



The ORC Newsletter

Official publication of the Ozaukee Radio Club, Inc. Mail all contributions to the editor, Tom Ruhlmann, W9IPR, 465 Beechwood Dr., Cedarburg WI 53012 (phone 262 377-6945). Permission to reprint articles published in any issue is granted provided the author and the Ozaukee Radio Club Newsletter are credited.



ORC Repeaters on 146.97, 224.18 and 443.750 MHz - Callsign W9CQO

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Volume XXIX

August, 2017

Number 8

From the President

de Kevin Steers (K9VIN)



Wow, how did it get to be August already? July was a blur, with vacation time and the Independence Day holiday. Soon we will be setting up antennas at the Port Washington Lighthouse, as we once again participate in Light House Day, where groups activate in the vicinity of lighthouses and lightships, and attempt to make contacts, while, hopefully, spreading the word of ham radio, during this public activation. Please join us during the weekend of August 18-20, to make this event a success. We are sure to need help transporting gear on Friday, setting up on Saturday morning, and tearing down on Sunday afternoon. Between noon Saturday and noon Sunday are

great times to swing by with family, friends, and especially the kids to have them watch/listen, and even operate, if they choose!

On the Air: Not as much air time as I had hoped this month. I seem to have spent more time ON the tower than using the Tower. I have been tinkering with a rotator issue, and ruling out issues. I have spent so much time up 50 feet, that when boats come by the cottage, they wave up at me, almost expecting me to be up there. Amusing and Embarrassing at the same time. I also installed a 'yardarm' on my tower to help stand off my OCF dipole better, in hopes to improve the SWR, but to no avail. On to plan B; possible Fan dipole, or just a 160M Dipole.

On the Bench: Not much going on, though I have cleared space on the bench to bring the rotator down from the tower, and toil with the CDE controller, as well, to try to troubleshoot the issues I seem to be having. Also, the amplifier I want to get on the air is waiting patiently, until I can find a turner that can handle both the power, and 160M, which has been my latest foray in the hobby.

73, Kevin (K9VIN)

DX'ing & Contesting

De Gary Sutcliffe (W9XT)



It's August! Where has the summer gone? We say it every year and yet seem surprised every year. Radio is slow in August. The HF bands are in their typical summer doldrums. HF conditions typically start to improve in September as we approach the autumnal equinox. One thing that gets interesting in August is VHF and above.

One reason is we start to get tropo propagation. This happens when you get an inversion layer in the atmosphere where there is a warm layer of air above a cooler layer. This can create propagation paths of

hundreds of miles or more. It tends to be more effective on the higher VHF and lower UHF bands.

Another event is the Perseid meteor shower. Meteors are small rocks or grains of sand that travel through space. Occasionally their path will intersect with earth's orbit. Because of their high speed they heat up in the atmosphere, leaving a trail of ionized particles, and often a visible trail we call a shooting star. Radio waves can bounce off these trails. These trails can last anywhere from a fraction of a second (called pings) all the way to half a minute or more for a "blue whizzer". The larger the meteor, the longer the trail. Angle and relative speeds of the meteor also have an effect.

The earth is constantly being hit by meteors. Most burn up in the atmosphere, but occasionally one hits the earth and becomes a meteorite. Every day the earth's mass increases by several tons from meteorites and dust from those that don't make it to the ground. Many meteors are debris from comets, and when the earth passes through the orbit of the comet. At that time, the number of meteors increase, and it is a good time to use them for radio propagation.

Most meteor scatter (MS) activity is on 6 and 2 Meters. It is also possible on 10 Meters and up to 432MHz. It takes more ionization as the frequency increases and thus much more difficult. QSOs can go out to about 1200-1400 miles, limited by the height of the meteor trail.

In the past, most meteor scatter was done on SSB. You set up a schedule with another station, usually on an HF net. The stations would alternate 15 second periods sending call signs. When one station hears calls, they would start sending signal reports. The two stations would go through a defined procedure to exchange the information needed to complete a QSO.

For a QSO to be completed, you needed several well-timed meteors to occur. That did not always happen. My success rate was probably around 20%. Many times, you would hear a single letter or even just a syllable from the other station on a ping. The game changed about 10 years ago when K1JT introduced his WSJT suite of programs for specialized VHF communications. One was for moon bounce (EME) and one specially designed for meteor scatter. Later he came out with others for various propagation modes including WSPR, an HF propagation tool that a couple of ORC members have been active with. These are digital modes and you need an SSB transceiver and a PC (or MAC) and a way to interface them. You can also run WSJT on Linux.

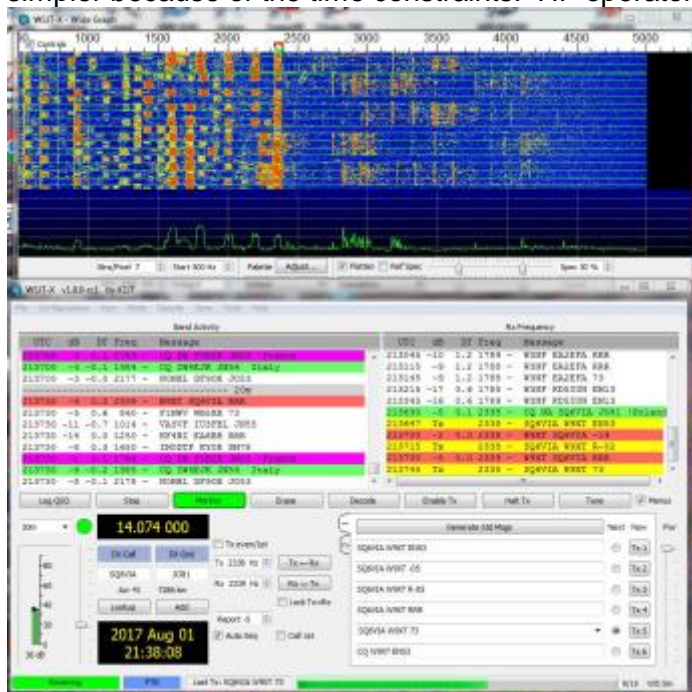
MSK144 is the meteor scatter mode. It sends the calls and exchanges repeatedly during 30 second transmission cycles. Because it sends so fast, it can take advantage of the much more common pings. A ping of about 1/3 second is plenty long. The QSO procedures are like phone meteor scatter. It has been a few years since I played with MSK144, but I used to have success rates well over 50% with 50 watts and a Yagi. Once I worked a station in Florida running 15 watts to a 5-element home brew Yagi on a step ladder on 2 meters.

With many meteors during the Perseid shower, there will be a lot of activity on 6 and 2 meters for several days around the predicted peak of August 12. I plan to be on starting a few days before the peak.

Speaking of 6 meters, by all reports the Sporadic E season was pretty good. Lots of US contacts with occasional openings to Europe and South America. One thing that really added to success is a new WSJT mode called FT8 which is specially designed for weak signal Es. In fact, it is possible to decode signals that are close to 20dB below the receiver noise. You often cannot hear the other station. This extra noise margin means a lot more openings are usable.

FT8 was just released in a preliminary software release at the end of June. It has caught on like wildfire. I got it hooked up a day before writing this column and have worked a couple of stations on 6M. Apparently last weekend there was a lot contacts made between the US and Europe.

A QSO can be made in about a minute and half. The sequencing has been automated which makes it simpler because of the time constraints. HF operators have been quick to pick it up too.



Each band has a frequency to set your radio to. Stations can be packed about one every 50 Hz inside the 2500 Hz or so bandwidth of the receiver. I had one receive period that I copied 14 different stations at once! In the first day or so of playing around with FT8 on HF I worked about 45 stations in 17 countries. The HF contacts were made while running 15 watts.

FT8 is a new mode and there has been some online discussion on improvements, and the second release will probably be out before too long. The general release of WSJT is 1.7. Version 1.8 RC1 has the new FT8 mode and is still considered experimental. The software can be downloaded for free at: <https://physics.princeton.edu/pulsar/k1jt/index.htm>

The screen above is a shot of W9XT working a station in Poland on FT8. He copied my 15-watt signal 14 dB below his receiver noise level.

Operating these modes is quite a bit different than other modes and takes some studying to figure it out. Be sure to read the documentation. Note that the documentation does not include instructions for FT8 but you understand how the other modes work it is not hard to figure out.

There is a pretty good YouTube video on getting started with FT8 at <https://www.youtube.com/watch?v=QoCngsKW9tc> There are a few things he is doing wrong in the video. He discussed setting the clock and audio levels but didn't have it set right. The user manual tells you how to do it. He also has some concepts wrong on how the decoding is done, but overall is a good video to get a feel of what it is and how to operate it. For those not experienced with operating JT modes getting a feel for how QSOs go, the video is better than the written manual.

Overall, JT8 is a great compromise in digging signals out of the noise and speed of operation. It will decode much weaker signals than RTTY and PSK31. It is not quite as good as JT65 for that, but uses 15 second transmission periods instead of 60 second ones for JT65. It also uses a minor fraction of the bandwidth JT65 does. Check it out.

Contest activity is lower during August. The summer running of the North American QSO parties are this month with CW on Saturday August 5 and phone is August 19. Basically, you send your name and state, 100 watts maximum. This contest was covered several times in the past. Rules can be found at ncjweb.com/NAQP-Rules.pdf

Also on August 19th is the ARRL 10 GHz and Up Contest. It is interesting, with local operators working each other across Lake Michigan from the beaches. An inversion layer often forms just above the water, allowing propagation. Generating power on this band is difficult so most are only running a few watts into a small dish. Since W9GA is probably the only ORC member who has gear for this band I won't go into the rules.

DXpeditions this month are down as usual. TX5EG will be on from several IOTA islands in August by a group of French hams. Look for them using A35JP until August 6, then again August 17-22. 80-12 Meters, CW & SSB.

Lesotho is a country in the middle of South Africa. Years past it was fairly common, but I have not worked it many times in the last 10 years. Look for 7P8VRR and 7P8QM from August 18-21. They won't be strong, running 100 watts on 40, 20 & 15 Meters only.

As usual there are many vacation style operations with a single operator. You just need to be on the air at the right time to get them since they are usually part of a vacation and ham radio is fit into otherwise free time.

That wraps up August. FT8 is a great counter to typically poor August radio conditions. Try it!

New FT8 mode from K1JT

de Tim, KA9EAK



K1JT and his team of developers have released a beta of WSJT-X with a new mode, FT8, Franke-Taylor, 8-FSK modulation. At the time of this writing the beta release that was made available earlier this month is now a release candidate. You can get more details here: <https://physics.princeton.edu/pulsar/k1jt/wsjt.html>.

I recently started operating with this new mode and even ran it while on my last camping trip, QRP with my new Elecraft KX2. It's very interesting and VERY VERY fast. A QSO may be completed in under two minutes! You can call CQ and have the WSJT-X software respond with a signal report to the first station to reply to your call and sequence through the rest of the QSO automatically.

Band Activity					Rx Frequency				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
162015	-17	1.6	884	~ CQ W9V9L EM59	161945	-2	1.2	622	~ W5ENU N4ULE +00
162015	-14	0.8	999	~ AF6N KYOR DM78	162000	Tx		619	~ N4ULE KA9EAK EN64
162045	-7	1.3	626	~ W5ENU N4ULE RRR	162015	-14	1.3	622	~ W5ENU N4ULE +00
162045	-5	1.4	1000	~ AF6N AA7IX DN71	162030	Tx		619	~ N4ULE KA9EAK EN64
162045	-10	1.1	1141	~ CQ AHOU CM97	162015	-17	1.6	884	~ CQ W9V9L EM59
162115	-16	1.3	629	~ W5ENU N4ULE 73	162100	Tx		884	~ W9V9L KA9EAK EN64
162115	-8	0.9	1001	~ AF6N AA7IX DN71	162130	Tx		884	~ W9V9L KA9EAK EN64
162115	-9	1.1	1141	~ KYOR AHOU +03	162145	-6	1.3	620	~ KA9EAK N4ULE -11
162145	-6	1.3	620	~ KA9EAK N4ULE -11	162206	Tx		884	~ W9V9L KA9EAK EN64
162145	-14	1.1	1141	~ KYOR AHOU +03	162209	Tx		884	~ N4ULE KA9EAK R-06
162215	-13	1.4	620	~ KA9EAK N4ULE -11	162230	Tx		884	~ N4ULE KA9EAK 73
162215	-8	1.2	1142	~ KYOR AHOU RRR	162215	-13	1.4	620	~ KA9EAK N4ULE -11

Along with the other protocols or modes in WSJT-X, JT9 and JT65 among a few others, FT8 is another tool in your toolbox for making contacts in the variable band conditions we'll find ourselves in for the near future.

There has been a lot of activity with the new mode and a lot of discussion about it including some good blog posts by Bas, PE4BAS - <http://pe4bas.blogspot.com/2017/07/ft8-digimode.html> and John, AE5X - <http://ae5x.blogspot.com/2017/07/ft8.html> among a lot of others. If you're looking for something new, download WSJT-X and give FT8 a try.

THE COMPUTER CORNER - No. 234: Top Freeware Picks

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(262) 268-1949 wb9rqr@att.net



My favorite site for safe freeware, majorgeeks.com, publishes a list of “absolute best, five stars rated, totally free programs for your computer”. These do not have any hidden toolbars or third-party programs, and they are not wrappers (bundeware). This list changes as new, good software is written, so go read the list as you need it at the following URL: <https://tr.im/1Wxcl>. Here is a sample of a just a few of the categories with just a couple of the picks. The person writing these descriptions is Tim Tibbetts, one of the two majorgeeks honchos.

All-In-One Suites

Simple System Tweaker: There is a handful of safe, tested tweaks most geeks will apply to a computer. This does it for you and saves potentially hours.

Advanced SystemCare: ASC is an all-in-one suite to keep your computer running fine and forget about it. Majorgeeks likes Driver Booster from them as well.

Anti-Spyware & Anti-Malware

Malwarebytes Anti-Malware: Malwarebytes is one of our all-time top downloads and for good reason. It's simple, fast and effective. You can purchase full time protection so you don't get infected again.

SUPERAntiSpyware: SUPERAntiSpyware might not be a recognizable a name to you but don't let that stop you. SUPERAntiSpyware has saved majorgeeks a few times when other programs have failed to detect or remove a problem.

Anti-Virus Protection

Avira Free Antivirus: Avira has good speed, accurate detection and removal and has been consistently rated 4.7 out of 5 by our readers. A pro version is also available.

Microsoft Security Essentials: Microsoft finally got into the game with free protection for all Windows users in 2010. While the detection and removal is very good we feel it can be a bit slower for power users.

Backup

Macrium Reflect: I have used Acronis True Image for years but it's not free and it has almost no quality competition. Macrium Reflect is the one program that comes really close. Backup files, a complete image and much more.

Dropbox: No need for a second hard drive, external drive or DVD. With Dropbox you can use the Cloud to back up your important files. You can also share and sync.

Browsers

Pale Moon: As you're about to notice, geeks tend to lean toward Firefox over Chrome and Internet Explorer. Hence there are a few awesome alternatives that tweak the Firefox code. This one promises 25% more speed and is a 5 star program all day long.

Cyberfox 64-Bit Web Browser: If you want a 64-bit version of Firefox, here you go. And it's pretty awesome.

CD\DVD\Blu-Ray Burning Tools

CDBurnerXP Portable: I usually have this one on my computer. Light, and easy to use. The installer version always has some sort of bundeware so you want this portable version to avoid that.

InfraRecorder: InfraRecorder is another often overlooked tool. It's small and has plenty of features similar to CDBurnerXP.

Data Recovery

Wise Data Recovery: Another tool that is part of an entire suite of tools and a really good one too. Often overlooked, you would be mistaken to do so.

Recuva Portable: For free, Recuva is an excellent choice. It's fast, easy to use and can even try to recover lost emails, deleted music and Microsoft Word documents or temporary files.

Drive Cleaners

Wise Disk Cleaner: Do you find CCleaner too conservative? Wise Disk Cleaner can often free up an additional gigabyte or more removing files CCleaner won't touch. I happen to love it personally.

Privatizer: Privatizer takes the traditional drive cleaner approach but adds in an additional focus on security as well.

CCleaner: CCleaner has been around and highly rated for many years. It also has a start-up manager, registry cleaner and shortcut to remove programs.

Driver Updaters

Driver Booster: I've used this one for years and it works great. It does offer to install one of their other programs at the end, but since it's not malicious or a wrapper it makes it onto the list.

Driver Easy: A newer program, this one also can back and potentially repair driver problems.

OK, that is a big enough sample. Here is a complete list in alphabetical order:

1. All-In-One Suites
2. Anti-Spyware & Anti-Malware
3. Anti-Virus Protection
4. Backup
5. Browsers
6. CD\DVD\Blu-Ray Burning Tools
7. Data Recovery
8. Defragmenting Tools
9. Diagnostics
10. Drive Cleaners
11. Driver Updaters
12. Email Clients
13. File Compression
14. Graphics
15. Multimedia
16. Microsoft Office Alternatives
17. Partitioning
18. PDF Alternatives
19. Text Editors
20. Uninstallers
21. Honorable Mentions

Remember, these are the top-of-the-top, and they are all free! The fact that they are free does not mean they are not good. Indeed, many are better at what they do than the pay-for alternatives. Visit majorgeeks.com to see your options. Happy Computing!

Vintage Amateur Radios

de Bill Shadid (W9MXQ)



Welcome to the new Vintage Radio Column in the ORC Newsletter. The plan is for this to be a monthly report on some interesting piece of vintage ham radio equipment or a complete station setup. I am looking for guests to share the limelight with me in this pursuit.

This month's edition focuses on 1964, when National Radio Company, Inc., was moving into the full featured, five band HF Transceiver market. Hot off their successful NCX-3 Tri-Band (80, 40, and 20 meters) SSB/AM/CW HF Transceiver, National was now promoting their unique NCX-5 80-10-meter SSB/AM/CW Transceiver. At the same time, National was building a competition station without equal at the time with a wide range of accessories. Take a minute to look at this complete NCX-5 Station:



Left to Right are the National NCX-A AC Power Supply/Speaker, the NCX-5 HF Transceiver, the VX-501 External VFO, the NCL-2000 Linear Amplifier, and the HRO-500 Receiver. The HRO-500 here is acting as a second receiver with the NCX-5, when desired.

The NCX-5 Transceiver covered the 80-10-meter bands without 160 meters or the WARC bands we have today. Most radios of the day lacked 160-meters because of differing coverage and power limits depending on the area of the country. In those days, LORAN radio occupied 160 meters along with the amateur operators. We were secondary there. The transceiver had a 200-watt final with an expected output of 100 watts. The radio was equipped with a very effective 8-pole crystal lattice filter that provided a 2.8 kHz bandwidth at -6dB and a shape factor of 1:1.7 – very effective even today.

Two unique features were “Transceive Vernier” control, as National named it, and digital frequency readout. The “Transceive Vernier” was the same as what we today call RIT or Clarifier. That was rare and shared pretty much by just National and Hallicrafters in those days. The most unique feature of the two was digital frequency readout. National did that with a mechanical (counter) mechanism as shown below:



The readout shown, assuming the bandswitch was set for 14 MHz operation would show 14.321 MHz. If you switched the bandswitch to 3.5 MHz, that would indicate 3.821 MHz. The mechanism would change to show the proper frequency for a band that began on 0.5xx MHz – so no guesswork. National went to great lengths to keep the mechanism linear across its various 500 kHz bands. The main tuning capacitor was very complex and had several tools in its design to adjust for linearity. Note a graphical, moving band scale on the right to show tenths of a kHz and more.

The VX-501 External VFO allowed for separate frequency excursion between receive and transmit. In a true oddity of design, the optional National XCU-27 Crystal Calibrator was mounted in the VX-501 when the External VFO was present. The External VFO, referenced as the Console by National, would act as sole frequency control, receive only control, transmit only control, or allow completely control by the transceiver VFO. Today, while the NCX-5 Transceiver is available with a little research, the VX-501 can be very hard to find.

The NCL-2000 Linear Amplifier was a full power amplifier in its day. It has a mode switch to differentiate between 1,000 watts input for CW or 2,000 watts input for SSB as was the custom in the 1960's. The NCL-2000 in my collection seems willing and able to produce at least 1,300 watts output from its RCA (now Burle) 8122 Ceramic Tetrodes. The 8122 has a dissipation capability of 400 watts per tube. Unlike most of today's amplifiers, the NCL-2000 is grid driven and therefore can run full power with as little as 20 watts of drive. The exciter feeds in to a dummy load in the NCL-2000 input circuit and therefore always sees a 50-ohm load. This amplifier is a complete, standalone unit in a single cabinet including a built-in 120/240 VAC power supply and blower feeding a pressurized cooling system for the power tubes.

You will recall a recent ORC meeting when Pat Volkmann, W9JI, presented his National HRO-50 Receiver (first sold in 1950). We also saw a much older National HRO-M Receiver (first sold in 1941) from my collection. The HRO-500 that is part of this article is the successor to the radio just following the HRO-50, the HRO-60 (first sold in 1953). The HRO-500 is all solid state with dozens of socketed germanium transistors and no plug-in coils as you saw with the older HRO's shown by Pat and me. The HRO-500 covers 0-30 MHz (but required a separate pre-amplifier for effective LF operation). Indeed, it was a very early, high performance, commercial grade solid-state radio that focused on shipboard, commercial, and the amateur users. It was the last HRO series radio marketed to amateurs. (The last HRO, the HRO-600, was never sold outside of the commercial market.) While National advertised the HRO-500 in the configuration shown in the picture at the beginning of this article, they offered no information on how to integrate the receiver with the NCX-5. In those days, it was expected that the user would just "figure it out." And we did!

The last item needs little description – the National NCX-A AC Power Supply/Speaker Console. This power supply is quiet and unlike a lot of its competitive radio power supplies, was not straining to provide the power needed by the radio. It was the matching power supply to the earlier NCX-3 Transceiver, and also to the later NCX-200 HF Transceiver. There will be more on the NCX-200 in a later column.

This National station is in my personal collection. It comes from long time fellow collector and trading partner, Bob Bailey, W9DYQ, of Shoreview, MN. Bob and I have been friends since childhood. He is an avid CW operator – and shrugs off SSB, AM, and FM as those modes that use a "Shadid Device." (His reference to a microphone.)

UPCOMING EVENTS

Membership meeting – August 9, 2017

Corn Roast – August 12th – Cancelled due to lack of participation

Lighthouse Weekend – August 19 and 20

ORC Fall Swapfest at Fireman's Park – September 23, 2017

ORC Field Day – June 24 & 25, 2017

De Tom (W9IPR)

I found the camera, so here are a few photos from Field Day. See the ORC web site for more photos.



Ozaukee Radio Club

July 12th, 2017 Meeting Minutes

Ben Evans (K9UZ), Secretary

First VP Pat V. (W9JI), who presided over the meeting in President Kevin S.'s (K9VIN) absence, called the meeting to order at 7:31 PM. All the attendees introduced themselves.

Announcements:

Tom R. (W9IPR) made remarks about stealth antennas for the home.

Bill Shadid (W9MXQ) found a 200-watt Viking AM transmitter.

Tom R. expressed thanks to the people who write articles for the newsletter. There will be a new column on vintage radios.

Bob S. (W19BOB) showed his Elecraft KX-2 transceiver. It is very small and easy to set up.

Gary D. (K9DJT), in the recent 13 Colonies Special Event, Gary made contact with 11 colonies on his mobile station. Art D. (AC9CD) swept all 13 colonies in that same contest.

Program:

Nels (WA9JOB) made a presentation about a recent engineering project in Buffalo, NY he had done, which included the detuning of two cell towers near four AM station transmitters so that the cell towers wouldn't re-radiate the AM stations' signals.

Auction:

Stan K. (WB9RQR) conducted the auction. Many items were sold.

Officer Reports:

President – The President was not in attendance, so there was no President's Report.

Pat V. (W9JI), 1st VP – No report.

Tom T. (KC9ONY), Repeater VP – No report.

Ben E. (K9UZ), Secretary – The minutes from June's meeting is in the newsletter. Motion to accept the minutes, subject to amending it to clarify that Mike H. (KD9GCN) is the new CLUB TRUSTEE, not the Repeater Trustee, and that there was no Treasurer's Report at the last meeting, was made by Dave B. (N9UNR); seconded and passed without debate.

Dave B. (N9UNR), Treasurer – Motion to accept the Income & Expense Reports for May and June was made; seconded and passed without debate.

Committee Reports:

Scholarship – Tom R. and Ed R. (AA9W) went to the South Milwaukee swapfest and had \$85.50 in sales.

Field Day – Ken B. (W9GA) gave his report on the results of Field Day 2017. Thanks to everyone who showed up. There was a good crowd, including new members. The final score (preliminary) was 12,708. Over 3,600 QSLs were made. This is the second best showing since 2011, when there were over 4,000 contacts. The GOTA station did well. Things to consider for next year: We could use additional operators; We have to get word out to the media outlets, modify the tent and make new stakes and do something about the antennas. Jim A. (K9QLP) thanked the people who made sure safety measures were in place.

Old Business:

None.

New Business:

Tom KC9ONY said ORC member volunteers are needed for set-up, operation, and tear-down for the ILLW Lighthouse event in Port Washington; otherwise the event will not happen.

Regarding the Corn Roast, a volunteer is needed to take charge of the event. Pat V. asked for a show of hands from those planning to attend. About six people raised their hands. Dave B. suggested that since there doesn't seem to be much interest in the event this year, perhaps he should cancel the reservation he made for the Pleasant Valley Nature Preserve. Pat said let's wait a few days before making that decision.

Adjournment:

A motion to adjourn was made, seconded, and passed. The meeting was adjourned at 9:26 PM.

Attendance:

There were 36 members and 2 guests present at the meeting.

A copy of the attendance sheet is available upon request in PDF format. Please contact Ben Evans via email at ben@evansengsolutions.com for a copy.

Respectfully submitted,



B. Benjamin Evans, K9UZ
Secretary

AGENDA

August 9, 2017

1. 7:00 – 7:30 PM – Networking and rag chew
2. Call to order: Introductions. Kevin Steers (K9VIN)
3. Announcements, bragging rights, show and tell, upcoming events, etc.
4. Program: Bernard Barr, K9JAT, Wire and Materials Resistivity.
5. 50/50 – Kristian Moberg, KC9TFP
6. Fellowship Break
7. Auction – Stan Kaplan (WB9RQR)
8. Presidents Report – Kevin Steers (K9VIN)
9. 1st VP Report – Pat Volkmann (W9JR)
10. 2nd VP Report –
11. Repeater VP report – Tom Trethewey, (KC9ONY)
12. Acceptance of Minutes: Ben Evans (K9UZ)
13. Treasurer's report – Dave Barrow (N9UNR)
14. Committee reports.
 - A. Fall Swapfest
 - B. Corn Roast
 - C. Other:
15. OLD BUSINESS
16. NEW BUSINESS
17. Adjournment to John's Pizzeria

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The ORC Newsletter

465 Beechwood Drive
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First Class

Next ORC Meeting

Grafton Senior Citizens Center

1665 7th Avenue, Grafton
Wednesday, August 9th 2017

7:00 PM – doors open

7:30 – Membership Meeting

Wire and Materials Resistivity

By Bernard Barr, K9JAT