

# My Portable Station Design and First Parks on the AIR (POTA) Activation

Doug McNulty  
KM4GC

Aerospace Ham Radio Club Meeting  
23 February 2023

# Discussion Topics






- Design Objectives
- KM4GC Portable Equipment Architecture
- Pictures of Portable Station
- What is Parks on the Air (POTA)?
- First Park Activation Experience
- Logging
- Conclusions
- Backup Info:
  - Equipment List
  - Minimum Required Logging Data
  - Example .adi File Entry for a QSO
  - Power Pole Connectors and Crimper
  - Setup Location in Park

# Design Objectives

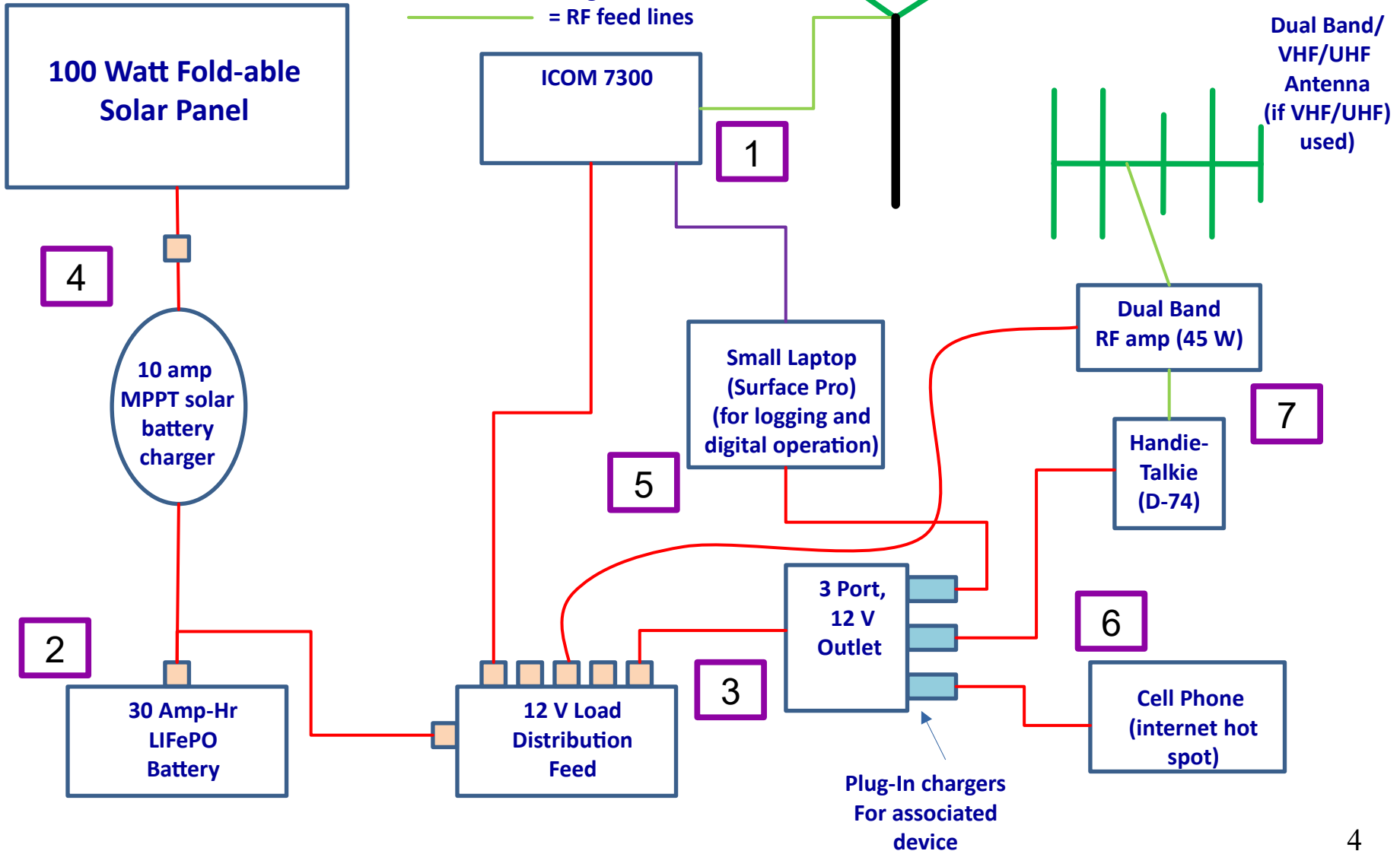
- Parks on the Air Park Activation
- Camping with RV
- Designed around MFJ-2289 HF antenna – won it as a door prize at a local ham club meeting
- Use with ICOM 7300 – 100 w, HF, Digital, SSB, & CW operations
- Cell phone for hot spot internet access
- Experiment with solar charging of battery
- Use Power Pole 12 volt DC power connectors – for compatibility with rest of shack and other hams for field day etc.
- Provide 12 volt cigarette lighter plugs for power distribution for off-the-shelf chargers (e.g. cell phone, computer)
- 10 gauge wiring for longer cable runs to solar panels and battery to minimize resistive losses

# KM4GC Portable Equipment Architecture

Note: See Backup Info section for detailed description of each piece of equipment

-  = Power Pole Connectors
-  = 12v "cigarette lighter" plug
-  = 12 volt lines
-  = Digital lines
-  = RF feed lines

Note: I mostly only plan to use HF for portable operation – VHF/UHF if on a mountain top



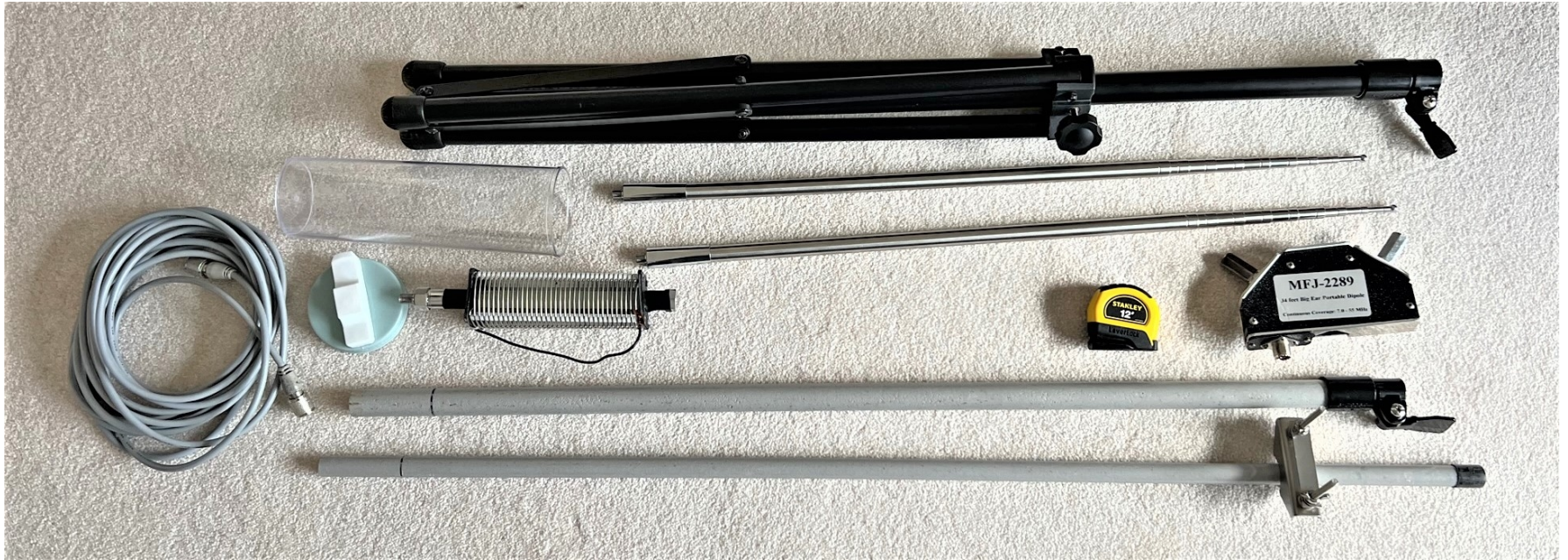
## Portable Station when 120v Power and WiFi is Available



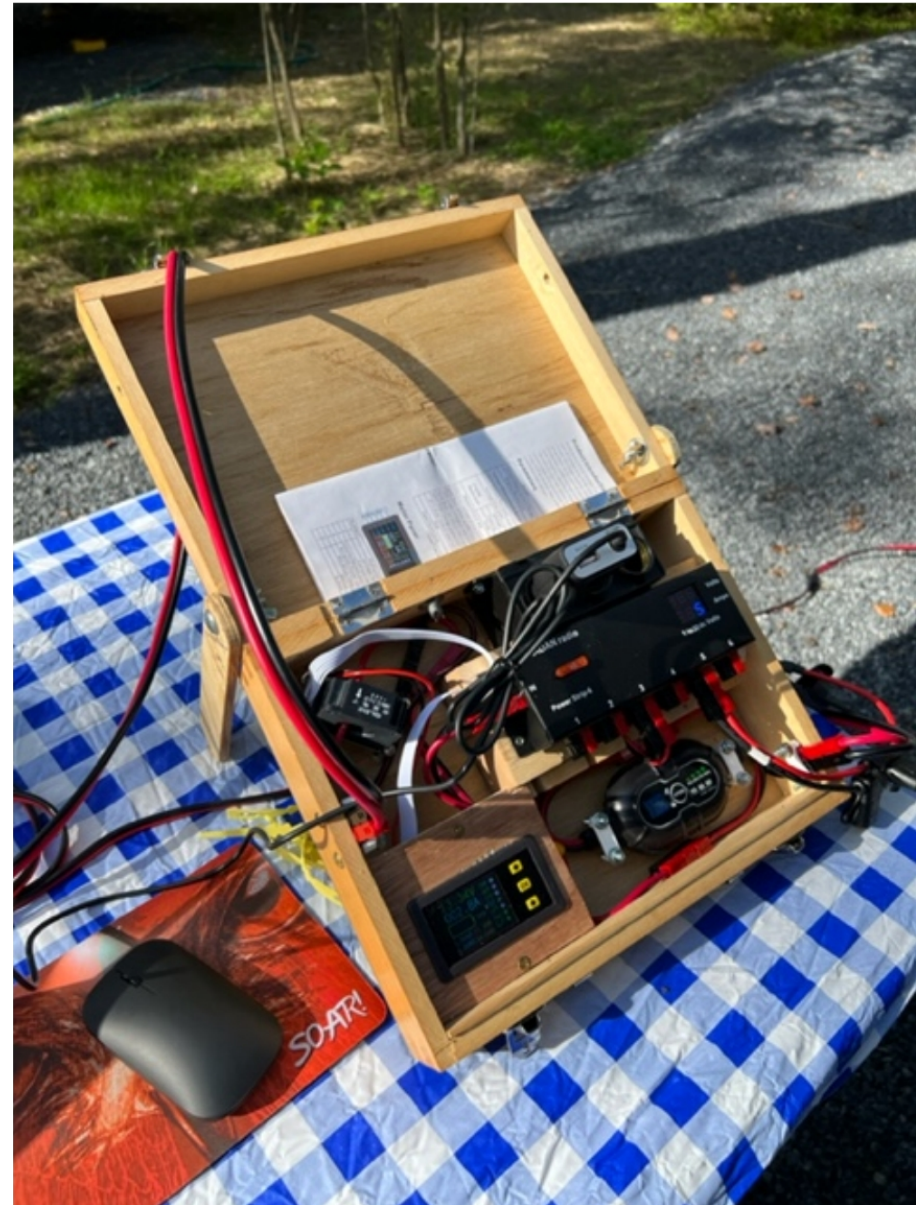
# Portable Antenna with Tripod Stand and Carry Case



# Antenna Components (note: Fiberglass Pole, Coil Case, Tape Measure)



# Portable Box for Chargers and Power Distribution (re-purposed son's old toy tool box)



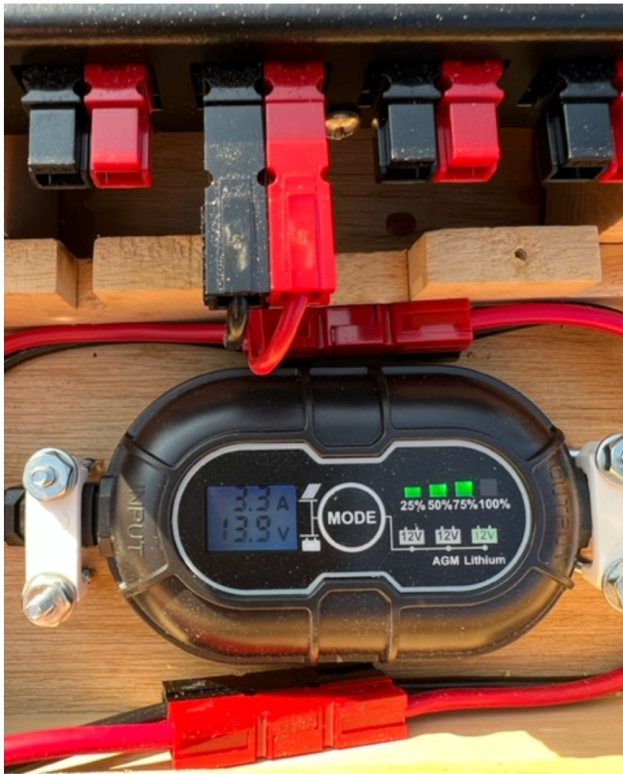


# Close up of Charger and Power Distribution Box



# Close up of Solar Battery Charger and Battery Monitor

Bottom part of 12v power Distribution box



Battery Monitor  
(control/display head &  
Current sensor)

Solar Battery Charger



## 120v Power Supply (for use when 120v AC is available)



# Battery, Transport Box, and 120v Battery Charger (battery maintenance when not in use)



# VHF/UHF High Gain Antenna



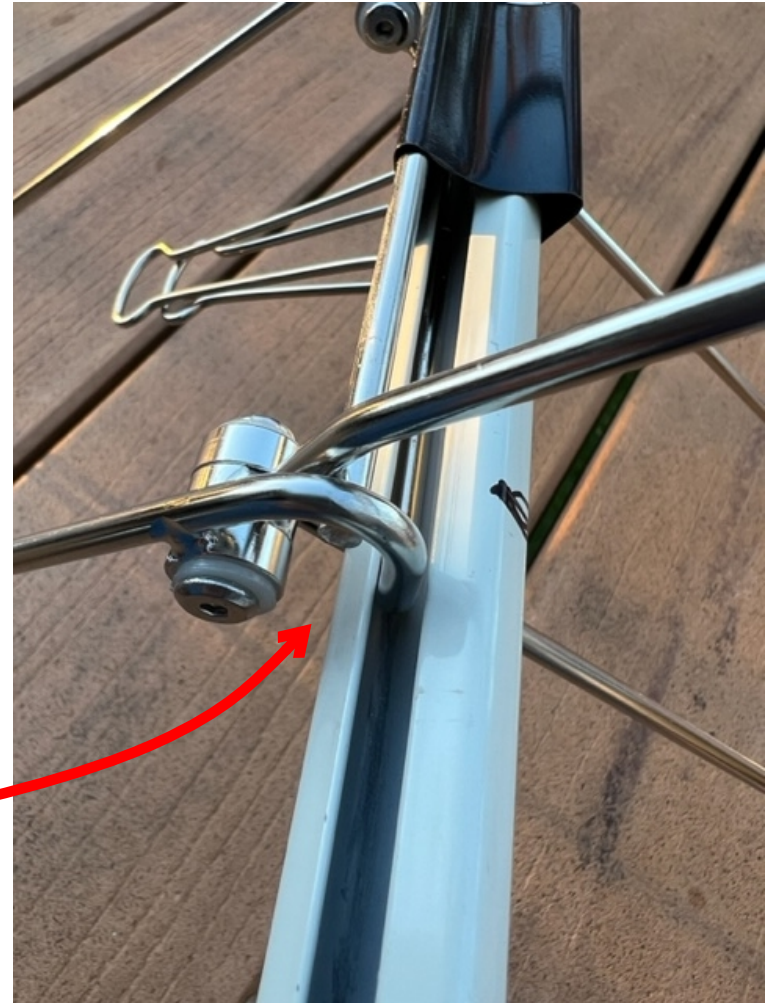
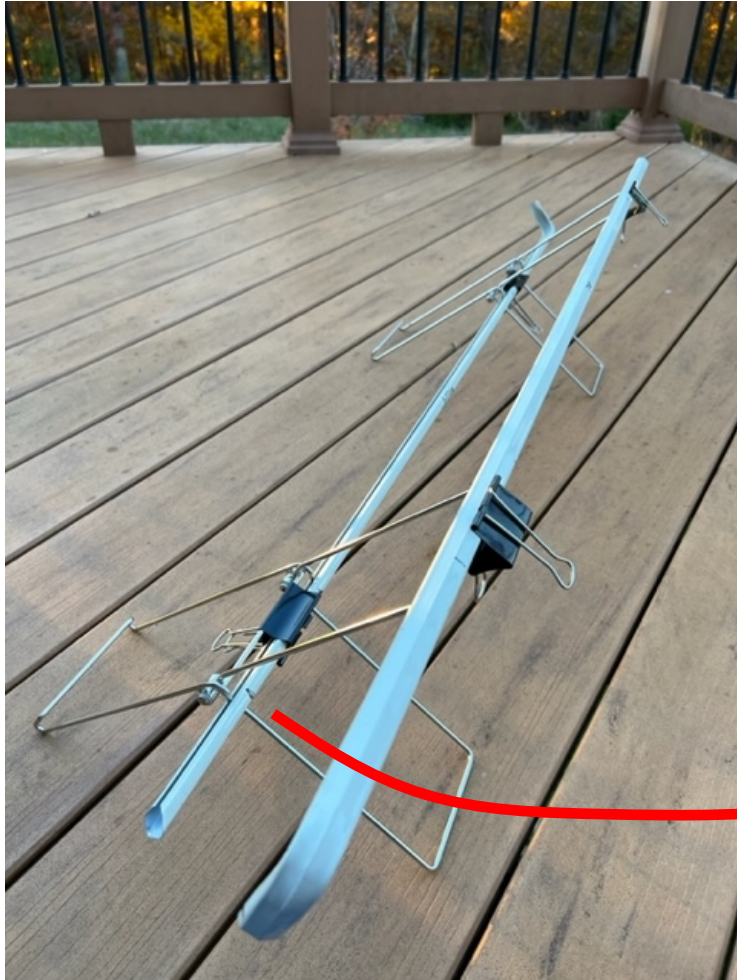
# Solar Panel (using old curtain rods to stabilize the small stands that come with it)



# Curtain Rod Setup to Make a Stable Support Holder



## Curtain Rod Setup to Make a Stable Support Holder






# What is Parks on the Air (POTA)?

- The purpose of POTA is to promote emergency awareness and communications from national/federal and state/provincial level parks for international portable amateur radio operations
- It also includes:
  - National Monuments, National Preserves, Wildlife Refuges, Wetland Management Districts, National Wild and Scenic Rivers Systems, Wildlife Management Areas, Antarctic Stations, National Military Parks, Historical Trails
- The official list of POTA Parks is published on "the POTA park list"
  - <https://parksontheair.com/#map-list>
  - There are 5,760 Parks in the US
- It is international in scope – many parks in many countries

# What is Parks on the Air (POTA)?




















































- Hunters try to contact Activators
- Activators operate from parks
- Activators submit logs to POTA for Hunters to get points & awards
- Activators also earn points & awards for different types and number of park activations as well as bonus points for Park-to-Park contacts
- The POTA web site has a near real time auto-updating “POTA Spots” page where Activators’ frequency, mode, and park can be posted so Hunters can locate where to find Activators
  - <https://pota.app/#/>

# POTA Active Spots Web Page Example

 Parks on the Air  SPOTS ACTIVATIONS KM4GC

Active Spots Data will refresh in 9 seconds. At a park now? ADD SPOT

Band: 20M 21 Mode: CW 7 Program: All 37 QRT: Show 37 Hunted: Show 37 Sort: Activator

<p> AD0YM @ K-1768 </p> <p> K-1768 Lake of the Ozarks State Park</p> <p> US-MO</p> <p> 14044.2 kHz (CW)</p> <p>  K5SJC</p> <p> 579 into NTX. Thanks Mike!</p> <p> Last heard 26 mins ago at 16:58 UTC</p> <p><span>RE-SPOT</span> <span>16</span></p>	<p> AE4Y @ K-4856 </p> <p> K-4856 Holmes Educational State Forest</p> <p> US-NC</p> <p> 14065.0 kHz (CW)</p> <p> K3LR-#</p> <p> RBN 25 dB 18 WPM via K3LR-#</p> <p> Last heard 2 mins ago at 17:22 UTC</p> <p><span>RE-SPOT</span> <span>28</span></p>	<p> NN3I @ K-1588 </p> <p> K-1588 Patapsco Valley State Park</p> <p> US-MD</p> <p> 14058.0 kHz (CW)</p> <p> NR4U-#</p> <p> RBN 6 dB 18 WPM via NR4U-#</p> <p> Last heard 1 min ago at 17:23 UTC</p> <p><span>RE-SPOT</span> <span>5</span></p>
<p> WA2USA/P @ K-1862 </p> <p> K-1862 Edward Ball Wakulla Springs State Park</p> <p> US-FL</p> <p> 14063.0 kHz (CW)</p> <p> K5TR-#</p> <p> RBN 7 dB 24 WPM via K5TR-#</p> <p> Last heard 17 mins ago at 17:06 UTC</p> <p><span>RE-SPOT</span> <span>24</span></p>	<p> WI2X @ K-8030 </p> <p> K-8030 Absecon Wildlife Management Area</p> <p> US-NJ</p> <p> 14060.9 kHz (CW)</p> <p>  KW4FM</p> <p> [579] *VA</p> <p> Last heard 1 min ago at 17:22 UTC</p> <p><span>RE-SPOT</span> <span>15</span></p>	<p> W1BLU @ K-8717 </p> <p> K-8717 Allapattah Flats State Conservation Area</p> <p> US-FL</p> <p> 14043.0 kHz (CW)</p> <p>  W1BLU</p> <p> QRT TU Hunters! 73</p> <p> Last heard 2 mins ago at 17:22 UTC</p> <p><span>RE-SPOT</span> <span>7</span></p>

# First Park Activation Experience

- Activated Monocacy National Battlefield Park K-0705
  - Just outside of Frederick MD (45 min from home QTH)
  - Set up in parking lot outside of visitor's center (nice for having a restroom and water if needed)
  - Put antenna on a grassy island next to car
  - Coordinated with park ranger before operating – good PR and he liked that I didn't set up antenna in a parking spot
- Operated Single Side Band (SSB) on 20 meter band
- Key to getting hunters is to spot yourself on the POTA Active Spots page
- Operated until a big gust of wind blew over my antenna forcing an involuntary QRT – right in the middle of a QSO
- Results: 84 contacts includes: 10 Park-to-Park, Spain, Italy, Canada

# First Park Activation Experience

- Had a large number of hunters (aka – pile up) the entire time I was active
  - This is a new experience for me – recommend you try working DX or be a hunter to experience pile ups yourself to see how DX and Activator stations operate to control the chaos
- Plan ahead to bring food, water, appropriate clothing (maybe a blanket if cold out), table, clipboard, note paper, pens, etc. besides station equipment
- I made time to hike one of the park's trails to the historic Frederick Crossing Rail Road intersection
- Solar Battery Charger:
  - Became a major noise source
  - Large number of noise clumps ~20+ KHz wide across entire ham band
  - Didn't show up in initial testing – not sure why except it was an exceptionally bright sunny day and I was drawing significant power from battery
  - Need to investigate mitigation approaches
  - Unplugged solar array feed when operating

# Logging

- Working a large pile up keeps you very busy!!!!
- I was constantly logging contacts while working stations and making sure I copied their call signs correctly
- Initially kept notes on paper and entered contact into computer logging software after a few contacts
  - Took too much time – had to stop operating to catch the log up from paper
  - Finally started entering directly into computer – saves much time

# Logging

- For POTA activation you must be prepared to not have connectivity to the internet
  - e.g. using QRZ.com for logging may not be accessible
  - Need a stand-alone logger that generates .adi files for uploading to:
    - POTA so hunters and you (activator) get credit for contacts
    - Logbook of the World (LOTW) for ARRL credit for contacts (don't forget ARRL rules on your location for counting QSOs for awards such as WAS and DXCC)
    - QRZ.com logbook if you use it at home QTH (recommend importing first to QRZ and use QRZ to load to LOTW to prevent getting duplicated entries in your QRZ log when downloading from LOTW later)

# Logging

- I used the N1MM+ logging software with the POTA User Defined Contest (UDC) template
  - N1MM+ can be linked to your rig so you don't need to enter mode, frequency, and band in the log – nice
  - It can also be linked to wsjtx and GridTracker for digital operations
  - N1MM+ does not generate all of the correct .adi fields required by POTA to log a contact – even with the POTA User Defined Contest (UDC) template!!!
    - Needed to hand edit 84 lines of contacts using WordPad – ouch!
    - Afterward I developed a new version of the POTA UDC template that minimizes and streamlines the amount of hand editing needed – but does not eliminate it



# Logging - Screen Shot of N1MM+ (using POTA UDC template)

28021.80 MIXED+DIG Manual - VFO A

File Edit View Tools Config Window Help

CW	PH	RTTY	PSK	SntRpt	RcvRpt	OPName	POTA-REF
160	160	160	160	VE3XVX	59	59	ON
80	80	80	80				
40	40	40	40				
20	20	20	20				
15	15	15	15				
10	10	10	10				

Run    S&P

Regional Hdg 343° LP 164° 331mi 533km SR 12:06Z SS 22:55Z

Call history UserText appears here when enabled.

VE: NA/CANADA, Zn 4 77/27 2,079

2/21/2023 19:56:27Z Parks on the Air - ham.s3db

MM-DD HH:MM	Call	Freq	Mode	Snt	Rcv	Name	Comment
02-11 19:22	KB8AXN	14283.00	USB	59	59		OH
02-11 19:25	W5LST	14283.00	USB	59	55		K-1106, K3791, K7436, K7435, K9681
02-11 19:26	KE4Q	14283.00	USB	59	56		FL
02-11 19:27	KN4WGD	14283.00	USB	58	57		FL
02-11 19:27	VE3XVX	14283.00	USB	59	59		ON
02-11 19:28	K8DLB	14283.00	USB	59	59		MI
02-11 19:29	N8HO	14283.00	USB	59	59		MO
02-11 19:30	NA1TS	14283.00	USB	59	59		TN
02-11 19:31	W3BAY	14283.00	USB	59	56		K-4471 FL

# Logging

- I plan to use a different logging tool for the next activation
- HAMRS – looks to be ideal for POTA activation with no need to hand edit the exported .adi file
  - Does not link to radio for automated capture of frequency, mode, and band – but not critical
  - Free Download – same as N1MM, but is much easier to set up and learn
  - May not be optimal for digital operations – plan to investigate use of GridTracker and how it works without internet connection
  - **<https://hamrs.app/>**
- Lesson learned: understand the minimum required info needed to log a contact for both POTA and LOTW and practice using selected logging software before activation
  - Minimizes time to log a contact (only enter what is needed)
  - Both programs have unnecessary fields in the user interface that take up your time and attention to fill out during a QSO
  - See Backup Info section at end of this briefing for details

# Screen Shot of HAMRS

## POTA-test


QSOs 8

**THEIR CALLSIGN**

**RST SENT** 59      **RST RCVD** 59

**THEIR PARK**

**COMMENTS**

**TIME** 19:46:36       **DATE** 2023-02-21      [Clear](#) [Save](#)

**OPERATOR**       **STATE**       **COUNTY**

**QTH**      **GRID**

**FREQUENCY**  MHz      **BAND** 20m

**POWER (W)** 100      **MODE** SSB

**MY PARK** K-0705      **MY CALLSIGN** KM4GC




**MY GRID** FM19hj      **CLUB CALLSI...** KM4GC

**MY STATE**      **MY COUNTY**

Entries 8

QSO Map

POTA Spots

DATE	CALLSIGN	RST ↑	RST ↓	STATE	FREQUENCY	BAND	MODE	THEIR PARK	
17:27:46 2023-02-18	AG4HG	59	59	TN	20m	SSB			<input checked="" type="checkbox"/> 
17:26:54 2023-02-18	KC5H	59	59	AR	20m	SSB	K-3791		<input checked="" type="checkbox"/> 
17:25:03 2023-02-18	W5LST	59	59	AR	20m	SSB	K-7435		<input checked="" type="checkbox"/> 

# Conclusions

- Many hunters thank you for activating a park – they are very appreciative
- You learn a lot about your equipment – how it works and ideas for improvement – e.g. I may not need solar battery charger while operating & I need to better secure the base of my antenna
- You gain a very large amount of operating experience
  - Controlling pile ups
  - Set up, take down, and configuration of equipment
  - Logging
  - Experiencing different propagation conditions
  - Finding open frequencies
  - Preparation for emergency comms
- I found it rewarding to take some time out to experience the park
  - e.g. Learned the battle of Monocacy stopped the South from invading Washington DC in July 1864 and was a prime example of how railroads were leveraged during the Civil War – The North shipped in equipment and thousands of troops to the Frederick Rail Junction and Washington DC – preventing the South from invading the city!
- **POTA activation is a lot of fun!!!!**

## Backup Info: Equipment List

- **Solar Panel:** Nicesolar Foldable Solar Panel 100W for Portable Power Station Laptop, Portable Solar Charger with Dual USB PD 65w IP67 Waterproof
- **Solar Battery Charger:** Intelligent 10A Maximum Power Point Tracking (MPPT) Solar Charge Controller, 10 Amp 12 Volt Solar Panel Regulator with Digital LCD Display + Temp Sensor + 2 Set Quick Connectors for AGM, Gel, Flooded, Lead-Acid, Lithium Battery (note: allows addition of a second 5 amp solar panel)
- **120 V Battery Charger for at home:** ECO-WORTHY 10-Amp 12V Smart Fully Automatic Battery Charger Maintainer Trickle Charger for Lead Acid LiFePO4 Battery Car Motorcycle Marine
- **Battery:** ECO-WORTHY 12V Lithium Battery, 30Ah Rechargeable LiFePO4 Lithium Ion Phosphate Deep Cycle Battery with Battery Management System (BMS) Protection for Trolling Motor, Marine, Kids Scooters, Power Wheels, RV
- **Lap Top Charger:** Surface Pro Car Charger, 42W 12V 2.58A Power Supply for Microsoft Surface Pro 3 Pro 4 Pro 5 Pro 6 Surface Go Surface Laptop & Surface Book with 5V 2.1A USB Fast Charging Port (plugs into three port 12 v adapter)

## Backup Info: Equipment List

- **VHF/UHF RF Amplifier:** Mirage BD-35 144/440 MHz 45 Watt Amplifier (note: I may also plan to use the BTECH 220 MHz amplifier (BTECH AMP-220 Amplifier for 1.25M (220-225MHz), 30-50W Output (2-6W Input)))but I am looking for a collapsible high gain antenna)
- **HT:** Kenwood D-74
  - with charger that plugs into three port 12v adapter
- **HF Antenna:** MFJ Big Ear Eight-Band HF Portable Antenna model MFJ-2289
- **Antenna Stand:** MFJ Portable Antenna Stand model MFJ-1918EX
- **Antenna Case:** “Ham Gear by MFJ” nylon carry case for above HF antenna and stand
- **UHF/VHF Antenna:** TWAYRDIO Foldable VHF UHF Yagi Antenna, Dual Band 2m 70cm High Gain Vertical Base Station Yagi Antenna
- **Battery Box:** Batteries Plus Bulbs (I think it was a U1 size)
- **Cell Phone Charger:** For when using cell phone as a WiFi hotspot for my logging computer

## Backup Info: Equipment List

- **Wiring :**
  - 10 gauge stranded wire (red/black) (actually I have a mix of 10 and 12 gauge wire sections for short sections but use 10 gauge for long runs (~10 ft max) – various sections made up of 5 ft and shorter sections to mix and match as needed for specific site set up
  - Power Pole connectors as needed for 12 Volt distribution standardization with rest of station equipment
- **Power Distro:**
  - PARADAN radio Power Strip-6 (with voltage and current load indicator)
- **AC Power Supply (for use when available):** MFJ-4230MV (120 V AC to 13.8 V DC)
- **Battery Monitor:** Charge-Discharge Monitor, DROK 0-90V 100A DC Ammeter Voltmeter, Battery Capacity Amp-Hour Watt-Hour Power Time Multimeter, LCD Display Digital Voltage Current AH WH Watt Meter Tester with Hall Sensor – [has nice display to show current flow and amp hours into/out of battery] – note: instructions are not well written
- **Antenna Coil Storage container:** BESTONZON 2Pcs Storage Tin Creative Circular Storage Tin Food Storage Container for Pasta Noodles (Assorted Color), Size:25.5X8.5CM from Walmart – and it is not make out of tin despite the title. Tuning coil fits perfectly – used for protection of coil when stored.

# Backup Info – Minimum Required Logging Data

- Minimum POTA log info per QSO:
  - Other station's callsign
  - QSO date and time in UTC
  - Band (Note: frequency not required)
  - Mode
  - Operator or Your Station call sign
  - For Park-to-Park (note one line entry per other park ID for multi-park activators):
    - My\_SIG\_INFO (your park ID e.g K-0705)
    - SIG\_INFO (other park's ID)
    - MY\_SIG and SIG set to POTA
  - File name format when uploading to POTA site:
    - ACTIVATORSCALL@PARKID-YYYYMMDD.adi (date in UTC for day park was activated)
    - e.g. KM4GC@K-0705-20230211.adi
- Minimum LOTW log info per QSO:
  - Other station's callsign
  - QSO date and time in UTC (both you and other station must be within 30 minutes for a match to be counted)
  - Band (Note: frequency not required)
  - Mode
- Both require submitted files be in Amateur Data Interchange Format (ADIF) using .adi file extension
  - Can be edited directly with MS Notepad or MS WordPad programs for example if needed



# Backup Info – Example .adi File Entry for a QSO (minimum required for Park-to-Park)

<Call:6>VE3PTA

<QSO\_Date:8>20230211

<Time\_On:6>173545

<Band:3>20M

<MY\_SIG:4>POTA

<Mode:3>SSB

<STATION\_CALLSIGN:5>KM4GC

<MY\_SIG\_INFO:6>K-0705

<SIG:4>POTA

<SIG\_INFO:7>VE-4889

<eor>

# Backup Info: Power Pole Connectors and Crimper



# Backup Info: Setup Location in Park

