



Building a Dish Antenna in Winter in Wisconsin

(What it took to work the N1V Hawaii Expedition)

Charlie Betz, N0AKC



This Presentation

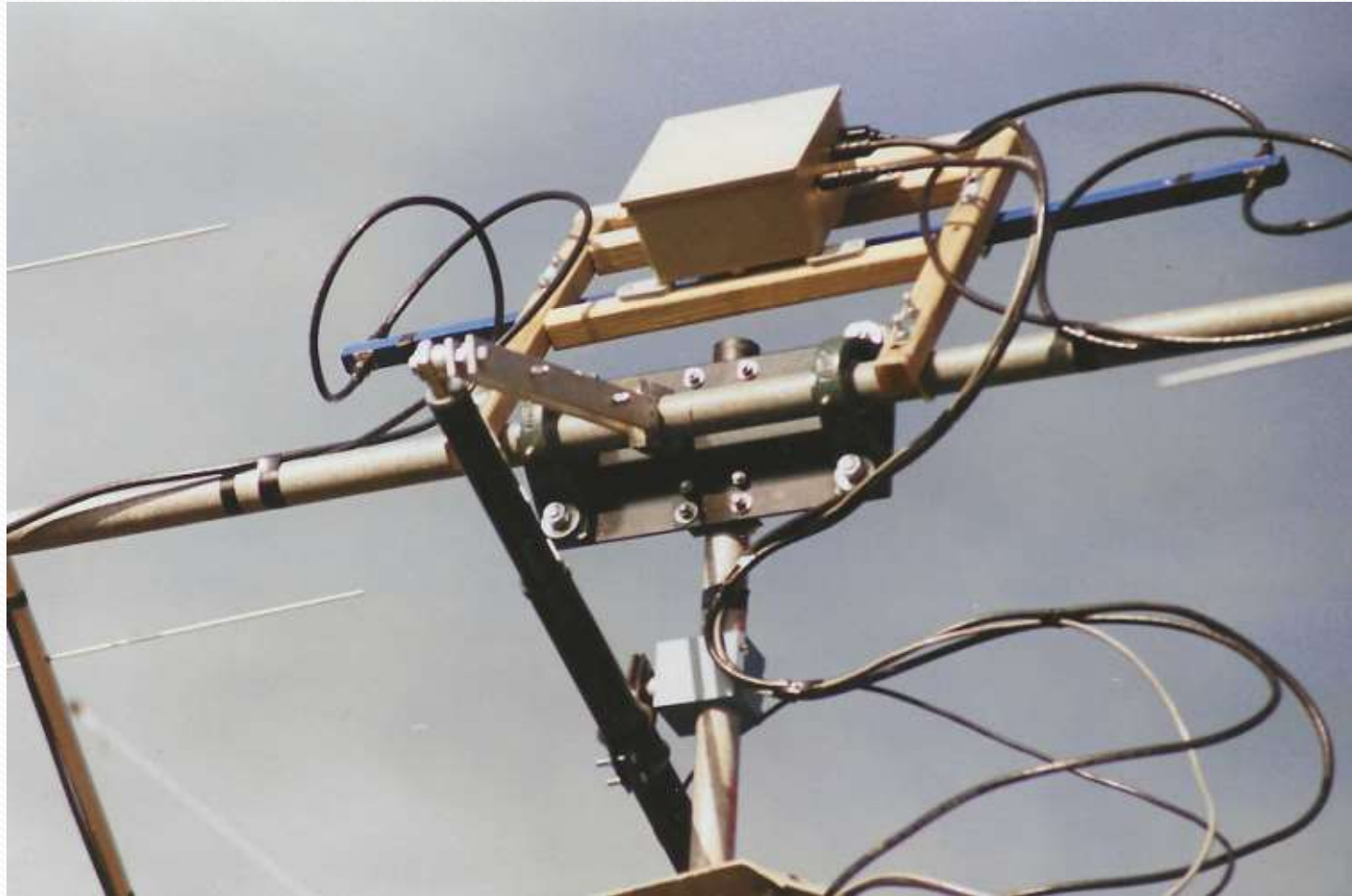
- A Brief History of EME at N0AKC
- Re-purposing an old TVRO dish for 23cm
- Working the N1V expedition
- 13cm and Beyond

First 2M EME Station (1993)



- 4 x 10 element K5GW antennas.
- LNA at array
- Yaesu G-500 elev. Rotor
- Ham 4 for Azimuth
- ~100 feet LDF-5 on TX
- ~100+ feet RG8 on RX
- Kenwood TS-520S
- MMT Transverter

Elevation System Upgrade (1994)



Elevation System Controller



New 2M Array (1996)



222/432 Array (2019)





EME Activity at N0AKC

- **2M WAS (#147) achieved in 2001**
- **222 WAS (#16) achieved in 2022**
- **Abandoned 10' (3M) TVRO dish looking for something to do**

NOAKC EME Antennas





Getting stated on 23cm EME

- Started getting prodded by N9HF in late spring of 2022 to make the jump to a new band.
- He'd started playing on the band with an old dish he had and an OK1DFC feed he'd built. System had issues and wasn't playing well.
- Dave inquired last June if I knew where he could find a used 10 foot TVRO dish for a reasonable price that he could haul back to Florida. It had to break down for transport.







N9HF



Fall 2022

- **N1AV and W2HRO announce plans to activate Hawaii on 902 & 1296 EME 3/5 – 3/10, 2023.**
- **N9HF says “You have to get on and work Hawaii”**
- **I started asking N1AV questions and Jay started pushing me to get on as well.**



January 9, 2023





Escalating the Project

- **We get sunny weather and a bit of a warm up in early February – time to get to work!**
- **It will take a lot of work, but maybe, just maybe, I can get the dish up and running by March 5.**



Hurdles to Overcome

- **Need to convert to full Az/EI to track moon**
- **My dish was mounted on a 3" pipe; SPID rotator mounts on a 2.5" mast.**
- **Dish is 175 feet from the shack**
- **We had 16" of snow on the ground**

Conditions in February



Original TVRO Dish



February 8, 2023

Only piece of the original polar mount that was kept.



February 11, 2023

Adaptor for mounting
SPID Az/EI rotor

Constructed from 3"
square tube with 2.5"
pipe welded on top



February 10, 2023

Modification of
mounting ring for
affixing it to Az/EI
rotor



February 12, 2023



February 13, 2023

Ring Mount Installed



February 18, 2023

Dish reattached to
mount



February 25, 2023

23cm feed installed



Cake Pan Choke Pieces



February 28, 2023

System essentially done. Need to get cables routed around the dish and down the pole.



March 5, 2023

First night on the air!

Stations Worked:

KD5FZX

W5AFY

K5DOG

KA6U (at K5QE)

W7JW

N0CTR

KA1GT

K8ZR

W6TCP



March 6/7, 2023

Stations Worked:

SM6CKU

KB2SA

W5GLD

DK3WG

W5ULA

VE6TA

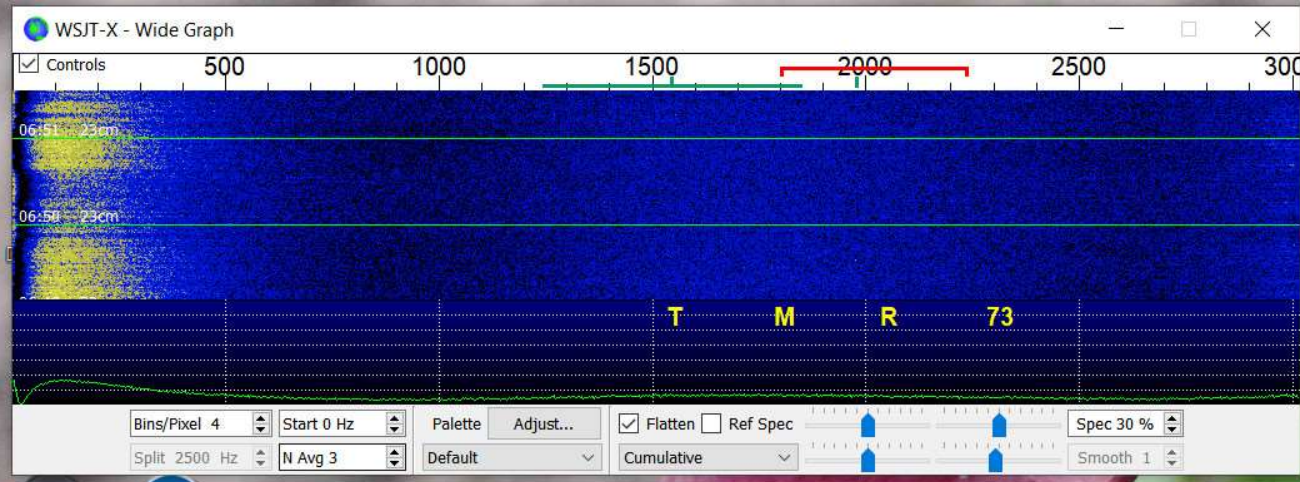
IK3COJ

N1V





- Atmel Studio 7.0
- Recycle Bin
- Acrobat Reader
- Slack
- PowerSDR v2i8.0
- eDrawings 2017 x64...
- Lenovo Solution



WSJT-X - Astronomical Data

2023 Mar 07
 UTC: 06:51:33
 Az: 196.3
 El: 53.7
 SelfDop: -252
 Width: 32
 Delay: 2.64
 DxAz: 92.8
 DxEl: 34.5
 Dx Dop: 1480
 DxWid: 28
 Dec: 9.6
 SunAz: 13.4
 SunEl: -49.8
 Freq: 1296.1
 Tsky: 3
 Dpol: 82.2
 MNR: 0.3
 Dist: 395872
 Dgrd: -1.9

Dopple

Fu

Ov

Co

Or

Ca

No

Sked ft

Rx:

Tx:

Pres ac manuz enter bar

Echo M

Doppler tracking

WSJT-X v2.6.1 by K1JT et al.

File Configurations View Mode Decode Save Tools Help

Single-Period Decodes					Average Decodes				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
0629	-25	2.9	1548	VE3NXK N1V BL11 q0	0630	Tx	1802	1802	N1V N0AKC EN44
0633	-25	3.0	1545	N0AKC N1V -24 q3	0632	Tx	1802	1802	N1V N0AKC EN44
0635	-22	3.0	1545	N0AKC N1V RR73 q3	0633	-25	3.0	1545	N0AKC N1V -24 q3
0637	-25	3.0	1547	CQ N1V BL11 q3 U.S.A.	0634	Tx	1802	1802	N1V N0AKC EN44
0639	-23	3.0	1545	CQ N1V BL11 q3 U.S.A.	0634	Tx	1802	1802	N1V N0AKC R-25
					0635	-22	3.0	1545	N0AKC N1V RR73 q3
					0636	Tx	1802	1802	N1V N0AKC 73
					0637	-25	3.0	1547	CQ N1V BL11 q3 U.S.A.
					0639	-23	3.0	1545	CQ N1V BL11 q3 U.S.A.

Log QSO Stop Monitor Erase Clear Avg Decode Enable Tx Halt Tx Tune Menus

23cm **1,296.054 874** Tx even/1st

H FT8 N1V BL11 Az: 269 4002 mi

Tx 1802 Hz F Tol 300 Submode C Rx 1545 Hz Max Drift 0

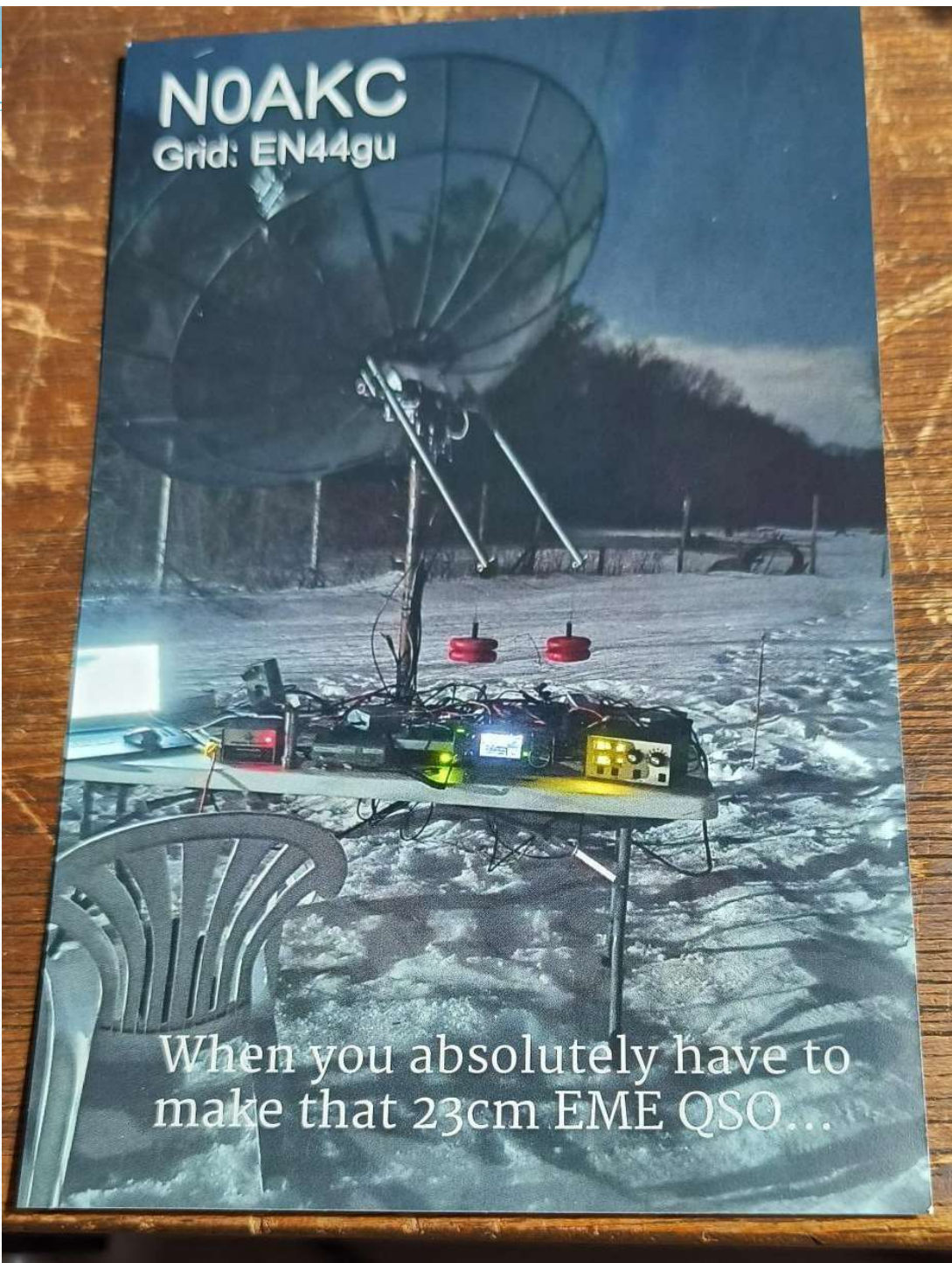
Generate Std Msgs Next Now Pwr

N1V N0AKC EN44 Tx 1

N1V N0AKC -25 Tx 2

N1V N0AKC R-25 Tx 3

NOAKC
Grid: EN44gu



When you absolutely have to
make that 23cm EME QSO...

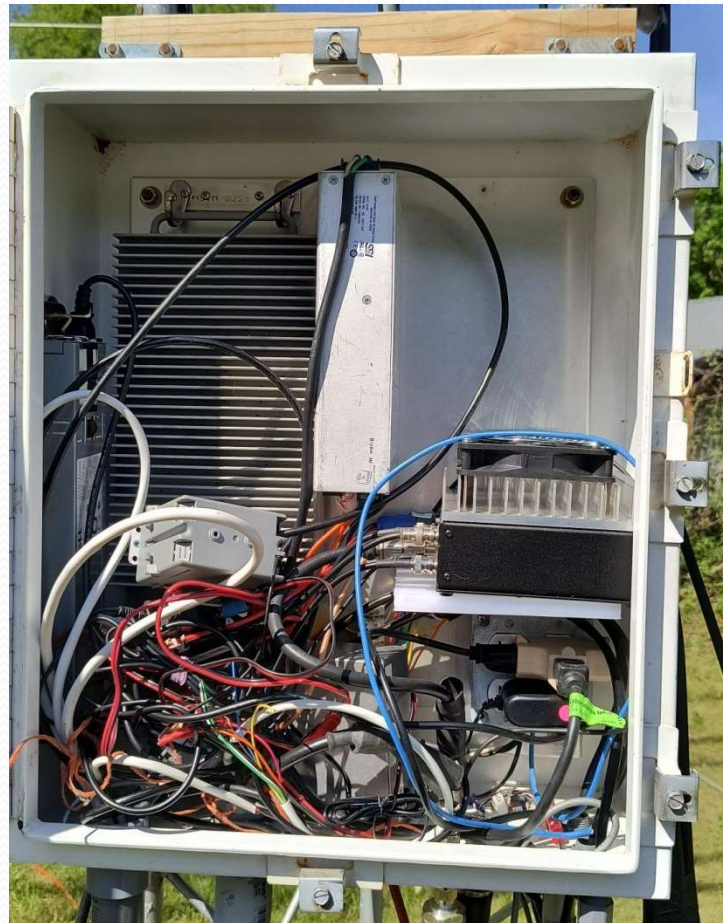
Obstructions Looking East



Utility Box on 222/432 Tower



Remote Installation of Equipment

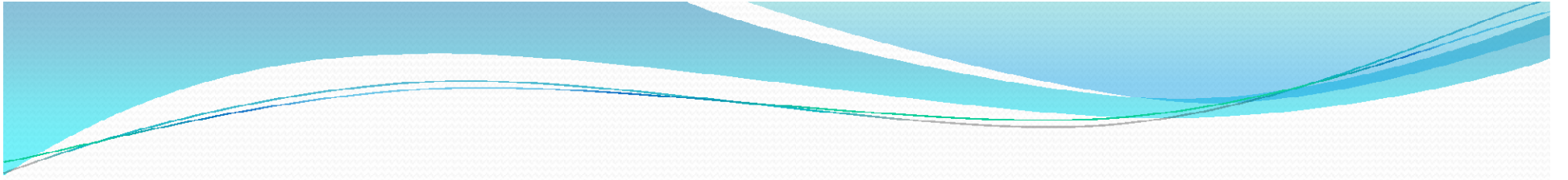




NOAKC 23cm Statistics

- **2001 – 2022:**
 - **States Worked: 6**
 - **VUCC Grids Confirmed: 20**
 - **DXCC Countries: 1**

- **As of July 7, 2024:**
 - **States Worked: 19**
 - **VUCC Grids Confirmed: 86**
 - **DXCC Countries: 24**
 - **EME Initial QSOs: 95**

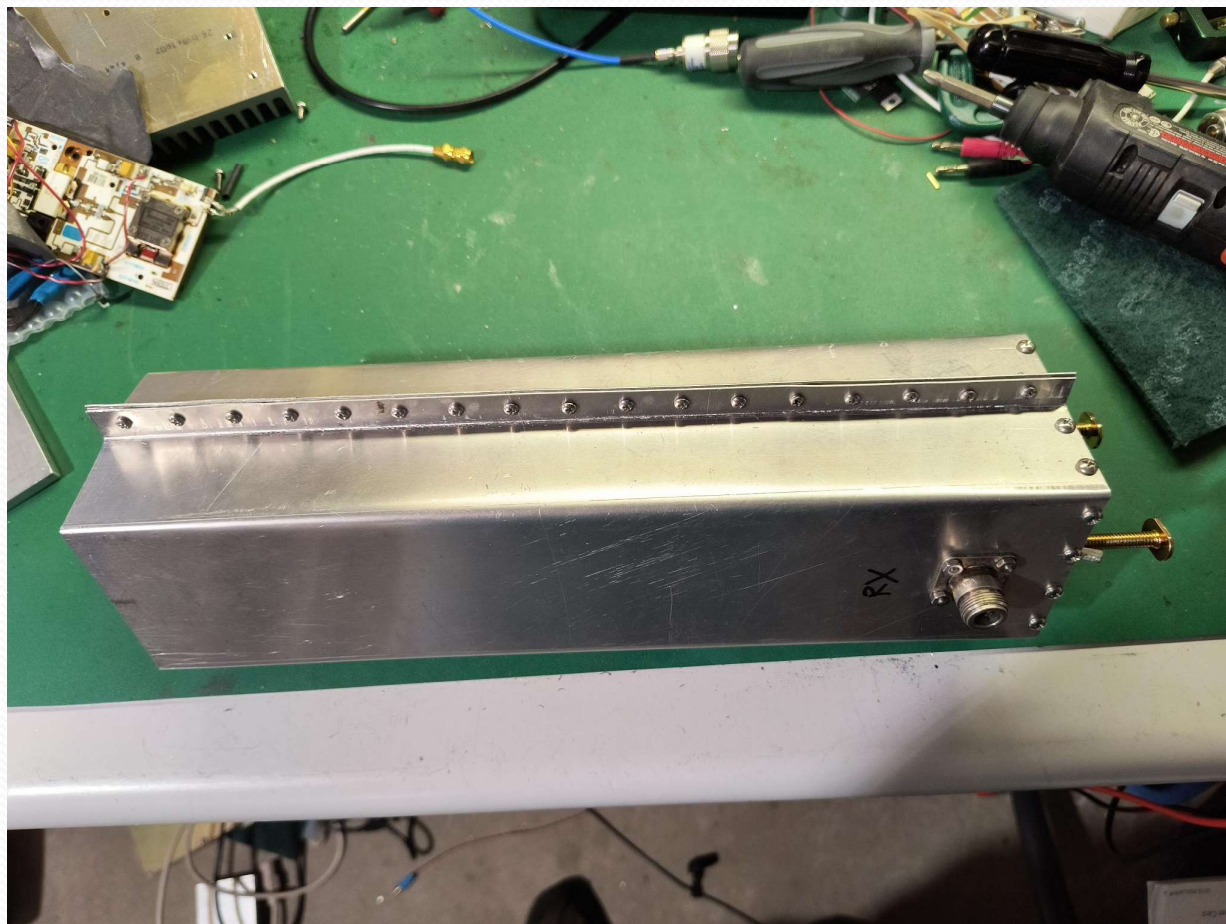




What's Next

- N1AV and W2HRO announce they are going back to HI in March 2024 taking 902, 1296, 2304 & 10 GHz.
- Time to add 2.3 & 10 GHz to the EME lineup!
- Unfortunately the 10 GHz hurdle proved too hard to climb in the short time frame.

Septum Feed for 2.3 GHz



February 2024



February 2024





2.3 GHz Results

- Unfortunately I was not able to work N1V on 2.3 GHz, but did work them on 902 MHz.
- The 2.3 GHz setup has proven to work very well as 13 EU stations have been worked to date
- Worked OE9ERC on 2.3 GHz SSB!



Going Forward

- 3.4 GHz feed is currently being built with hopes of being on the air for the ARRL Microwave EME weekends.
- Still working on 10GHz; also hoping to have a low power station on the air for the EME contest.
- I currently have no equipment for the 5.7 GHz band so not sure if I'll venture there or not.

73

