk Swap

Location: Shelby Township, MI
Type: ARRL Hamfest
Sponsor: GM Amateur Radio Club
Website: http://www.gmarc.org Learn More

08/20/2022 - GMARC Trunk Swap

Location: Shelby Township, MI
Type: ARRL Hamfest
Sponsor: GM Amateur Radio Club
Website: http://www.gmarc.org Learn More

09/10/2022 - Central Michigan Amateur Radio Club Hamfest

Location: Okemos, MI
Type: ARRL Hamfest
Sponsor: Central Michigan Amateur Radio Club Learn More

L'Anse Creuse Amateur Radio Club Nets

Day	Local Time	Band	Mode	Frequency	Net Control	Calendar
Monday	~~2000~~	~~15 M~~	~~CW~~	~~21.165 MHz~~	QRT due to lack of participation	
Monday	2030	15 M	USB	21.395 MHz	Clem, W8VO	Every Monday
Monday	2100	6 M	USB	50.160 MHz	Gregg, N8GEO	Every Monday
Tuesday	2000	~~2 M~~ Internet	~~Packet~~ telnet	~~144.93 MHz~~ ve2har.dyndns.org	RF Net is QRT Ralph, W8ROI	Every Tuesday (Connect to detqso)
Tuesday	2100	2 M	FM	147.08+ MHz	Sterling Heights CERT	2nd Tuesday of the month
				A LCARC sanctioned net run by the Sterling Heights CERT		
Thursday	1930	10 M	USB	28.435 MHz	Clem, W8VO	Every Thursday
Thursday	2030	2 M	FM	147.08+ MHz	Clem, W8VO Russ, N8HAR Gregg, N8GEO Mike, AC8ER Fritz, KE8BFW	1st Thursday 2nd Thursday 3rd Thursday 4th Thursday 5th Thursday

Membership Request

Date: ____/____/_____

Request For:

___ $20.00 LCARC Individual Membership
Are you a New Member? (Y / N)

___ $30.00 LCARC Family Membership

___ $2.00 LCARC Student Membership (Under 18 years of age)

___ Please update my membership information because it has changed.

I am an ARRL Member: (Y / N / Life)

L'Anse Creuse Amateur Radio Club
Gregg Crump, N8GEO
29729 South River Rd
Harrison Twp MI 48045-3030

Only membership applications to go this address.. Make sure you use the full 9 digit zip code when mailing in your application.

Treasurers Box
Date Paid: _____
Amount: _____
Initials: _____

Note: LCARC dues are from **Nov 1st** to **Oct 31st**

Class License (Circle One)
Novice Technician Tech+
General Advanced Extra

Call sign:_____ Old Call Sign:_____Street:_____

Name:_____ City:_____ State:_____

Nickname:_____ Zip: _____-_____

Spouse:_____ 6 Character Grid Square (optional):_____

Phone: (_____) _____ - _____ Email Address:_____

(Please indicate your name above even if it hasn't changed, so we know who's giving us money and can mark that you've paid in our records.)

The Tuned Circuit
Monthly Bulletin of the
L'Anse Creuse Amateur Radio Club
29729 South River Rd
Harrison Twp, MI 48045-3030

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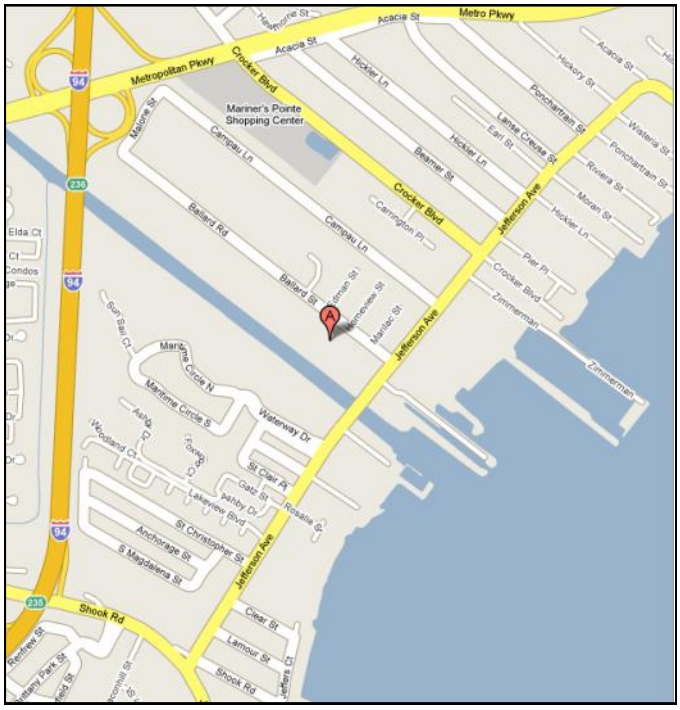

The L'Anse Creuse Amateur Radio Club meets at 7:00 pm the first Wednesday of each month, except during July and August. Meetings are held at Tucker Senior Center located at 26980 Ballard St, Harrison Township, MI 48045 unless indicated otherwise in the most current issue of the Tuned Circuit. Call-in on the Echo Repeater (N8LC) on 147.08 MHz (+ 600 KHz, 100 Hz PL tone) for any meeting information, or to ask a member for the location of the meeting.