

TCDXA
TWIN CITY DX ASSOCIATION



Minnesota

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Twin City DX Association

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Gray Line Staff

KØAD
K9WAG
WØJMP

The GRAY LINE REPORT

DXing from Minnesota - Land of 10,000 Lakes

TCDXA Members Fire Up the Bands During 2018 ARRL Field Day

Complied by: Al Dewey, KØAD



Tribander in Foreground and Military Masts in Background at Rochester Radio Club Field Day Site

ARRL Field Day continues to be an early summer tradition with many TCDXA members. Whether part of a larger organized club effort or just a one or two person operation, TCDXA members were very active in putting Minnesota and Wisconsin on the air during the June operating classic. The following are a few stories and pictures depicting our members enjoying this summer's operating classic.

Roger, KØMPH – 2A WI

Jeff, NØNQN, a friend from church suggested we work field day this year. Jeff is recently re-licensed and has launched two high altitude balloons (with APRS) in recent years. See QRZ.COM for details.

Our class 2A field day effort was a one-day Saturday event at his brother-in-law's rural location in Wisconsin. We had three fiberglass poles supporting a 40 meter vertical, a 20 meter inverted V, and a 20-10 meter inverted V (one band at a time). Jeff worked phone and I worked CW. By separating the antennas far enough we were both able to work on 20 meters at the same time with minimal inter-station interference.

Everything went well except for one defective coaxial cable. We had 10 minutes to spare from set-up to start. During set-up it was a bit hot and during take-down the bugs were threatening but they never did materialize. It felt good to be in the chair again "practicing" CW. Forty was the money band, with some nice runs and we discovered the 15 meter opening for a few easy Qs. The final count for 7 hours operating time was: CW - 283 Qs and Phone - 61 Qs.

I am already planning how to make the antennas easier to transport, deploy, take down and stow for next year. Thanks Jeff for the suggestion and the great conversation. 73, Roger, KØMPH

Vern, KØVG – 2A MN

I operated FD with a group from the Red River Radio Amateurs. They had two groups active for FD. One station was set up in West Fargo, ND with the Emergency Service Trailer.

I was with the group in Sabin, MN operating with the call WBØBIN. We had the use of the shelter in the city park. We operated as class 2A using wire antennas and a 5 band vertical. One station ran HF digital and the other ran CW and Phone. I operated the bonus VHF Station using a 6 meter Moxon on a 10' pole. I ended with 15 phone and 8 FT8 contacts. There were 7 additional non-FD FT8 contacts.

The emphasis was on having a fun time. The group ended with over 200 Q's.

Mike Heiler (KAØZLG), Vicki Heiler (KEØBFW), Gerry Phillips (NKØA), Christine Phillips (KBØBML), Darcy Neibeling (NDØMN), Gurnee Bridgman (W9NT), Pete Pugliano (WCØG), Jess Lavold (NØMPN) and Bob "Tiny" Dablow (WBØBIN) were the other operators.

Food was provided by Kathy XYL of Tiny, WBØBIN. Tiny is also the mayor of Sabin. 73, Vern, KØVG

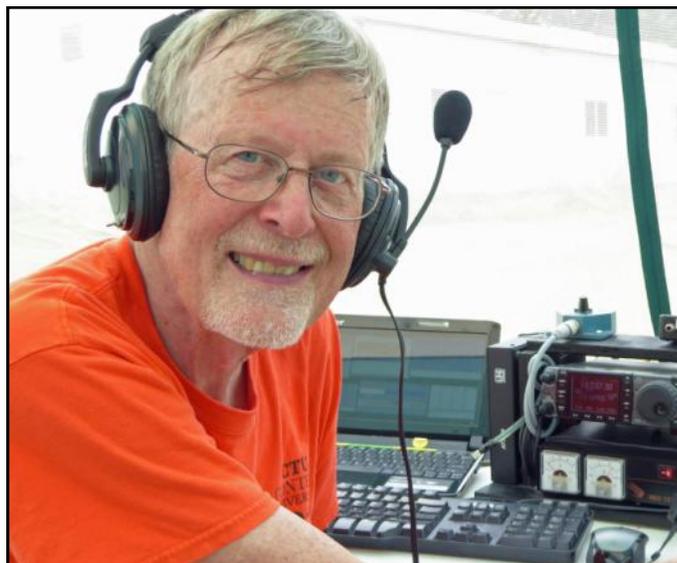
Blue Lake Brothers, NØAT – 2A MN

The Blue Lake Brothers team did Field Day this year from the shores of Blue Lake near Dorsett, MN. NØAT's family again allowed us to use their resort to get our Field Day fix for 2018. Members of the Blue Lake Brothers team vary from year to year. This year's team consisted of Ron (NØAT), Al (KØAD), Kirk (NØKK), Matt (KØBBC), Bill (WØOR), Chris (KØAUG), Bob (KBØGII) and Michael Pengelly (NØKK's son). The team arrived throughout the day on Friday before Field Day. With the availability of lots of land and many tall trees, we decided



to use all wire antennas again this year (except for small beams on 6 and 10 meters). For the HF stations, we had dipoles on 80 and 20 and loops on 40 and 15. The GOTA station used a 20 meter loop and KØBBC provided a Buddipole and small beam for 6 meters.

Conditions were fair. We ended up with 1569 CW QSOs, 513 SSB and 13 FT8 QSOs giving us a final score of 9084 after all bonus points were added. Our score was up a bit from last year. NØKK and I were able to make a satellite QSO from the dock which is always fun. With an article in the local newspaper and a great sign on the road, we had a number of visitors stop and spend some time learning about amateur radio. Ron put several of his grandchildren on the microphone to make some “youth” QSOs. All and all, it was another really fun field day effort with a lot better weather than last year.



Roger (KØMPH) at FD in Wisconsin



Jeff (NØNQN) operated with KØMPH on FD



Dave (KØVH), Drew (KCØCJP), Fred (K4IU) and Bob (ACØBW) at Rochester Radio Club Field Day Site

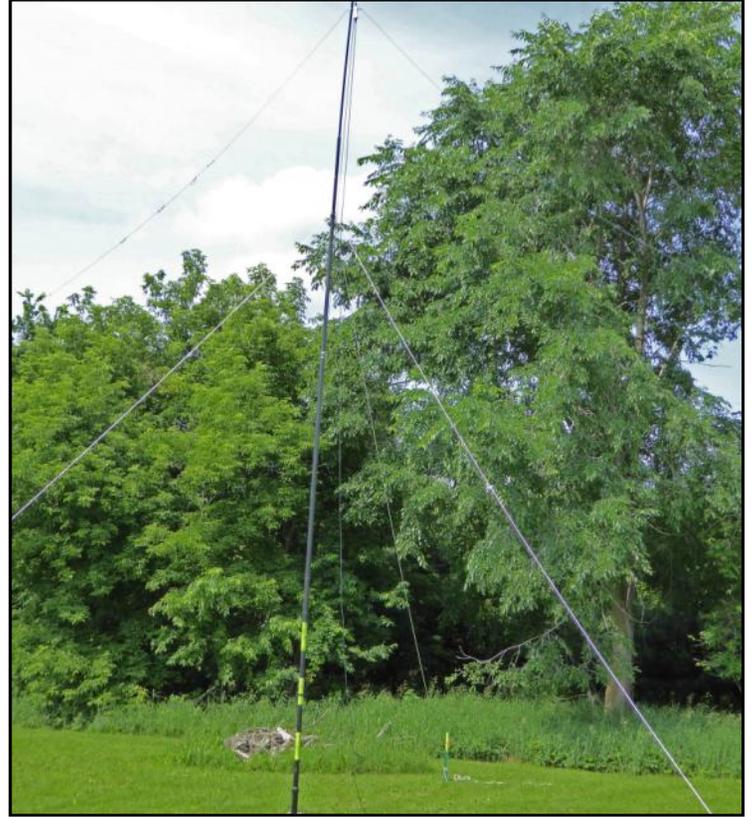


KØMPH Field Day Site





Vertical at KØMPH Field Day Site



Inverted V at KØMPH Field Day Site



WBØBIN FD Station in Sabin, MN





KØPC at Twin Cities Repeater Club
Field Day Site in Burnsville



6 meter Moxon Antenna at
WBØBIN FD Site

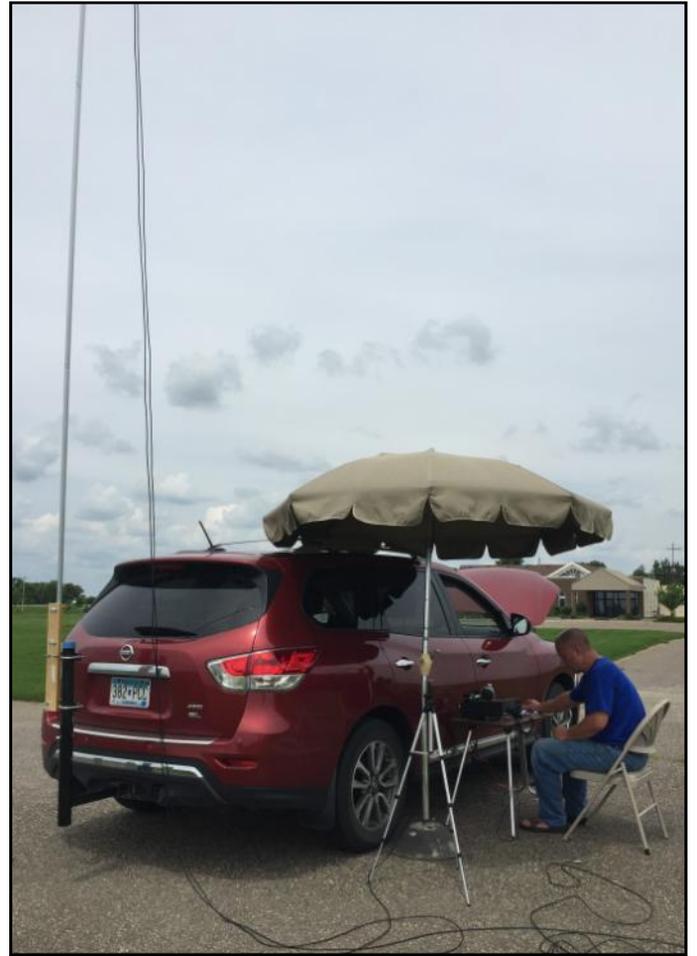


WBØBIN VHF FD Station





KBØEO Field Day Antenna System



KBØEO 1B Field Day Station



The Blue Lake Brothers FD Team (l to r) WØOR, NØAT, KØBBC, KØAUG KØAD, Michael Pengelly, NØKK





ARRL Sign Provided by KØBBC Helped Draw Attention to NØAT Field Day Site



KØBBC gets ready to raise 6M Antenna on Buddipole



NØAT helps his Granddaughter make a youth QSO





NØKK prepares for another Satellite Pass



WØOR runs CW on one of the Two HF Stations at NØAT



I to r: KØAIF, KEØROH, and NØODK at SARA Field Day. Julie (KEØROH) made her first QSOs at this FD with VT, ND, and NV





NØODK talking with new Extra KEØRZZ at SARA FD. Photo Credit: NØDRX



KØGW and NØODK at SARA Field Day, taking a bit of a break. SARA club display in background. Photo Credit: NØDRX



KØGW logging and WØGAF operating—distant view. Photo Credit: NØDRX



KØGW logging and WØGAF operating. Photo Credit: NØDRX



WØGAF logging and W9LHG operating at SARA Field Day. Photo Credit: NØDRX



A Review of the Flex 6600M Software Defined Radio

By Paul Staupe WØAD



Paul, WØAD in his new station built around the Flex 6600M

I passed the Novice test in WØAIH's basement in Virginia, MN 48 years ago. Still in junior high I started on a lifelong journey of interest in DXing on Top Band as well as DXing on the BCB (Broadcast Band) and below. In high school, upgrading to a Drake R-4A/T-4X was a giant leap forward in technology from my original HQ-110A/Ranger Novice rigs. Moving to a Drake C-line was a natural evolution and I became friends with Rob Sherwood and modified several R-4Cs with Rob's kits to improve low band and close signal performance. However, I always wondered if I was missing signals due to weak tubes or misalignment. When solid state rigs came along I was aware that they left much to be desired in terms of strong signal capabilities, so I held off until eventually settling on a Yaesu FT-1000D with all the filters and sub-receiver. Space diversity reception had intrigued me on TopBand and I could achieve it on the FT-1000D to some extent, but the sub-receiver was not phase locked to the main receiver and was an inferior design. W8JI had published his project on phase locking R-4Cs together, but I knew something better was coming along.



Transitioning to SDR Technology

Fast forward to 2015. I'd been in touch with Glenn Johnson WØGJ over the years and visited his Iowa QTH after he had moved from Bemidji. Glenn had been using conventional transceivers so I was very interested when I discovered that he had switched to Flex Radio. After his K1N DXpedition to Navassa which showcased the Flex's capabilities in a DXpedition, I took him up on his offer to lend me a Flex 6500. Considering a radio without knobs was an easy concept for me to absorb since I've spent my career in IT and telecommunications. When I installed the software and booted up the loaner Flex 6500, I immediately realized the power of the design.

The Flex "ingests" the entire HF spectrum and immediately converts it from analog signals to digital 0's and 1's. It then manipulates the data into readable signals without the traditional mixing approach of superhetrodyne methods used since the 1930s. The massive amount of data that is produced by taking snapshots of the whole HF spectrum many times per second takes a tremendous amount of computing power.

Early SDRs (Software Defined Receivers) required a fast computer with a lot of RAM and multiple CPU cores to decode the vast amount of data. Flex's approach with their Signature Series (6300/6500/6700 and now the 6600) is to offload the data processing to an internal specialized solid state device called a Spectral Capture Unit, (SCU). The radio itself does the massive processing and the computer provides the control and video functions. As a result, the brute force requirements for a ham's

PC was eliminated. The sheer amount of data that's decoded by the SCU is incredible. An Intel i7 hex core processor is capable of decoding between 4-8 gigaflops, (a gigaflop is a unit of computing power equivalent to 1 billion floating point operations per second). The specialized SCU in the Flex is capable of decoding 121 gigaflops per second or about 20 times the speed of the most expensive PC. In the Flex, the entire HF radio spectrum is sampled over 245 million times per second !!! When the actual slice receivers in the Flex select a "slice" of the spectrum and provide the analog to digital conversion on the frequency of interest, the rest of the data is discarded.

It was after reading a presentation about how SDR technology had finally eclipsed traditional superhetrodyne radio that I finally gained the insight as to what a Flex could do:

<http://www.ke4ham.com/club-information/modern-radio-sdr-101/>

The bottom line is that there has been a paradigm shift in receiver technology from analog (superhet) to digital (SDR) analogous to the shift from spark technology to continuous wave (CW). This is described in Aitkin's excellent book "The Continuous Wave: Technology and American Radio 1900-1932" (Princeton Press 1985).

Aitkin's book explores the quantum leap in technology from spark to CW which eventually rendered spark transmission obsolete even though the incumbent providers such as the Marconi Company made significant advances in later years. CW was an entirely new way to transmit RF and was clearly superior.

This was on my mind as I tried out WØGJ's loaner Flex 6500.



Its ability to get next to a strong signal without receiver de-sensing as the digital filtering literally emulates a 1000 pole crystal filter with no loss of quality of the received signal or ringing. It is only manipulating 1s and 0s and not the RF signal itself as in a superheterodyne radio. This is the equivalent of copying audio CDs - the copy is an exact duplicate of the original no matter how many copies are made. The original waveform is preserved while eliminating adjacent QRM. It can also be digitally enhanced to become more readable which is helpful on both CW and SSB.

I was amazed to discover the high resolution visual display, showing each signal on the panadaptor as well as the time characteristics of each signal in the waterfall. I purchased a 40" ultra-high definition TV with a HDMI input from MicroCenter and mounted it on my wall so I could see not only N1MM+ and my other computer applications, but a crisp view of the Flex panadaptor and control functions. I was no longer just listening the band, I was now able to see the band.

In a way, this was disappointing as I could now see every signal on the band, and if there was a spot with no signal visible on my display, I wasn't going to hear it and it wasn't going to be worked, no matter how hard I hoped it would be there. So, some of the excitement of tuning blindly up and down the band hoping to hear DX was diminished but replaced with the knowledge that if I saw a DX station on the band-scope, I most likely could work it. (I solved that issue by getting back to "old school radio" with a refurbished Drake B line, the radios I couldn't afford in high school that I now use quite often!)

The Flex display made working DX stations in split mode far easier as I could see both the DX station and the pileup, and many times by

"coat tailing" the last station he worked after he signed (which also would be visible on CWSkimmer), I would soon be in his log. This is far more efficient and effective than hoping you would land on the right spot, as I experienced by working VKØEK on 20 meters in April 2016 with my Kenwood TS-590 in the last two hours of their DXpedition after a week of fruitless blind calling.

The challenge with the Flex 6500, when using it with the SmartSDR software, is a lack of knobs to change frequencies. This is done by either using the mouse wheel, dragging the receiver frequency to the desired spot, or typing the frequency in the window. This is somewhat alleviated by using a multifunction Flex Control knob which plugs into the computer and emulates a VFO tuning knob. However, not having real knobs was still an issue for rapid QSY, as well as precision tuning. Being forced to use a mouse to change receiver settings although intuitively laid out on the screen, is still slower than having a button to push on radio front panel.

Even more important than knobs and front panel buttons was the fact that the upcoming 6600M also would have two spectral capture units; separate yet equivalent receivers that could be phase locked. At long last, I could utilize space diversity with different antennas such as verticals and Beverages for low band and BCB DXing.

Taking Delivery of the Flex 6600M

With these features in mind, when the Flex 6600M was announced at Dayton 2017, I sent in my deposit a day after the convention ended and waited.





A close-up of the new Flex 6600M

Flex sent out periodic updates, and it soon became clear that they were not going to be rushed into releasing a radio before it had been totally beta tested. My hopes for winter contesting with the new radio were put on hold.

However, I received a notice in late January 2018 that the Flex (M) models were shipping, and a week later, my radio was ready to ship. I immediately sent my Flex



The Flex 6600M has an HDMI Port allowing the radio front panel to be displayed on an external monitor

6500 as a trade-in and received the 6600M just in time for the February ARRL DX CW contest after paying for overnight shipping to make sure it arrived!

My learning curve was very short as the 6600M behaved very much like my previous no knobs 6500. Surprisingly, it took a while to get used to knobs and buttons again. A nice touch was that the 6600M has its own HDMI port rather than using a video display card on the computer. I purchased a second UHD TV with a HDMI input and mounted it on the wall. I could now view the radio display all by itself and the rest of the station functions on the big 40" monitor.

The smaller monitor is dedicated to the Flex display which is a more convenient way to watch what's happening on the bands. As an added bonus, I can DX the DTV spectrum with a Yagi on my mast at 90 feet.





WØAD's antenna stack on
80' of Rohn 45G

Both the 6500 and the 6600M have up to four software defined receivers called “slices” that can be used on the same band, for split operation in DXing. In the case of the 6600M with its two SCUs, true full duplex cross band operation anywhere between 160M and 6M with two antenna outputs is possible. There is no signal degradation between any of the slice receivers as they are simply software decoding digital data. For example, one slice can be monitoring 6M openings while another two slices can be chasing DX on 20 meters.

Integrating the Flex 6600M Into My Station

The Flex 6600M integrates into the station much differently than my previous Kenwood TS-590. A HP quad core computer running Windows 10, the Flex 6600M, the Flex Control, my German made solid state amplifier, (more on this later) and my 4O3A antenna switch (which follows the Flex automatically changing antennas dur-

ing band changes) are all connected. They communicate to each other via a standard commercial (Cisco Meraki) gigabit Ethernet switch.

My prop pitch rotating a W6NL 2 element 40M Moxon at 90', a 9 element FM BCB Stereo Probe 9 at 85' and a 4 element SteppIR at 80' is controlled by a Green Heron RT-21pp. A Tic-Ring at 70' rotating a 3 element KLM 30M Yagi is controlled via a Green Heron RT-21D. A Ham-IV rotating a 4 element SteppIR at 35' on a swinging gate is controlled by a Hy-Gain DCU-1. An Array Solutions 80M 4 square and an Array Solutions StackMatch II switch for the SteppIR completes the interfaces. All are controlled by USB connections to the computer. My objective is to someday be able to operate the entire station remotely. At this point, the only functions that are not remote controllable are Beverage selection and direction selection on my YCCC 5 element receive array.

On the main 40" monitor, I use CWSkimmer, N1MM+ which logs, spots and controls the rotors, VNC to remote control the solid-state amp, and the Hamation (Array Solutions) ShackLAN which controls the 80M 4square and the StackMatch for the SteppIRs. I also run DDUtil, a helper application that remote controls my SteppIR control boxes as they change frequencies. Additionally, I can still run SmartSDR on the big screen as I did before with the Flex 6500 (which remote controls the Flex 6600M and utilize the FlexControl knob). I was somewhat surprised to discover that since using SmartSDR on my PC rather than on the Flex itself, the PC becomes a remote controller even though the Flex is next to the computer and the front knobs and display on the Flex are disabled. Likewise, if I'm using my iPad to control the Flex or if I use a software package SmartLink distributed



by Flex. This allows remote control of the Flex from anywhere, even though my corporate network. The front knobs and display are disabled as a different computer's IP address is controlling the Flex.

SSB/AM/SAM/FM on the Flex uses either a high impedance mic jack or a balanced audio connector for microphone inputs.



A 40" Ultra High Definition TV provides plenty of screen real-estate for applications used with the Flex 6600M

There is no need for an external equalizer since voice is immediately turned into data and can be manipulated as discussed previously. Voice can be studio quality or highly processed and even downward expanded to eliminate background noise. On SSB reception, automatic notch filters can be introduced to eliminate heterodynes as well. One of the benefits of using the Flex is that no external boxes are required for RTTY or digital modes. Since everything is already digital, the signals can be manipulated by software so that the necessary tones and timing are all internal. The Flex is essentially a computer; a purpose built special-

ized computer eliminating the delays associated with general use computers and issues of CPU interrupts and delays. The signal generation is accurately timed without the need for anything external.

The Flex software emulates serial ports with a CAT helper application, and audio/control information with a DAX helper application that are included with Flex's SmartSDR

package. These two applications eliminate the jumble of wires and boxes required for digital modes in standard transceivers. Many of the devices such as rotor controls and helper applications are identified and controlled by the Flex software.

Rather than purchasing the solid-state companion linear amplifier from Flex, I chose to purchase a LDMOS amplifier called a B26-RF2K+ which was an outgrowth of the DARC in Germany marketed as RF-KIT.

https://rf-kit.de/en/2k_Kit.php

This relatively inexpensive amplifier covers 160-6M and is extremely quiet at 1500 watts. It has an internal antenna tuner which follows the Flex using a serial USB cable. It is also remote controllable using a shareware application called VNC. The RF-KIT also has its own touch screen. In order to protect the LDMOS devices from overdrive, I keep the Flex at 50W maximum and the amp has a 16 dB attenuator plus other protective circuitry. Without the attenuator, the LDMOS has such high gain that I couldn't stay legal on 30M even driving it with only 1 watt output from the Flex. With 50 watts attenuated, the RF-KIT puts out 1500W on all bands,



with slightly lower output on 6M. The ease of controlling the amp through the VNC software makes it an excellent step toward my goal of operating remotely.

Performance

So how does this all fit together? The Flex has performed well in several contests since receiving it six months ago. The overload characteristics are superb. I can easily receive a weak DX signal 100 Hz away from a 20+9 local with ease. When DXing, I set my passband to 50 Hz wide and hear no ringing or artifacts even though the passband is extremely narrow. Also, I've been able to enjoy BCB and beacon DXing without the image and overload problems that I have experienced in every other receiver I've ever owned due to high power levels on the BCB. I'm just beginning to get familiar with utilizing the space di-



Decoding KCHK AM in New Prague, MN in diversity mode on the Flex 6600M

The figure above shows the Flex decoding KCHK AM in New Prague, MN in diversity mode right next to the strongest local signal in my area WLOL on 1330. The left signal is coming from my 80M 4 square, and the right side is coming from one of my Beverages. This is similar to what I'd do on CW on 160 or 80M. With the headphones on, the fades will equalize and a weak signal will be much more readable.

To sum it up, the investment I've made in the Flex 6600M and state of the art technology has vastly improved my station. Although it's no substitute for a good antenna farm and a good operator, it provides the means to work DX in a much easier manner than previous technology and I believe is well worth it.

73, Paul WØAD



The new B26-RF2K+ amplifier now interfaces with the Flex 6600M in WØAD's station

diversity mode on the BCB and as autumn approaches I'll be using it more frequently on 160 and 80 meters with the transmit antenna and either Beverages, a loop or the YCCC 5 square RX array.



Note from the President

by Bill Mitchel, AEØEE



As the seasons change once again, I am reminded of the many ways in which ham radio is itself changing.

Over the past year or two, we have seen the rapid rise of FT8. Software-defined radios are becoming more common, and computer-radio interfacing is growing tighter and tighter.

Scientists have pored over the results of the August 2017 solar eclipse datasets, and preliminary results have been published. This data collection was largely made possible by FT8, software-defined radios, and many computer-interfaced radios.

We have two additional bands---630 and 2200 meters---which will provide new challenges for amateurs.

There have been major leadership changes over the past year: many TCDXA board positions turned over, and we have a new ARRL Dakota Division Director and a new ARRL CEO.

Looking toward the future, we likely have a few years before the solar cycle returns the sun to its active state. In the mean time, it is a good time to bring some change to DXing.

We can each spend more time on a new mode or a new band. Your radio may even have some buttons or features you've never learned about, and there's no time like the present to figure out what they do and why they're there.

Our hobby also depends on a robust community of amateurs, so it is important to seek out, welcome, and encourage new DXers. We must be conscious of the barriers that lie in their way and work to minimize those impediments. Perhaps that means showing up to a local club meeting, even though they don't usually talk about DXing. Perhaps that means making your station available for someone to use, or operating portable to give them a chance to see what ham radio is about. Regardless, I hope you will consider what you can do to make an inclusive and welcoming future for DXing.

We are living in a period of major change in amateur radio, but also one of great opportunity and promise. Enjoy the challenges, and keep pushing the boundaries of what is possible with ham radio and DX!



Selecting and Purchasing a New 1500 Watt Solid State Amplifier

by Dan Dantzler, WØJMP

Although I have been a ham since 1964, I really did not become a DXer until 1996. In 1996, we moved into a house where I could for the first time, put up a tower. It was only a 40 foot Rohn with a Hy-Gain TH-3 on top. While I had been a guest operator at many stations with impressive antennas, this was the first time I had my own yagi. It opened up the world. In 1997, I bought my first HF amplifier; an Alpha 89 which I bought at the Dayton Hamvention. Of course it was a tank. It worked well but had several issues that did not fit my operating style. First, it took three minutes to warm up. That is 180 seconds. That is an eternity while waiting in line to work a fading DX station! Second, it required tuning. Not only did you have to wait those 180 long seconds for the tubes to warm up but then you had to find a clear spot on the band to tune up. That took a few more precious seconds away from your time to snag the DX. After a few years of very light use, I sold the Alpha to a big AM user in Chicago.

Next, I bought a Tokyo Hy-Power HL-1.1Kfx. It would put out 500 watts on 160 through 10 meters. I fell in love with solid state amps at that moment. The amp would follow my transceiver and required zero tune-up. It was virtually a 500 watt transceiver! I was sold. But as the sunspot cycle decreased, I began spending more time on the lower bands. And I craved “more power”. I was so impressed with the operation and quality of the Tokyo Hy-Power amplifier that I moved up to the THP HL-1.5Kfx. This solid state product boosted my output from 500 watts to a KW and added six meters. I loved that amp. Sadly, THP went into bankruptcy and these wonderful products are no longer made. As insurance, I bought a spare RF output board with transistors installed.

While I loved the HL-1.1, once again I wanted a little more power. I also wanted an amp that would be easier to control remotely.

Nearly two years ago, I drew up my requirements. They were:

1. Legal limit output for unlimited time. I know that unless I am sending RTTY bulletins, that is more power than needed, but I wanted head room.
2. Easy remote control
3. LDMOS FET finals. After seeing a video about LDMOS FETs, I was convinced that they were virtually indestructible. (LDMOS means laterally diffused metal oxide semiconductor.)

Here is an impressive video about the robustness of LDMOS transistors:

<https://www.youtube.com/watch?v=8ziYqjMQGEQ>

Extra features that I would like to have included:

1. Built by reputable company with track record building amps
2. Built in tuner
3. Separate power supply

After searching, I found only three amps that met my basic requirements:

- Flex Power Genius XL
- SPE Expert 1.5KFA
- Elecraft KPA 1500





FlexRadio Power Genius XL



SPE Expert 1.5K-FA

The good news; all of these amps met my requirements. The bad news? None is in current production.

I looked at each one carefully. SPE Expert certainly has a good reputation and has built a lot of HF amplifiers. The company is in Italy but is distributed in the US by Bob Hardie in Texas. The amp sells for about \$5,000 and you could put your name on the waiting list with no down payment and no obligation. Basically, you got a right of first refusal when your name got to the top of the list. I put my name on the list. There is no tuner included and the amp and power supply are in the same box.

The Elecraft KPA 1500 was next up the price ladder at \$6,000. Elecraft has built a lot of 100 and 500 watt amps and has a great reputation. But they had never built a legal limit amplifier. I have had quite a few Elecraft products and have always been pleased with the product performance. Elecraft service is the best I have en-



Dan, WØJMP with the Elecraft legal limit solid-state amplifier prototype at 2017 Dayton, photo by K9WAG



Eric Swartz, WA6HHQ of Elecraft (left), Dan, WØJMP (right) at the 2017 Dayton Hamvention

countered in the industry. The amp has the power supply in a separate box than can be mounted under the desk. The RF deck is barely bigger than my old Tokyo Hy-Power. Plus it has a built in tuner that will handle mismatches up to 3:1 at full power. It will go up to 10:1 at reduced power. I saw and handled the amp at the Dayton Hamvention in 2017. Of course that was only a mock-up or prototype.

On the top rung of the price ladder was the Flex Power Genius XL at \$7,000. This amp was actually designed and produced by Ranko Boca, 4O3A in Moldavia. His company and Flex are jointly marketing and distributing the amp. Flex is not experienced building HF amplifiers but I think that Ranko has built amps for non-amateur applications.



The amp does not have a built in tuner but if you bought the amp, you were promised a yet-to-be-designed separate tuner. If you ordered and paid early, the tuner was to be provided at no additional cost. The Power Genius is the only one in this lineup that can operate SO2R (single operator, 2 radios) right out of the box. This is a big plus for serious contesters.

Time to decide! The price on the SPE Expert was attractive and they were proven amp builders. But no tuner. Their remote software looked OK. The US distribution appeared to be a small operation. Parts would have to come from Italy if needed. And what about service?

The Power Genius looks like a great amplifier.



54 Pound Box arrived June 7, 2018

Even though it is built in Montenegro, having a US company like Flex behind it was attractive. The lack of an integrated tuner was a minus, and no specs for future tuner was worrisome. It was also the most expensive of the lot.

I finally decided on the Elecraft. Service and support that I have received from

Elecraft over the years, has been top notch. The “two box” system with a separate RF deck was attractive and a built in tuner was a plus. I ordered it paying for it up front to get free shipping. I cannot remember my exact order date but it was early last summer. The first pre-



Switch Mode Power Supply on the Left, RF Deck on the Right

dicted shipping date was “middle of summer, 2017”. In the first of many delays, it was pushed back to “fall” and then to “end of the year”. The shipping date continued to slide. While I was anxious to get my hands on the amp, it was more important to me that Elecraft get it right before shipping. Shipments FINALLY began in February, 2018 but initially it was a very slow trickle. My amplifier finally arrived on June 7th of this year. The serial number on my amplifier is 000210. That may mean it was the 210th unit built but I am not sure. Manufacturers often dither serial numbers to hide actual production quantities.

Obviously, I was thrilled and anxious to open the amp, hook it up and get it on the air. Both the power supply and the RF deck are in the same sized boxes; 4.5 inches high, 13.5 inches wide and 11.5 inches deep. Surprisingly, the RF deck weighed more (15.6 pounds) than the power supply (11.5 pounds) thanks to the lighter weight of switch-mode power supplies. Two cables interface the boxes; one 50 volt line with Anderson Powerpoles that look like the size needed for a forklift truck and one control cable. Connections to allow the amp to read and follow my Icom IC-7610 VFO are via a simple stereo cable with 3.5 mm stereo plugs on each end. A USB cable connects the amp to the computer.



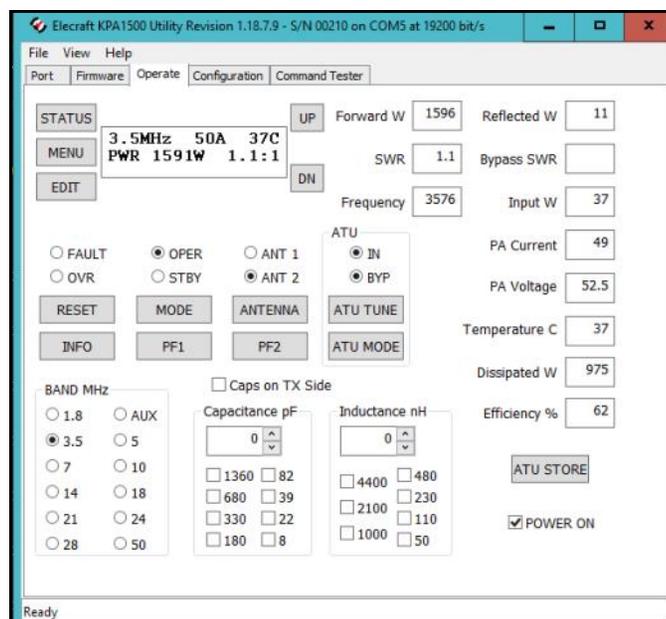
Getting the amp and the radio to talk to each other required a deep dive into the menus on both. Elecraft has produced videos to help setup the amp with most popular transceivers including the IC-7610. Once figured out, the system acted like a 1500 watt transceiver. About 50 watts drive is required for 1500 watts out on most bands.

A basic utility program allows control and monitor of the amplifier functions from the computer. The utility, among other things, allows you to turn the power supply on and off, a great feature for remote operating. It is also used for downloading updated firmware to the 1500. Updating the firmware takes a couple mouse clicks and a few minutes. Since this is a new product, a few updates have already been issued.

How does it play?

The first thing I noticed is the absence of noise going from receive to transmit. The amp uses pin diode switching and my most recent amps have used relays. At first, I had to keep glancing at the power output to convince myself that it was actually doing its job. But, while the T/R transition is silent, other clicks, clacks and whirs do come out of the box. Whenever changing bands, relays clack. Activating the tuner also creates a clatter. And the cooling fans do whirl. There are three fans on the RF deck that kick in at various temperatures. The first fan on my unit started with a slight squeal before spooling up to speed. I called Elecraft and had a new fan in a few days. But after operating for a while, the squeal worked itself out so I have not yet replaced that fan. The fans do make noise and that has been a complaint of some users. I do not find them objectionable but they are certainly noticeable. In the latest firmware update, Elecraft raised the

temperatures at which the fans kick in. I am sure that is a result of the noise complaints. Getting rid of the heat in a 1500 watt amplifier does require some air to move. Also, at lower power, the LDMOS FETs are not particularly efficient. Since I often use digital modes, I am operating the amp at 100 to 200 watts output. At this level, the amp is only about 20% efficient. The means more power is being converted into heat. But, at 1600 watts CW out into a dummy load, the finals are running at 61% efficiency.



Screen shot of the KPA 1500 Utility Showing 1591 Watts (into a Dummy Load) and 62% Efficiency

Bottom Line

\$6,000 is a lot of money to spend on an amplifier for amateur radio. It is not something that I would do without a lot of considerations. Did I “need” this amp? Of course not. But I am happy with my decision and with the final selection. I hope to use it for many years to come. If anyone would like more information or would like to try it out, let me know.



Dollars for DX Report

Mike Cizek WØVTT
DX Grant Manager



Greetings. The fall DXpedition season is starting up. We have had two requests for DXpedition funding; TO6OK and TT8KO. The Czech DX Group asked for funding for their upcoming trip to Mayotte, TO6OK. Given their outstanding track record from past DXpeditions, your board recommended we give them a \$250 donation, which is in line with our club guidelines for a top 100 country. Mayotte ranks #96 in the Clublog global most needed list. At press time, only 60 of our 150 club members had voted. The voting period ends on Saturday 8 Sep so please cast your vote before then. Remember, this is YOUR money we are spending.

Just before press time Ken LA7GIA asked for funding for his one man operation as TT8KO in Chad this coming October. I have not yet had time to examine his request but hope to get my recommendation to the board during the Labor Day weekend.

Your board of directors is working on the fiscal year 2019 budget for the club. One of the items we are discussing is whether or not to increase the budget allotment for DXpedition funding. We have donated significantly more than our allotment for the past four years and the club is still financially sound. The new budget will be presented to the membership at our September meeting.

73,
Mike WØVTT

Join TCDXA

Our mission is to raise *Dollars for DX*, used to help fund qualified DXpeditions.

Our funds come from annual member contributions (dues) and other donations.

TCDXA is a non-profit organization, as described in Section 501 (c) (3) of the Internal Revenue Code. All contributions from U.S. residents are tax-deductible.

Becoming a member is easy. Go to <http://tcdxa.org/> and follow the instructions on the home page.

All contributions (including annual dues) may now be paid on our secure site, using PayPal or credit card.

Gary Grivna KØGX

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Treasurer's Report *from Pat Cain, KØPC, treasurer*

TCDXA OPERATING BUDGET FY 2018

**(Sep 2017 - Aug 2018)
August 31, 2018**



INCOME	ACTUAL	BUDGET	Actual 2017
Surplus from FY 2017 (balance 8/31/2017)	2689.68		5200.20
Member Dues 2018 by Cash/Checks/PayPal	4578.52	4500.00	4649.36
Door Prize Ticket Sales club share	723.00	500.00	602.00
Donatons (estates, wills, etc.)	0.00		
Refunds and Reversals	0.00		5.79
TOTAL INCOME	7991.20	5000.00	10457.35
EXPENSES		BUDGET	Actual 2017
Member Recruitment/Retention	0.00	(300.00)	0.00
Website ISP & Domain Name	(65.69)	(70.00)	(65.88)
Office Supplies, Miscellaneous expenses	(23.57)	(150.00)	(87.96)
Flowers <SK> and Hospital gifts	0.00	(200.00)	0.00
Holiday Party 2017	(528.64)	(500.00)	(433.15)
ARRL Spectrum Defense Fund	(100.00)	(100.00)	(100.00)
NCDXF Donation	(250.00)	(250.00)	(250.00)
MWA Plaque	(75.00)	(75.00)	(75.00)
DXpedition Contributions Total	(4,002.51)	(3000.00)	(6755.68)
#1 Dxpediton - VK9MA Mellish Reef	(500.00)		
#2 Dxpediton - 3B7 St. Brandon	(500.00)		
#3 DXpedition - 3C0L Annobon	(251.26)		
#4 Dxpediton - KH1 Baker Island	(2,000.00)		
#5 Dxpediton - 6O6O Somalia	(251.25)		
#6 Dxpediton - VP6D Ducie Island	(500.00)		
#7 Dxpediton -	0.00		
#8 Dxpediton	0.00		
#9 Dxpediton	0.00		
TOTAL EXPENSES	(5045.41)	(4645.00)	(7767.67)
NET	2945.79	355.00	
Checking balance	2945.79		
PayPal balance	0.00		
Cash / Checks on Hand	0.00		
NET BALANCE	2945.79		



Backscatter: Miscellaneous, Assorted and Sundry Items of Note

by Dan Dantzler, WØJMP

The End of Time?

Well, not exactly. But the time (and frequency) standard that we have used for decades is on the chopping block. WWV, including WWVH and WWVB is not in the 2019 National Institute of Standards and Technology (NIST) 2019 Budget. The proposed operating budget for 2019 is a 28% reduction from the 2018 budget.

WWV and WWVH transmit on 2.5, 5, 10, 15, and 20 MHz. WWV is located near Boulder CO and uses 70KW ERP.

WWVH is located near Kauai, HI.

WWVB is also located near Boulder and transmits on 60 kHz. WWVB is the signal used by an estimated 50 million “atomic” watches and clocks.

There is a famous budget game played in Washington called “Washington Monument”. The sequence is 1) The Park Service is asked to reduce their budget and eliminate expenses. 2) The Park Service proposes to close the Washington Monument. 3) The public outcry against the closing is deafening. 4) The budget is restored and the Monument stays open. I suspect this may be a game of “Washington Monument”.

The entire budget reduction is \$49 million of which the maintenance of WWV/H/B is \$6.3 million.

There are other good ways to obtain standard time today (such as internet programs and GPS). However, the obsolescence

of 50 million clocks and watches should create a significant outcry. If you would like to see the entire budget, it can be found here:

<https://www.nist.gov/director/fy-2019-presidential-budget-request-summary/fundamental-measurement-quantum-science-and>

If you are opposed to the cut, write to your senators and representative. There is also an online petition but I do not think they are very effective. If you are interested, it can be found here:

<https://petitions.whitehouse.gov/petition/maintain-funding-nist-stations-wwv-wwvh>

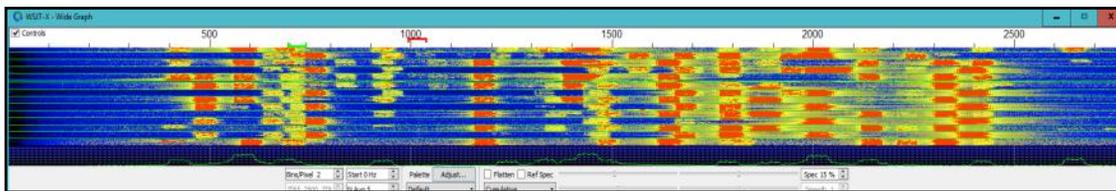
2018 Sporadic E Season

We just completed an excellent Sporadic E season. Six meters was hopping from May into late July. I worked over 1,000 unique call signs on 6 meters this year. I worked some on CW, FSK144 and SSB but most on FT8. I saw many working Europe and Asia. Kirk, NØKK snagged a Hawaiian station to complete his 6 meter WAS. But he is still waiting for the confirmation.

Why was this a big season? I think there are several reasons. First, more and more HF rigs are including six meters. Many newer amplifiers, especially solid state amps also include six. With that, more operators are exploring the “magic band”. But the biggest factor is FT8. This is the first Es season where FT8 was in wide use. FT8 is a game changer for a couple reasons. First, it is a very sensitive mode so smaller stations can join the fun. Second, it is fast. JT65 and JT9 were effective on six but quickly changing propagation on six led to many incomplete QSOs. That was Joe Taylor’s (K1JT) main reason for developing FT8. Most important is the way JT modes operate.



If I want to look for propagation on six meter SSB or CW, I go to the calling frequencies. But I can easily miss a QSO as I often hear only one side. It is very easy to tune around and miss QSOs, give up and go to other bands.



6 Meter waterfall on August 13, 2018.
Yes, this really is 6, not 20 meters.

With JT modes, including FT8, you are decoding an entire slice of band at the same time. The waterfall this season often looked like it was 20 meters instead of six. I also believe the activity on FT8 attracted more people to other modes. Once you are set up for FT8, you are only a mouse click away from using MSK144 for meteor scatter.

Still need a layout person for The Gray Line Report

As previously announced, I have decided to end my duties as the layout person for The Gray Line at the end of 2018. That means I only have one issue left. I (and my predecessor) use Microsoft Publisher for the newsletter layout. It is a powerful and relatively easy desktop publishing program. If you have used Word and Excel, you already have the basic skills needed. If you have been using another desktop publishing program, you would find the transition to publisher simple. Or you could use another program if you preferred. I will be happy to work with you for several issues and be on call after that. Please step forward and keep this newsletter alive. Keith, K9WAG will also be stepping down as proof-reader. We have had a couple people volunteer for this position.

Visalia International DX Conference

The 70th (yes 70th!) International DX Conference will be held in Visalia, CA on April 12, 13, and 14, 2019. Hotel registration is now open. This is one of the premier or per-

haps THE premier DX conference in the world. For more information, go to:

<http://>

www.dxconvention.com/

Silent Keys

It is with great sadness that the TCDXA announces the loss of the following members:

Steve Towle WØHT

Dennis Luther KØFZ (charter member)

Stub Filter Follow-Up

by Bill Mitchell, AE0EE

In the June issue of the Gray Line, I wrote about building coaxial cable stub filters for Field Day. Now having experienced Field Day, I can report that we learned a few things.

First, the stub filters need to be shielded to be effective---otherwise they are a resonant antenna, and two in close proximity will help the stations couple into each other, rather than reducing interference. PI4CC uses paint cans (with an SO-239 connector through the lid) to hold the stubs, though with larger-diameter cable you may need a different shielding setup.

Second, with our antenna set-up designed to reduce interference and an operation that primarily used SSB, inter-station interference was rarely an issue. As a result, we did not need the filters and they were available but not used.





The MWA Contest Corner

By Al Dewey, KØAD



Synergy with New Contest Radios

Some exciting new radios have hit the market in the last year or so. ICOM released the ICOM IC-7610 which is a Software Defined Radio (SDR). Although it replaces the ICOM IC-7600, it is probably more similar to the ICOM IC-7300. Known TCDXA members now owning the new ICOM IC-7610 SDR include KØMD, NØAT, WXØV, WØJMP and NJØF. Flex Radio Systems started shipping the Flex 6600 and 6600M which is a complete Single Operator Two Radio SDR transceiver in a single box. TCDXA members taking delivery of

the new Flex 6600M include WØAD, KØAD, NØBK, KØTG, KEØOR, and K3WT. I encourage you to connect with club members as you learn to use your new radios. Let's face it, these SDR radios are a bit more complicated than radios of the past. They have a lot of great



ICOM IC-7610 SDR Transceiver



Flex 6600M SDR Transceiver

features but it can take some digging to learn to get the most out of your new radio. Initial reports from those using both the ICOM IC-7610 and Flex 6600M are extremely positive.

In my situation, Paul (WØAD) was very helpful in helping me make the decision to purchase the Flex. He took possession of his 6600M in February and invited me over to try his out and even run one of the Wednesday CWT contests. I put one on order the next day. In the weeks leading up to receiving my new radio, Paul answered almost daily questions I had. Another example of "synergy" was with K3WT. Tom asked me a lot of questions about the 6600M and decided to place one on order. When he received his, he had a lot of questions about setup and wondered about a weak "clicking" noise he heard in his new radio. So he brought his radio over and we

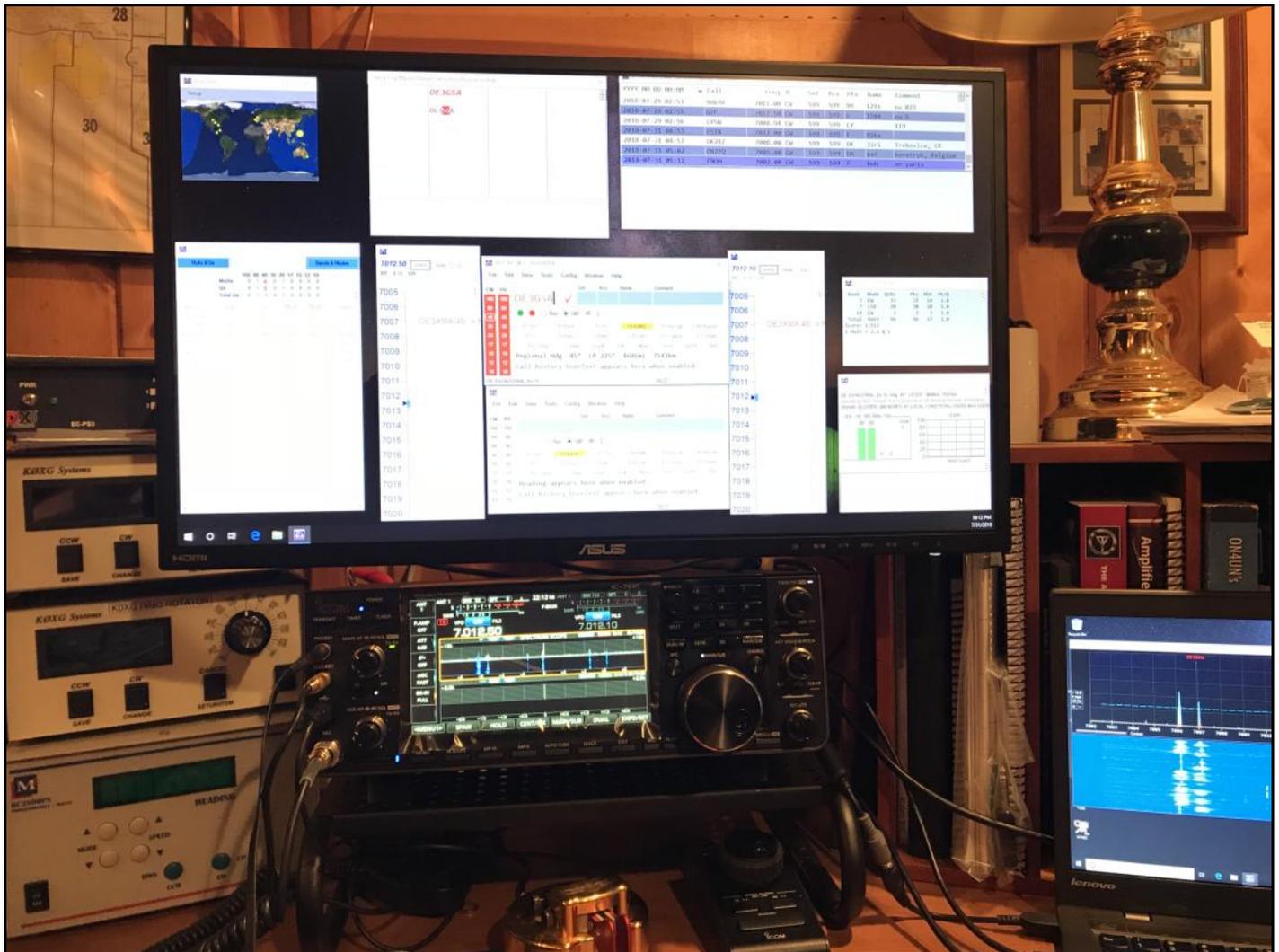
did some A/B tests with mine. The noise was confirmed and Tom was able to work with Flex to get a new 6600M shipped to him.

Of course, sharing knowledge and asking questions can go well beyond TCDXA and MWA. Both ICOM and Flex have User Communities where experiences can be shared and questions asked.



I recently had an issue getting “Record on the Fly” to work with N1MM+ and my new Flex 6600M. I perused this on both the N1MM+ User Forum and Flex Community. I was put in contact with Don, N4ZZ who had just gone through this. We got on the phone and narrowed the problem down to a problem in the DAX drivers that came with my Flex 6600M. I re-installed their drivers and all then worked well. My point is that I encourage all of you who

have new state of the art radios in your shack to reach out and ask for help if you are having any issues with your new radios. I can almost guarantee that you will find an answer either within the club or beyond. I also encourage you to read WØAD’s review of the Flex 6600M elsewhere in this issue as well as the excellent review of the ICOM IC-7610 (including comments from Scott, KØMD) in the October, 2018 issue of QST.



A New ICOM IC-7610 Now Occupies a Prominent Place in KØMD’s shack



Helping MWA with Your Contest Score

Every once in a while, I like to remind everyone (especially new testers) of how your individual contest score helps the Minnesota Wireless Association compete as a club against other contest scores. The most basic way is the simple addition of your individual score to those of other MWAers to form an overall club score. This club score is compared to total scores of other clubs to determine club completion winners in a number of categories. Club competition in ARRL Contests, for example, have an Unlimited (50 or more logs), Medium, and Local Category. MWA usually competes in the Unlimited Category because of the large number of logs its members submit. The second way that you can help is by participating in a multiple operator effort at a single station. The score submitted by the multi-op is added to the overall club competition score. There are a couple additional requirements to have a multi-op score included. First of all, the multi-op station must be located within MWA's 175 mile circle. If, for example, a bunch of MWAers went out to Colorado and did a multi-op effort, that final score would NOT count for MWA's club competition score. If, however, the multi-op station is located in a DX location outside North America, the total multi-op station score DOES count for the MWA club score. One other rule for multi-ops is that 50% or more of the operators in a multi-op must belong to the same club for that score to count. For example, if two MWAers joined four other testers from the Society of Midwest Testers (SMC) and operated at WØAIH, that club score would NOT count for MWA (e.g. it would count for SMC).

Some contests have team competition instead of club completion. Teams are formed before the contest and are usually open to anyone (i.e. not just operators from one specific club). The North American QSO Parties are examples of a contest with Team Competition.

Whatever method you are using to help your contest club compete, it is important that you make sure you are on the club roster, put "Minnesota Wireless Assn" on your log and (most importantly) make sure you remember to submit your log after the contest!

MWA Fall Meeting Scheduled

With the 2018-2019 contest season just around the corner, The Minnesota Wireless Association has scheduled its fall meeting for September 24th at Broadway Pizza in Blaine. This is always a fun time to meet old friends, meet new testers in the area, learn how MWA fared in the previous contest season, enjoy some pizza, honor MWA award winners and more. This year, there will be a "Contest Panel" to which newbies and veterans alike can pose their radiosport questions. Guests are always welcome. The cost (to cover dinner) is \$15.00 for Guests, \$10.00 for the Winning MWA Team and \$20.00 for the losing MWA Team. More information on the MWA Fall Meeting is available at: <http://www.w0aa.org/index.php/8-articles/articles/42-meeting-announcement>. If you plan to attend, MWA asks that you RSVP on the Web Page just mentioned so they know how to plan and how many pizzas and salads to make.





TWIN CITY DX ASSOCIATION (TCDXA)

CLUB FACT SHEET

Who We Are:

The Twin City DX Association (TCDXA) is a 501(c) (3) non-profit amateur radio organization, whose members have an interest in DXing and in supporting the club mission: **Dollars for DX**. Bylaws and Articles of Incorporation govern the club's operation.

Club Mission:

The club mission supports major DXpeditions with financial donations. The source of operating income for this activity is an annual contribution (dues) of \$25 from each member.

DX Donation Policy:

The policy supports major DXpeditions that meet our requirements for financial sponsorship. All requests must be approved by the Board of Directors. Final approval is by vote of the full membership. Over 70 DXpeditions have been sponsored since 1997. Details are available on the website at: <http://www.tcdxa.org/sponsoredDXpeditions.html>

Club History:

The club was formed in the early 1970s by a small group of DXers from the Twin City area. Over the years, the club has changed; most notably by opening its doors to anyone interested in DXing - from the casual to the very serious operator. Our membership now resides in numerous states and several countries.

Requirements for Membership

We welcome all hams who have an interest in DXing and hold a valid FCC Amateur Radio License. It doesn't matter whether you're a newcomer, or an old-timer to DXing; everyone is welcome!

Meetings:

The club meets on the third Monday of each month (except July & August) at PUB 42 Restaurant in New Hope, MN. Members gather early in the bar for Happy Hour, and move into a private room at 5:00pm for dinner and a short business agenda, followed by a program. If you enjoy a night out on the town with friends, you'll enjoy this get together. Meeting attendance is NOT a requirement for membership.

Club Officers:

Four officers, plus one additional member make up the Board of Directors; currently: Bill Mitchell, AEØEE, President & Director, wsmitchell3@gmail.com, Bert Benjaminson, WBØN, Vice President & Director, Pat Cain, KØPC, Secretary/Treasurer & Director, k0pc@arrl.net, Mike Cizek, WØVTT, Director & DX Donation Manager and Doug Arnston, KØPX, Director.

Website:

We maintain a website at www.TCDXA.org that provides information about a variety of subjects related to the club and DXing. The site is maintained by our webmaster Pat Cain, KØPC.

Newsletter:

The **Gray Line Report** is the club newsletter, which is published on a quarterly basis. We're proud of the fact that 99% of the content is "homegrown" – written by our members. Past issues are on the website at: <http://www.tcdxa.org/newsletter.html>.

How to Become a Member:

An application for membership can be completed and submitted online, or printed and mailed in. (See <http://www.tcdxa.org/Application.html>) Contributions may be made by check or via the PayPal link on the homepage at www.TCDXA.org.

Visit us at a Meeting:

You are most welcome to attend a meeting, and look us over, before joining. Meetings are held at the PUB 42 Restaurant at 7600 Avenue North in New Hope (<http://pub42.com/>). Join us for happy hour at 4:00pm with dinner at 5:30pm, followed by the meeting at 6:30pm.



VKØIR	K5D	AHØ/NØAT	3W2DK	K4M	XU7MWA
ZL9CI	VK9DWX	5X8C	FT4TA	TX3A	S21EA
A52A	FT5GA	K9W	VK9MT	KMØO/9M6	J2ØRR
T33C	3D2ØCR	XRØZR	VK9DLX	YS4U	J2ØMM
3B9C	E4X	T3ØD	VU4KV	YI9PSE	BS7H
TX9	CYØ/NØTG	3W3O	EP6T	ZL8X	N8S
CP6CW	VP8ORK	3W2DK	VP8STI	4W6A	3B7SP
3YØX	VU4PB	FT4TA	VP8SGI	T32C	3B7C
K7C	STØR	VK9MT	TX3X	HKØNA	5JØA
5A7A	3D2C	VK9DLX	VP6DX	7O6T	K5P
VU4AN	3CØE	VU4KV	TX5C	NH8S	FT4JA
VU7RG	TT8TT	EP6T	9XØR	PTØS	PZ5W
VK9DWX	9M4SLL	3GØZC	9U4U	FT5ZM	ZL9A

TCDXA DX DONATION POLICY

The mission of TCDXA is to support DXing and major DXpeditions by providing funding. Annual contributions (dues) from members are the major source of funding.

A funding request from the organizers of a planned DXpedition should be directed to the DX Donation Manager, Mike Cizek, WØVTT. He and the TCDXA Board of Directors will judge how well the DXpedition plans meet key considerations (see below).

If the Board of Directors deems the DXpedition to be worthy of support, a recommended funding amount is presented to the membership for their vote. If approved, the TCDXA Treasurer will process the funding..

Key Considerations for a DXpedition Funding Request

- | | |
|---|---|
| <ul style="list-style-type: none"> DXpedition destination Ranking on <i>Most Wanted Survey</i> Most wanted ranking by TCDXA Members Logistics and transportation costs Number of operators and their credentials Number of stations on the air Bands, modes and duration of operation Equipment: antennas, radios, amps, etc. Stateside and/or foreign QSL manager | <ul style="list-style-type: none"> Website with logos of club sponsors QSLs with logos of club sponsors Online logs and pilot stations Up front cost to each operator Support by NCDXF & other clubs LoTW log submissions Previous operations by same group Valid license and DXCC approval Donation address: USA and/or foreign |
|---|---|

To join TCDXA, go to <http://tcdxa.org/>.

