

# The Hertzian Herald



Hello again,

It's been a busy time since our last club meeting. Summer in our area is loaded with most of the outdoor activities for the entire year with graduations, weddings, family get-togethers, and that list doesn't even include all of the Amateur Radio outings.

It's also a good time to inspect and repair the damage the weather does to our equipment. I found some corrosion in a coax connector that looked like mineral salts, then I replaced it. I was wondering why my SWR was drifting a bit and my receive signal was attenuated a bit



I have been moving my shack from the basement to a spare room. I have several radios to set up along with all the add-ons. It's unbelievable the effort required to make that one change, (at least for me). I'm two weeks into it and I am glad that the end is near. It's a good thing I know my way around wiring!

At our next meeting July 20, we will find out the Hamfest numbers for our efforts. I can say that it WAS a success! We had no large problems to deal with and the small ones were handled well. I don't think our attendance was as high as last year, but people seemed to be happy and buying too. I think swap shop prices were lower this year too. Great weather was with us both days.

Field Day was also a success this year with no major mis-haps to report. We couldn't ask for better weather. I hope you had a chance to join us for the pot-luck dinner and fellowship. We could have used twice as many operators as we had. And at times the radios were not in use. As a club, I think we could do better. Lets hope our numbers are ok. We'll find out at the meeting!

I do want to thank all of the club members who contributed to our two June activities. Without you, we couldn't do it. I don't know how many man-hours it took to do Hamfest and Field day but I know that some of the senior members did many hours of preparations, pack-up and put-away that no one else sees.

Dealing with the vendors at hamfest comes after a lot of emails and paperwork. I hope for these members it is a labor of love. We will need that love again.

Hope to see you Thursday and 73  
Keith  
KJ8H

<http://mcrc.org/>  
-----  
[www.facebook.com/groups/1643856795878368/](http://www.facebook.com/groups/1643856795878368/)

### Club Officers

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**MCRCA Meeting Minutes for June 15, 2023**

Meeting called to order at 7:30 pm, by Keith KJ8H.  
 Pledge of Allegiance  
 Introductions: 3 new members, no upgrade or guests.

MINUTES: Motion by Paul W8PI, supported by Don N8BZN, to approve as written in the Herald. Approved.

TREASURER REPORT: Motion by Don N8BZN, supported by Dale WA8EFK, to approve the treasurer's report as passed out to the membership. Approved.

DX REPORT: Paul W8PI, there is a little DX out there. Ducie Isl. VP6A will be on the air from June 11-24, 2023. In 2018, on Baker Island in scorching heat, exhausted operators spent a day dismantling 11 tents, 12 antennas, 5 generators, radios, computers, Ethernet stretching hundreds of feet, desks, CHAIRS, trash and hauled it all back to the boat. On the voyage back to Fiji we wondered if there wasn't a better WAY. With funding from the Northern California DX Foundation George Wallner, AA7JV, put together a team to create that new way. Welcome to the RIB (Radio in a Box). VP6A was the first full deployment of the RIB on a rare location. Our Facebook group just exceeded 1,000 members. Check it out for interesting photos and stories.

CONTESTING: Paul W8PI, WV QSO Party June 17<sup>th</sup>. ARRL Field Day June 24 & 25<sup>th</sup>. VOTA all year long.

TESTING: Paul - Next session - Sat. June 17, 2023. **Appointments Preferred - FRN and email req'd**

CLASSES: Sat. August 12, 2023 contact Don N8BZN, all 7 passed at the last class.

HAMFEST: Be there or be square.

FOX HUNT: Mike N8KUF, next fox hunt is July 8<sup>th</sup> and we meet at the EMD parking lot at 8:30 am. The last hunt will be Sept. 9<sup>th</sup>.

Field Day: Vienna Park in Temperance, MI. June 24 & 25<sup>th</sup>. Set up begins at 9 am Saturday and radios start at 2 pm. There will be a GOTA station with no limit contacts. Potluck will begin at 6 pm and hopefully the scholarship winner will be there.

ARPSC: Ed WS8Y, the Erie Run had a very good turnout and the help was appreciated. S.E.T. – ARPSK scored 5<sup>th</sup> in the nation. This year we worked with a served agency.

ARRL: Sale WA8EFK, ARRL's yearlong operating event, Volunteers On the Air, or VOTA, began January 1, 2023. The event is organized as part of ARRL's 2023 theme, "Year of the Volunteers," which recognizes the contributions of ARRL member volunteers, and offers opportunities to become more active and involved in amateur radio and ARRL.

The new law preventing cell phone use in cars will exempt Ham Radio operation.

RRRA: Mike N8KUF, Big News! There is a new repeater in Dundee one that is digital capable DMR. Everything else is working fine.

OLD BUSINESS: Scholarship – Seth Hendrick will be at Field Day about 6 pm.

NEW BUSINESS: None

DOOR PRIZE DRAWING: Wes KC8SKP

50/50: Dan KC1BUD,

ANNOUNCEMENTS: None

PROGRAM: Mike N8KUF, provided an old video from Bell Labs about transistors.

ADJOURNED: 8:34 pm

ATTENDANCE: 23

**Committees****Club Station**

Wes Busdiecker KC8SKP

**DX Net**

Soon

**Field Day**

Jeff Breitner KA8NCR

**Finance**

Paul Trouten W8PI (chair)

Fred VanDaele K8EBI

Dale Williams WA8EFK

**HamFest**

Fred VanDaele K8EBI

**Hertzian Herald**

Fred VanDaele K8EBI

**Historian**

Paul Trouten W8PI

**Public Relations**

Terry Kolton N8NYP

Tom Imlach KE8KNZ

**Scholarship**

Fred VanDaele K8EBI

**Program Chairman**

**WANTED**

**Membership**

Terry Kolton N8NYP

n8nyp@arrl.net

**Property Custodian**

Paul Trouten W8PI

## ARPSC Report

On Saturday July 22<sup>nd</sup>, ARPSC will be having our Set-up in the park day at Nike Park in Newport from 9-11am. ARPSC members will be setting up their portable field stations to practice this skill, and to allow everyone to view other operators' stations to get ideas on how to tweak theirs. This will be open to any operator, bring your field station or just stop by and get some ideas!

### IMPORTANT DATE CHANGE:

The 2023 Fall Simulated Emergency Test will be Saturday SEPTEMBER 30<sup>th</sup>. We will be directly participating with Monroe County EMD, Southeast Michigan Incident Management Team along with several Fire Departments. We will need lots of folks to help on this, both in the field and relays from home stations. More info to come-Keep your eyes open!! This will be an excellent training and an opportunity to work with our Served Agencies and to show off our skills and abilities!

Speaking of S.E.T, the scores were posted in the July QST and for the 2022 SET Monroe County placed.....

**5th in the NATION for the ARES portion with 678pts!**

and.....

**10th in the Nation for the NTS portion with 231pts...!**

Additionally, Michigan Section took 2nd place Nationwide with 3,697 pts, beating that state down south by 1007pts (2,690) in ARES section (Michigan had only 3 counties and the state turn in points in 2021, this year there were 21 counties reporting due to better effort by state leadership to have counties report their results)

in '21 we (Monroe) placed...  
6th with 560 for ARES  
Tied for 8th place with 143 in NTS

Awesome Job all...we just slowly and steadily keep creeping up toward that top spot....  
The S.E.T is a test of all Amateur Radio Operators Emergency skills, just like Field Day. You do not have to be an ARPSC member to participate in the S.E.T and can participate with just a few minutes right from your home QTH. I do, however, encourage everyone to come out and participate and join in the fun. We will be looking for folks to set up (or help) at simulated shelters, command points, etc. Don't have a go kit put together, well first off why not?...but if you don't have field capabilities, we can always use folks to team up at locations and help log traffic, etc. Stay tuned for more info as we get closer to the 30<sup>th</sup> of September. If you are interested in being involved helping a top National team go for the top spot, please reach out to me or any of the ARPSC leadership.

If you are interested in honing your skills or building new ones, please feel free to stop in to any of our meetings or training sessions, or participate on our nets. We are here to help every operator learn and perform better. It doesn't matter if your call sign was just posted on the FCC database or you have had your ticket for decades, we are always looking for additional operators.

ARPSC meetings are the first Thursday of every month at 7:30pm at the EMD on Raisinville Rd. Next meeting is Thursday August 3<sup>rd</sup>

*NOTE: There WILL be an August meeting at the EMD even though it is fair week.*

As always Thanks to the club and the club webmaster for linking our FB and webpage, and to Fred for his time getting this newsletter out.

73  
Lance Charter  
Emergency Coordinator  
Monroe County Amateur Radio Public Service Corps

## Why is GPS free?

I'm a GPS engineer. I'll answer this in a sort of roundabout way by explaining the history of GPS and how it works - then get into why it's used for civil application and why you don't have to pay for it.

GPS was originally a US AirForce program called Navstar. Navstar started in 1973. It was a spiritual follower of other navigation-based programs such as Loran (a 2D positioning system for ships on water), and Decca (a hyperbolic radio navigator based on calculating one's position based on the intersection time of radio signals). These hyperbolic navigation systems were originally started in WW2 to assist bomber runs.

The idea of a space-based version of a navigation system is said to have started with the Soviet launch of Sputnik-1. A group of DoD funded engineers at APL were tasked with figuring out where Sputnik-1 was, and because Sputnik-1 transmitted a continuous waveform, it experienced a measurable doppler shift (if it traveled towards you, it sounded higher pitched - when it passed overhead and continued on, it had a lower pitch). In this way, a group of scientists at APL were able to figure out where Sputnik-1 was! [1]

The US DoD then began to investigate new methods for navigating off of radio signals from space *specifically*, eventually leading to Navstar. Navstar as a program was born near the end of Vietnam. During Vietnam, if the US wanted to destroy a bridge, they had to fly sorties over that bridge and drop bombs in the hope that one of those bombs would hit. They had a very high miss rate, caused immense collateral damage, and costed a lot of money because the accuracy of bomb drops was so low (I won't pull a reference for this, but the Thanh Hóa bridge is a great example of this problem). Thus, the Navstar program which would become GPS was implemented to try to resolve the massive challenges associated with target accuracy and navigation.

The Navstar program spent 25 years getting from program inception to final delivery of a full GPS constellation (you need around 30 to navigate, because they're medium-earth orbit globally orbiting satellites, and you need four overhead at any given time to work - it took them a while to get all of those up!) GPS works by resolving the GPS pseudorange equation through trilateration. That is, the satellites transmit two things (broadly): 1) their own precise position, monitored by a group of surveilled ground control monitoring stations around the world, and 2) the precise atomic reference time at which their signals are transmitted using on-board clocks occasionally updated/corrected from the ground. A receiver on the ground has a bad clock and doesn't know where it is, so it resolves a nonlinear equation with four unknowns (it's position in 3 dimensions and its clock error) from the GPS satellites. It's hard to explain without getting into the math, but just know that in this way, all GPS receivers receive very precise timing, as well as their position, by calculating the intersection of four spheres (a great depiction of this is here: <https://ciechanow.ski/gps/>).

During the Navstar program, there was a big push for GPS to be provided as a civil service. For starters, it gave near-atomic clock quality time for next to nothing in cost (you get the benefit of the GPS satellite clocks on your handheld receiver), as well as instantaneous position globally. The timing in particular was a really big deal to the US here - the power grid requires precise timing, the stock market does, etc. The GPS program made all of those things cheaper, better, and easier. So the DoD was always considering *some version* of a civil service for GPS. And then in September, 1983, Korean Airlines Flight 007 accidentally flew through restricted soviet airspace and was shot down, killing 269 people. This was the final incentive that the US needed to publicly provide a GPS civil service.

Another reason that the civil service was allowed was technological. The GPS satellites, which were AirForce assets, transmit a signal called P(Y)-code, which is a military GPS signal with an encrypted code (only military receivers can use it). At the inception of GPS, it could not be directly acquired (doing so required that you knew pretty well where you are), so the Navstar team developed something called "Coarse Acquisition", which was *another, worse signal* that could be navigated off of in order to get 'good enough navigation' to get to P(Y)-code. This signal was already being transmitted for military use, and by providing it for civil use, civilian users got a worse version of GPS through C/A. In other words, providing civil use didn't negatively interfere with military use, made stock market and power grid work cheaper (and many other things like public infrastructure development, surveying, etc.).

When they first provided 'free to all' GPS, the AirForce created Selective Availability - a scrambling code on the C/A signal that made it worse than it normally would be (by about 10x). This made C/A GPS 'good enough to navigate off of' but not good enough for military application, as the US was worried about adversaries using it.

In 2000, the US formally turned off Selective Availability, allowing civil use ([/u/abbot x](#) gives a great answer as to why in the comments below). Today, the GPS program is one of the only military programs where civil services (the Department of Transportation, I believe) sits on the stakeholder committee for the branch that runs it out of AFRL, and they use it for everything. And a lot of other countries have navigation satellite constellations too now (the EU, Russia, China, Japan, and India).

TL;DR: US taxes paid for GPS, but you *really* get access to it because it helps the US government *substantially* in aviation, civil, infrastructure, economic, and military sectors, and the version of GPS that you're using is still substantially worse than the one the military uses. There's some legacy effect here too - the US originally only let civil users use an acquisition code that was never meant for navigation, whereas now they have dedicated civil use signals (mostly due to the intense peer pressure of continued civil reliance).

[1] <https://web.archive.org/web/20120512002742/http://www.jhuapl.edu/techdigest/td/td1901/guier.pdf>

Recommending a few books that talk about these topics and history in the historical chapters:

1. Kaplan and Hegarty, Understanding GPS/GNSS: Principles and Applications, Third edition
2. Misra and Enge, Global Positioning System: Signals, Measurements, and Performance

Also a good online resource for all things GPS is Navipedia, produced by the European Space Agency but broadly maintained as a wiki (if you want to take a look at more of the math).

Edit: [u/victorfencer](#) pointed out that Loran pre-dated Sputnik-1, and I've gone back and checked my textbooks and fixed this. My apologies!

Edit 2: [/u/chteme](#) pointed out I should have said surveying, not surveilling (though you know, it's probably applicable to a lot of stuff).

Edit 3: I've gotten a good number of questions about why they turned off SA, and [/u/abbot x](#) gives a great answer below, much better than I would have given, if you want to know more!

Edit 4: Very incredibly kind of all of you. I've got several updates here.

First, (and I've fixed the post above with this), the GPS trilateration equation is nonlinear, and you can see a great visual of it here: <https://ciechanow.ski/gps/> (somebody posted this and it's very cool and I think their comment got deleted).

Second, I commented on some major differences between the different constellations here: [https://www.reddit.com/r/bestof/comments/13y9f9i/comment/jmq19g2/?utm\\_source=share&utm\\_medium=web2x&context=3](https://www.reddit.com/r/bestof/comments/13y9f9i/comment/jmq19g2/?utm_source=share&utm_medium=web2x&context=3).

Third, there are a lot of comments regarding time dilation. Fun history fact - the first space-based precursor to GPS was called Transit, and was the first technology that had to actively account for time dilation or stop working, and it assisted in proving Einstein's Theory of Relativity (or perhaps more aptly, continued to prove it). GPS does the same thing! Today it still accounts for time dilation through regular updates to the timing on-board satellites.

Fourth, just as a note to really try to hammer home WHY GPS is free, GPS is estimated to produce \$1.4 *trillion* per year in economic gains for private-sector businesses (<https://www.nist.gov/news-events/news/2019/10/economic-benefits-global-positioning-system-us-private-sector-study>). This is in addition to all of the governmental gains in infrastructure, transportation, aviation, power grids, stock markets, good ol' timing, etc. I think part of the trick here is that the US *knew* this would have impact that extended way beyond the already massive military application, and events like Korean Airlines 007 were a straw that broke the camel's back on that discussion. But making it 'free' already saves the US a *ton* of money (both for private and public use) and that more than any other reason is why it's free!

**MCRCA Foxhunt #2 July 08, 2023**

Fred K8EBI and Brenda KB8KQC fulfilled the Fox Duties

The FOX was located in a parking lot, hiding behind a dumpster, in the rear of 1397 N. Monroe St.

Shortest possible route per Google Maps = approx. 5.8 Miles

**Hunters**

**Team 2 - First Place**

Paul W8PI and Vickie

Fox found at Approx. 10:09

Miles = 6.3

**Team 1 - Second Place**

Mike N8KUF, Aaron KE8PUN

Fox found at Approx. 10:08

Miles = 7.5



While rain threatened early that morning, most of the hunt was under a cloudy sky with temperatures near 70 (all in all pretty decent hunting weather). Just after the fox was located it started sprinkling and rained heavier as we pulled away. The timing for hunt completion vs. rain was better than anticipated.

Thanks to those who were able to attend and participate. This was a relatively easy hunt of the kind suitable for entry level hunters. Hoping to see more of you at the September Hunt.

This was the second scheduled hunt for 2023. We'll look forward to much more fun, challenges, and participation in the remainder of the 2023 hunt season.

Respectfully submitted - Mike N8KUF - 2023 Foxhunt Chair

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**First Cell Phone Use**

May 13: On this day in 1946, the Federal Communications Commission (FCC) granted Southwestern Bell a license for radio-telephone service, which enabled those in St. Louis to be the first in the nation to make and receive phone calls in their car.

Covering a 75-mile radius of downtown calls to an auto had to be placed through a mobile operator at 2654 Locust. This was transferred over normal telephone lines to the office at 1010 Pine, where the call went out over VHF radio from the 250-Watt transmitter on the building's roof.

Service cost \$15 a month, after a \$25 installation fee. There was an additional charge per call, depending on time. As seen in this photo, necessary equipment took much of the trunk space. The first radiotelephone call was placed in St. Louis on Jun 17, 1946.

[sources: John Sarkis & Missouri Life]



The American Radio Relay League's round-up of the forthcoming week's DX activity on the amateur radio bands

This week's bulletin was made possible with information provided by The Daily DX, 425 DX News, DXNL, Contest Corral from QST and the ARRL Contest Calendar and WA7BNM web sites. Thanks to all.

**TIMOR-LESTE, 4W.** Vasily, R7AL, Mike, RU3UR and Anastasya R6DTO are QRV as 4W6RU from Lusaka until July 20. Activity is on 30 to 10 meters using CW and FT8. QSL via R7AL.

**MALAWI, 7Q.** Don, K6ZO is QRV as 7Q6M from the Embangweni Mission Hospital in northern Malawi until possibly the end of July. Activity is in his spare time with a special emphasis on 6 meters. QSL direct to WOMAN.

**MALDIVES, 8Q.** Bert, CX3AN is QRV as 8Q7HU until July 18. Activity is holiday style on 40 to 6 meters. QSL to home call.

**DEMOCRATIC REPUBLIC OF CONGO, 9Q.** A large group of operators are QRV as 9Q1AA, and 9Q1ZZ using FT8, until July 18. Activity is on 160 to 6 meters using CW, SSB, RTTY, and FT8 with four stations. QSL direct to I2YSB.

**TAIWAN, BV.** Kenicho, JP1RIW is QRV as BM0QSO from New Taipei City until the end of 2023. Activity is on the HF bands using mostly FT8. QSL via bureau.

**PORTUGAL, CT.** Special event station CR6J will be QRV on July 17 to 23 for the 41st International Motorcycle Rally in Faro. Activity is on 80 to 6 meters using CW, SSB, and various digital modes. QSL via CT1EHX.

**PHILIPPINES, DU.** Rag, LB3RE is QRV as DU1/LB3RE from Luzon Island, IOTA OC-042, until July 18. Activity is on 40 to 6 meters. QSL to home call.

**REPUBLIC OF KOREA, HL.** Wouter, PB1WL plans to be QRV as HL4/PB1WL from July 17 to August 16. QSL to home call.

**AMERICAN SAMOA, KH8.** Operators N3QQ, KB2FMH and W8HC are QRV as KH8RRC from Tutuila Island, IOTA OC-045, WFFF KFF-0054, and POTA K-0053 until July 18 to mark the 30th anniversary of the Russian Robinson Club. They are also active as W1AW/KH8 until July 18 as part of the 2023 VOTA operating event.

QSL KH8RRC direct to KB2FMH, and W1AW/KH8 via LoTW only.

**AUSTRIA, OE.** Special event stations OE2XXM and OE5XXM are QRV during July, and September around the international Autumn field day in Gosau. QSL via operators' instructions.

**FAROE ISLANDS, OY.** Nobu, JA0JHQ is QRV as OY/M0JHQ until July 15. Activity is on the HF bands. QSL direct to home call.

**SABA, ST. EUSTATIUS, PJ5.** Operators PE6Q and PA4O are QRV as PJ5/home calls until July 18. Activity is on 80 to 6 meters using CW, SSB, FT8, and FT4. QSL via ClubLog.

**MARSHALL ISLANDS, V7.** Bob, W0RGC is QRV as V7/W0RGC from Kwajalein Island for about two to three weeks. Activity is in his spare time on 20, 15, and 10 meters using SSB. QSL to home call.

**MYANMAR, XZ.** Akio, JE2QIZ is QRV as XZ2B from Yangon until the end of September. Activity is on 15, 12, 10, and 6 meters using CW. QSL via JH3SIF.

**ZIMBABWE, Z2.** Eddy, OE3SEU is QRV as Z21MV through August. He is active on Satellite QO-100 using SSB. QSL via LoTW.

**THIS WEEKEND ON THE RADIO.** The North American RTTY QSO Party, CQ Worldwide VHF Contest, QRP 20-Meter CW Fox Hunt, NCCC FT4 Sprint, NCCC RTTY Sprint, NCCC CW Sprint, K1USN Slow Speed CW Test, Russian Radio Team Championship, Trans-Tasman Low-Bands Challenge, Feld Hell Sprint, IARU Region 1 70 MHz Contest, RSGB International Low Power CW Contest and the Run for the Bacon QRP CW Contest are all on tap for this upcoming weekend.

The ICWC Medium Speed CW Test, OK1WC CW Memorial, RSGB FT4 Contest, Worldwide Sideband Activity Contest, Phone Weekly Test, A1Club AWT, CWops Test, VHF-UHF FT8 Activity Contest, Mini-Test CW 40 and the Mini-Test CW 80 are scheduled for July 17 to 19.

Please see July QST, page 78, and the ARRL and WA7BNM Contest web sites for details.

## Amateur Radio Examinations Monroe, MI

Monroe County Radio Communications Association Amateur Radio examinations are held the 3<sup>rd</sup> Saturday of every even numbered month at:

American Red Cross Chapter Bldg.  
1645 North Dixie Highway  
Monroe, MI 48161

**Registrations preferred**  
**Call for information.**  
**email address and FRN required**

**2023 Schedule:**  
February 18    April 15  
June 17        August 19  
October 21    December 16

TESTING BEGINS PROMPTLY AT 9:00 AM

Applicants are expected to have all forms filled out and be ready to take tests at that time. Coffee and doughnuts are available at 8:30 AM. For more information or to make reservations, call Paul Trouten - W8PI at 734-854-2224

### Join us at the next meeting

July 20th at 7:30 pm  
American Red Cross Chapter Bldg.  
1645 North Dixie Highway  
Monroe, MI 48162

### Local Net

ARPSC Net - Every Monday evening on '72-Monroe (146.72 Mhz) starting at 8:00pm.

ARPSC Meeting first Thursday of every month at the EMD office on Raisinville Rd.. 7:00 PM

## One Day Bi-Monthly Technician classes

**Next class will be August 12, 2023**

The Monroe County Radio Communications Association (MCRCA) is offering a one-day Amateur Radio course for the entry level Technician class license. The class will run from 8:30 AM to 4:00 PM on the **second Saturday of every even numbered month**. The cost is \$10 and includes lunch, snacks and beverages. The test will be conducted immediately following the class and has a separate fee of \$14. These classes will be held at the Red Cross building, 1645 N Dixie Hwy, Monroe, MI 48162.

There is a maximum class size of 10 people on a first come first served basis and you should sign up no later than 1 week before the class. All study material and testing paperwork will be provided at the time you sign up and you should plan on doing some pre-class studying to make things easier in the class.

If you are interested in becoming a Ham Radio Operator, please call or email me to get signed up for the next class.

N8BZN Don Fritz / (419) 345-4495 after 6PM / [Donfritz56@gmail.com](mailto:Donfritz56@gmail.com)

## New MCRCA Members

Please welcome recent new members to the club.

James Kiester KE8VLW, Dan Bain KC1BUD, Phil Bardoni ??????