

**Narrative Description of Events
And Lessons Learned
2nd Quarter Maryland-DC Hospital Drill
Montgomery County (Maryland) ARES
April 9, 2022**

This is an addendum to the Incident Activity Log, elaborating on the Montgomery County ARES participation in the exercise. It was written by KN3U. A draft was circulated to the exercise participants, and this final version of the report incorporates their feedback and suggestions.

SETUP

Six Montgomery County ARES members arrived at Holy Cross Germantown Hospital in advance of an 0700 call. We were soon joined by a seventh member. Two additional members participated from home, as planned.

The lift gate to upper levels of the parking garage – normally reserved for employee parking – was down when we arrived. A quick visit to security resolved that. Fortunately, they “got the memo” and were expecting us. Unfortunately, they were unable to lock the lift gate open, so later arrivals had to park at the lower level. This was only a minor inconvenience.

At any rate, by 0700, we – and our equipment – were on the top deck (Level 5) of the garage. W3TDH, KC3MIX, WA3UEA, and AC3N went about erecting the antenna, while KN3U and N3DDS set up a portable shelter and station one level down.

The HF antenna was assembled from a kit including two military surplus AN/GRA-50 doublets with an AB-155 mast kit. We configured it as crossed inverted-vee dipoles for 80 and 40 meters, about 20 feet above parking deck. We have found that parking garages make excellent ground planes for NVIS antennas. We also set up a VHF/UHF base station antenna to access the CMRG repeater in Frederick. We used the WA3YOO call sign on UHF.¹

Three members brought their portable go-stations. Two were used during the exercise.

By 0730, the VHF/UHF station was up and we made contact with exercise participants in other counties using the CMRG repeater network. At 0815, our HF station was ready for first contact.

Exercise Tasks

1. Our first task was to originate a round-robin message via Winlink HF P2P. I didn't note when the PG station indicated that they were ready to establish a P2P connection, but I estimate it was around 9:45. At that point, we encountered an error message from Ardop saying that the

¹ WA3YOO was originally the call sign of the RACES station at the Montgomery County EOC, and has been maintained as a club call sign by MCACS. We use it on our repeaters and RMS gateways. The call sign is sometimes also used for Montgomery County ARES activities in the field.

assigned sound card was absent. This turned out to be a simple issue, but it took us quite some time to figure out what was wrong. (Note egg on face.)

It turns out that during configuration and testing a few days before the event, the radio's USB cable had been plugged into a different USB port on the laptop. At that time, the radio's built-in sound card was identified as "USB Audio Codec" in the Windows Sound Control Panel. When plugged into a different USB port on the day of the exercise, it was identified as "2- USB Audio Codec." Ardop, of course, was looking for a sound card having the original name. Once we realized that, we changed the sound card assignment in Ardop and all was well. (Windows also makes any "new" sound card the default, so you have to make sure that you undo that assignment as well.) At 10:19, we established a solid connection with to KD3JA at the PG site and the round-robin was off and running.

2. A parallel task for Montgomery County was for WB2U to originate a Winlink message to W2LNX via Vara FM P2P. W2LNX was to forward the message to KD3JA using HF P2P. However, the PG station was busy with another task at the time. W2LNX was unable to establish contact with KD2JA before he had to leave for another commitment, so he sent the message to us at Holy Cross Germantown Hospital with instructions to forward the message to PG County. Subsequently, we were distracted and neglected to forward the message. By the time I noticed the oversight, the PG HF station had secured. (Sorry, Vic and David. You did your part!)
3. At 10:36, KC3PLT placed an APRS "bread crumb" on the aprs.fi website using his own station and call sign (KC3PLT-9) from the Holy Cross Germantown Hospital location. He also initiated a message using the Winlink GPS Position Report template, which was sent to KA3AHI by N3DDS via HF Winlink before the conclusion of the exercise. With 20/20 hindsight, we now realize that we should have used the Winlink GPS Position Report feature to send the report directly to the CMS, where a pin would have been placed on the map found on the Winlink.org website. We did not do that, a significant oversight.
4. Around 11:45, we were contacted by St Mary's County to receive a message from them, closing the loop on the round-robin portion of the exercise. It took multiple tries, but we were eventually able to receive the message in full at 12:58. We forwarded the received message to KA3AHI's Winlink mailbox via an RMS Gateway station near Rochester, NY, bringing our part in the exercise to a conclusion. We signed out of the voice net at 13:20.
5. By 14:00, all equipment was packed and loaded and participants departed from the hospital grounds.
6. Due consideration was given throughout to the safety of participants and bystanders. No injuries were reported, and no animals were harmed by our testing. (We did see a large bird of prey hunting in nearby parkland.) One box of donuts was completely consumed. A good time was had by all.

Lessons Learned (or Re-Learned)

1. The ICS-309 Message Log generated by Winlink Express lists the time the message was posted to the Outbox, which may be significantly different from the time the message was sent or received at a given station. In our ICS-214 activity log we noted the time of transmission or reception, as recorded in the Ardop and Vara logs. It is interesting to look at the time differences:

Station	Message	ICS-309	Vara Log	Ardop Log
Sent to KD3JA	Part 1 exercise message originated	0946		1019
From W2LNX	Unscripted test (10k image file)	1033	1054	
From W2LNX	Exercise message from WB2U	1033	1055	
From WB2U	Unscripted test	1100	1101	
From KB2SKP	Part 1 exercise message reply from STMA	1138		1258
To KA3AHI	Forward STMA reply via RMS Gateway	1303	1309	
To KA3AHI	Winlink GPS Position Report via RMS Gateway	1316	1320	

2. Many instructions on the web provide the menu settings for a given radio to run Winlink on HF. Most of these postings leave out essential information about how to operate your radio for best results. Among the “gotchas” that keep arising during our training are the following.
 - Be sure you are on upper sideband, or “upper sideband-digital”, if your radio has a digital mode (often indicated as USB-D, DIG-U, or similar notation).
 - The abbreviation “USB” can mean upper sideband or universal serial bus, depending on context. Sometimes both in the same sentence!
 - Be sure your receiver’s IF filter bandwidth is centered at 1.5 kHz above the carrier frequency and wide enough to accommodate the bandwidth of the modulation scheme you are using. If your radio has a choice of roofing filters, select the narrowest roofing filter that is wider than your signal bandwidth. If your IF bandwidth is set correctly, you should see noise in the Ardop/Vara waterfall display across the entire space between the two vertical bars that denote the signal bandwidth.
 - The narrow (500 Hz) modes of both Ardop and Vara have a distinct advantage in terms of signal-to-noise ratio. Running narrow also make you less of a target for being stepped on by other stations, and make you a good neighbor by sharing the band with others. Use the wide modes only when you have a long message or attachment to send, strong signals at both ends of the link, and only if the band is not crowded.
 - Be sure that transmit compression is turned off. If your radio has a digital mode, it probably does this for you automatically, but check the user manual to be sure.
 - Be sure that the receiver’s notch filter is turned off. Again, some radios do this automatically in digital mode, but others do not. If you overlook this detail, the notch filter will severely interfere with demodulation of received data signals.
 - Ditto for RIT and XIT (receiver and transmit incremental tuning, sometimes called “clarifier”).
 - Ditto again for most digital noise reduction modes that are implemented using DSP. Modern DSP algorithms can work wonders dealing with unwanted noise that interferes with voice

reception, but at the cost of adding distortion and/or audio artifacts that interfere with demodulation of data signals.

- Set the audio gain of the receiver to a comfortable midrange listening level and leave it there. Turn the automatic gain control (AGC) off and use the RF gain to control the receiver's volume. Watch the RX signal strength meter and waterfall display in your modem software and turn the RF gain down if the meter goes into the red. Reducing the RF gain reduces background noise and interference, and prevents strong signals from saturating or overloading the IF stage of the receiver and/or the DSP unit. So, to the extent that you can do so and still hear the station you are communicating with, you are better off.²
- Carefully set your transmitted audio level to avoid overdriving the transmitter. How to do this is highly dependent on the particular radio you are using. Unfortunately, many radio manuals are vague on the details, and there is a good deal of bad advice to be found on the web. This topic deserves a full article.
- It generally pays to keep your TX audio drive level above the midpoint in the Ardop and Vara apps, and also in the Windows Sound Control panel. Use the radio's transmit audio level controls if you are getting too much audio for the transmitter to handle.³
- Make sure your radio's sound card is not listed as either the "default device" or default communications device" in the Windows Sound Control Panel. Otherwise, you will inadvertently be transmitting Windows beeps and boops. Unfortunately, Windows plug-and-play functionality is severely limited, so it pays to check your sound card settings in the Control Panel every time you make changes to your setup. I have a shortcut to the Sound Control Panel on my Windows taskbar so I can open it with one click.
- It is a great idea to lock your radio's dial so as not to inadvertently bump the radio off-frequency.

3. I was aware that there was a space weather forecast of a slight possibility of degraded propagation on Saturday due to coronal mass ejection that occurred on Thursday. Despite subsequent reports that there were some impacts to HF communications on Saturday, we didn't notice any propagation issues during the exercise. We established P2P connections with exercise

² Advice on the web is all over the place regarding the best AGC setting for digital modes. Consider this: AGC was developed to prevent blowing out your eardrums should a strong station start transmitting while you have the RF gain turned up to pull in a weak signal. The AGC circuit reacts to the strong signal a lot faster than we do! But when the AGC turns down the RF gain in response to a strong signal, that weak signal you are trying to demodulate disappears entirely. So, better to turn AGC off and let the modem deal with the strong signal as best it can. No eardrums will be damaged, and there is a very good chance that the demodulator will be able to decode the weak signal despite the interference. This article explains things very well.

If you do use AGC, choose the fast AGC setting. The slow setting was designed to "hold on" to the AGC setting in between syllables when listening to an AM or SSB voice signal. When operating using a data mode, there are no syllables; the output of the data modem usually has a constant, or nearly constant, audio level.

³ If you reduce the drive level in the digital settings on the PC, you are effectively reducing the resolution of the 16-bit digital words that represent the audio waveform. For example, if you reduce drive level to 25% in the computer, your 16-bit audio becomes 14-bit audio, with a loss of fidelity.

stations on both 40 and 80 meters, and also had solid connections with RMS Gateway stations near Philadelphia, PA and Rochester, NY.⁴

4. Several members noted that Winlink P2P connections are inefficient for passing time-sensitive traffic on HF, due to the need to coordinate frequencies for each and every connection. However, on the plus side, the use of the Windows HF P2P mode provides an opportunity for lots of MDC ARES members to participate, and provides valuable HF operating experience. (There is a big difference between making random contacts on HF and being able to reliably pass traffic with a specific station in a specific location at a specific time.) It also generates a significant amount of traffic on the required UHF coordination net, which is a realistic simulation of operating conditions on a busy net with lots of traffic and people coming and going. So there is a lot to be said for running these P2P exercises, even if the mode is suboptimal.

Similarly it was noted that on the day we are needed to pass critical third-party traffic in a disaster, it will be because of a widespread internet outage, which means the CMRG network – which relies on the internet for links – will be compromised. On the other hand, while acknowledging the essential truth of that criticism, it's still a useful training exercise to use the CMRG system to maximize the pool of exercise participants and get to know each other.

For the long term, we need to develop some RMS gateway stations in Maryland to make better use of the Winlink Hybrid Network as well as the optional RMS Relay capability. Perhaps we can set up a Zoom meeting among interested parties to discuss that. I've spoken to Steve Waterman about this. He has some specific recommendations along those lines, and has offered to assist us if we want to pursue that.

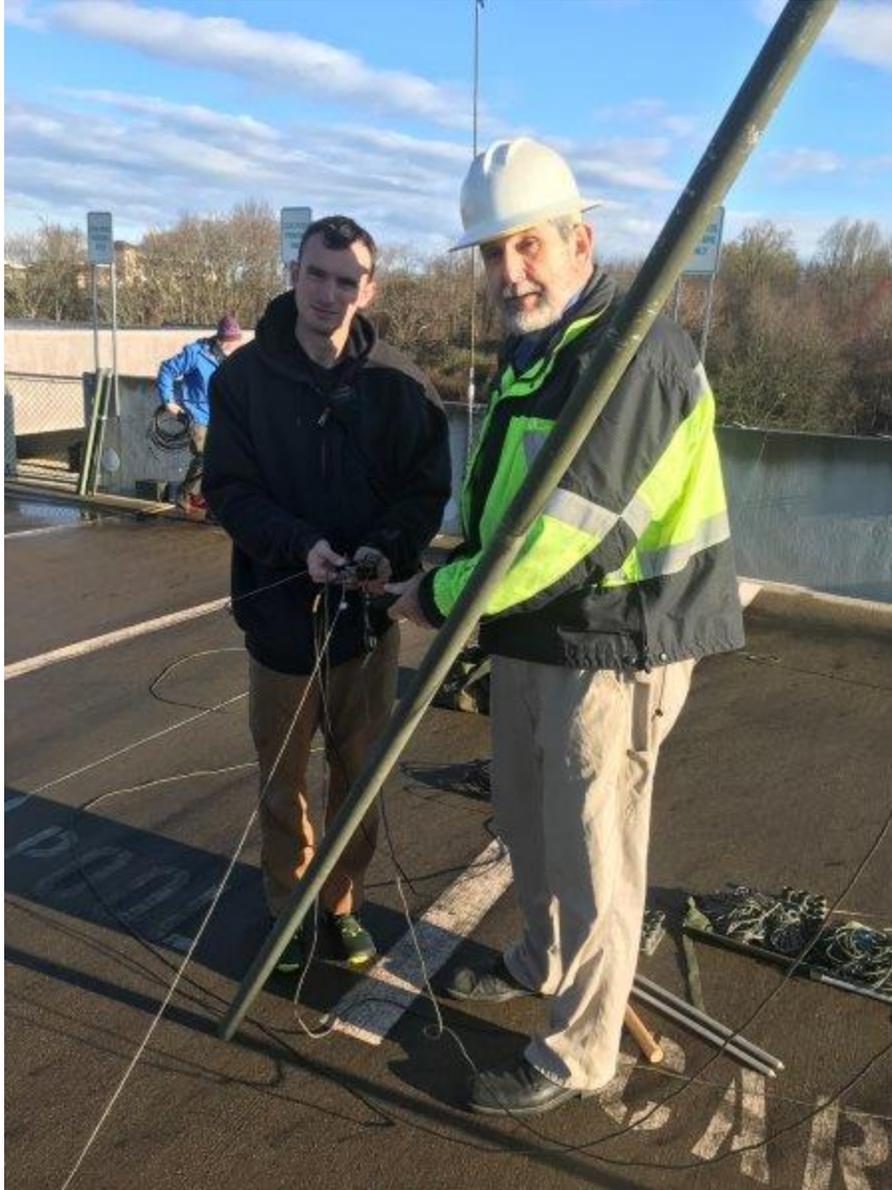
5. Finally, thanks to Jim and Wanda for the effort that went into planning the exercise.

A few photos are attached.

⁴ Our connection with W2LNX was likely via ground wave. Our connection with St Mary's County was likely skywave, while our connection with Bowie, at 23 miles, could have been either or both.



N3DDS's elegant self-contained go-station; W3TDH and KN3U.



KC3PLT and W3TDH getting ready to raise the antenna. KC3PLT is holding the center insulator with the four dipole legs, feedline, and halyard attached. One leg of the tripod supporting the center mast is seen. A second HF antenna and the VHF/UHF antenna were strapped to the railing in the background.



From left: N3DDS, KN3U, KC3PLT, KC3MIX, and (washed out by the ample sunlight) AC3N. Because of the pleasant weather (and covid threat), we only set up to of the tent sides to serve as a windbreak. Behind the (cellphone) camera: WA3UEA.