Results from the Inaugural Gladstone Signal Spotting Challenge: 14 Oct 2023

- *WSPR was the most popular mode*
- *FST4W was well represented*
- *HB9TMC set a scoring record with FT4/8*

HamSCI is pleased to announce the results from the inaugural running of the Gladstone Signal Spotting Challenge (GSSC). Held during the October, 14, 2023 North American annular solar eclipse, the competition was designed to recognize operators of digital mode stations who contribute valuable data to ionospheric research. Receiving stations upload their records to sites such as PSKreporter.info, WSPRnet.org and reversebeacon.net. Transmitting stations are received by stations worldwide who upload to those same databases, creating records of the transmitting stations' activity.

Similar data was collected during the 2017 solar eclipse in North America. The HamSCI website explains how and why data generated by radio amateurs is valuable for research purposes.

The GSSC results are divided into receiving stations (modes: WSPR, FST4W, CW), transmitting stations (WSPR, FST4W) and FT8 stations (transmit and receive) entries. The total number of valid entries was 68, from 11 countries on 6 continents. The station furthest from the eclipse path was **VK4EMM**, in Queensland, Australia; with **FR1GZ** on Reunion Island nearly as distant. FAQs and full rules for the GSSC can be found on the HamSCI website.

The most popular entry mode was WSPR. 48 entries were found to be 'receivers' in the WSPRNet database. Collectively, they had nearly 113,000 records for the 10 hour contest period. The top two receivers' finals scores were very close: **W1WRA** (22,447) and **HB9TMC** (21,335). Not surprisingly, the WSPR transmitting numbers were much higher (a transmitting station's signals will generally be picked by many, many receivers). 48 transmitting stations appeared in over 352,000 database records. There was greater separation between the top two transmit scorers **KG5JEN** (73,798) and **K6XX** (46,181).

Out of the 'top 4' WSPR group, HB9TMC showed the greatest frequency agility: His activity generated receive reports on nine bands, 160 through 10 meters. **VE3GGR** was equally agile with his transmissions, generating transmit reports on nine bands, 80 through 6 meters.

Special emphasis was placed on a relatively new mode, FST4W-120. Its benefits (relative to WSPR) are increased decoder sensitivity and greater tolerance to Doppler spread (more information on FST4W can be found at the WSPRDaemon website). FST4W receive and transmit counts were given a bonus multiplier of 1.25 when calculating total GSSC scores. Five stations chose to receive on the new mode, while the same number (though not all the same stations) transmitted FTS4W.

Very little mention was made of FT4/8 in the GSSC rules, mainly because there's a parallel competition (same date/time) popular with FT4/8 operators, the Solar Eclipse QSO Party (SEQP). As expected, the SEQP drew quite a bit of FT4/8 activity. Even so, a few FT4/8 ops did enter the GSSC, and their results are scored and listed separately. One of those operators, Stefan, **HB9TMC**, in Switzerland, deserves special mention for what was far and away the greatest number of entries by a single station in the GSSC: 224,550 FT4/8 reception reports bear Stefan's callsign. He reported on nine bands. As noted above, over 20,000 WSPR reception reports (also on nine bands!) also bear the HB9TMC callsign. That's a lot of equipment, antennas and resulting data, to be sure!

Following the scoring charts, Addendum 1 contains sample station descriptions, and Addendum 2, photos. All were submitted by the entrants with their GSSC entries.

Congratulations to all who entered. **HamSCI appreciates your contribution to space physics and citizen science via on-air amateur radio competition.** We'd like to invite you to the next running of the GSSC, to be held on April 8, 2024, during the North American total solar eclipse. We hope to see your callsign in the 2024 results!

- Gary Mikitin, AF8A (HamSCI Amateur Radio Community Coordinator)

The Gladstone Signal Spotting Challenge is named for Philip Gladstone, N1DQ, the creator and maintainer of the PSKReporter.info website, also known as the Digimode Automatic Propagation Reporter. Philip has made a tremendous contribution to Amateur Radio operating, citizen science and ionospheric research through the spots which are collected and stored on PSKReporter.info. This Wikipedia entry tells the story: https://en.wikipedia.org/wiki/PSK_Reporter.

The HamSCI Community is led by The University of Scranton Department of Physics and Engineering W3USR, in collaboration with Case Western Reserve University W8EDU, the University of Alabama, the New Jersey Institute of Technology Center for Solar Terrestrial Physics K2MFF, the MIT Haystack Observatory, TAPR in Arizona, additional collaborating universities and institutions, and volunteer members of the amateur radio and citizen science communities. We are grateful for the financial support of the United States National Science Foundation, NASA, and Amateur Radio Digital Communications (ARDC).

WSPR/FST4W/CW Rx (Receiving) Stations

Callsign	Grid Square	WSPR Rx Reports	FST4W-120 Rx Reports	FST4W Rx Multiplier	CW Rx Reports	Station Photos Multiplier	Station Design Mulitplier	Final Rx Score
W1WRA	FN42fx	20,406		1		1	1.1	22447
HB9TMC	JN46lj	21,335		1		1	1	21335
PT2FHC	GH64cg	9,025	254	1.25		1	1.1	10277
KC1NID	FN42gr	4,483		1		1	1	4483
KE8UZF	EN83da	3,831		1		1.05	1.1	4425
WD8CIV	FN13if	3,608		1		1	1.1	3969
CT7ANO	IM58hu			1	3,929	1	1	3929
WF7T	EM66pe	3,394		1		1.05	1.1	3920
K1ZK	FN34jj	3,247		1		1.05	1.1	3750
N1HAC	FN33xp	3,378		1		1	1.1	3716
K3FHP	EL97aa	3,180		1		1.05	1	3339
KD2UBX	FN23qc	3,046		1		1.05	1	3198
WD8KRV	DM42nf	2,544		1		1.05	1.1	2938
PY2SDR	GG56tv	2,301	317	1.25		1	1	2697
AD7TI	DM33un	2,568		1		1	1	2568
AB4BA	DM79op	2,200		1		1.05	1	2310
LB2NI	JP20pi	2,014		1		1	1.1	2215
VK4EMM	QG62lr	1,522	192	1.25		1.05	1.1	2035
AG6MO	DM14ec	1,843		1		1.05	1	1935
W2XH	FN42kj	1,662		1		1	1	1662
KG5IPA	DM61us	1,435		1		1	1.1	1579
AD2L	FN11ir	1,415		1		1	1.1	1557
KC0FGX	EN30se	1,415		1		1	1.1	1557
KE7Z	CN88fc	1,337		1		1.05	1	1404

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WSPR/FST4W/CW Rx (Receiving) Stations (continued)

Callsign	Grid Square	WSPR Rx Reports	FST4W-120 Rx Reports	FST4W Rx Multiplier	CW Rx Reports	Station Photos Multiplier	Station Design Mulitplier	Final Rx Score
K6XX	CM87vd	1,180	12	1.25		1.05	1.1	1380
VA7USD	CN88go	1,076		1		1.05	1.1	1243
PU3IKE	GG40an	919		1		1.05	1.1	1061
KD2ZPL	FM29ur	871		1		1.05	1.1	1006
VA2CY	FN46lw	985		1		1	1	985
W3LDB	FM19lb	814		1		1.05	1.1	940
VE3GGR	FN03ge	612		1		1.05	1.1	707
KD0YTE	EN30qf	618		1		1	1.1	680
K9WIS	EN52vt	531		1		1	1.1	584
AF7XJ	DN13wn	553		1		1	1	553
N5DCH	DM64pt	469		1		1	1.1	516
N5JDT	DM72av	435		1		1	1	435
W8AN	EN81fi	407	5	1.25		1.05	1	434
W7WXR	EN16xx	413		1		1	1	413
JJ1BDX	PM95tp	277		1		1.05	1.1	320
K5VOP	EM13ne	250		1		1	1	250
K7VIT	CN85qn	178		1		1	1	178
PU3VRW	GF37xx	147		1		1	1	147
VE3VPT	FN25ig	90		1		1	1	90
PY1TCM	GG77xm	59		1		1	1	59
WB8IMY	FN31ol	30		1		1	1	30
FR1GZ	LG79rc	5		1		1	1.1	6
WB6CXC	CM88mj	1		1		1.05	1.1	1
CX/PU3VRW	GF25um	1		1		1	1	1

*Final Rx Score = ((WSPR Rx) + (FST4W Rx * FST4W Mult) + CW Rx) * Photos Mult * Design Mult

‘Photos Mult’ and ‘Design Mult’ are scoring multiples earned by stations who submitted photos and station design information as part of their GSSC entries.

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WSPR/FST4W Tx (Transmitting) Stations

Callsign	Grid Square	WSPR Tx Reports	FST4W-120 Tx Reports	FST4W Multiplier (1.25)	Station Photos Multiplier	Station Design Mulitplier	Final Tx Score
KG5JEN	FN33cf	67,089		1	1	1.1	73,798
K6XX	CM87vd	39,695	231	1.25	1.05	1.1	46,181
AE4PE	EM85mm	40,184		1	1	1	40,184
K1ZK	FN34jj	22,373		1	1.05	1.1	25,841
KD2ZPL	FM29ur	18,649		1	1.05	1.1	21,540
PR8KW	GI77ul	16,985	56	1.25	1	1	17,055
WB8IMY	FN31ol	14,498		1	1	1	14,498
WB6CXC	CM88mj		9,698	1.25	1.05	1.1	14,001
KD0YTE	EN30qf	9,513		1	1	1.1	10,464
KD2UBX	FN23qc	9,940		1	1.05	1	10,437
TI4JWC	EK70wb		7,121	1.25	1.05	1.1	10,281
N4LKB	FM18iq	8,936		1	1	1.1	9,830
VE3GGR	FN03ge	8,452		1	1.05	1.1	9,762
FR1GZ	LG79rc	8,817		1	1	1.1	9,699
KD8CGH	DM65ub	7,698		1	1.05	1.1	8,891
W7WXR	EN16xx	5,990		1	1	1	5,990
N5DCH	DM64pt	5,382		1	1	1.1	5,920
KE7Z	CN88fc	5,564		1	1.05	1	5,842
VA7USD	CN88go	4,342		1	1.05	1.1	5,015
2M0IJU	IO75sv	4,878		1	1	1	4,878
AF1R	FN42jh	4,403		1	1	1.1	4,843
JJ1BDX	PM95tp	3,844		1	1.05	1.1	4,440
K2AL	FN20tq	4,428		1	1	1	4,428
AB4BA	DM79op	4,064		1	1.05	1	4,267

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WSPR/FST4W Tx (Transmitting) Stations (continued)

Callsign	Grid Square	WSPR Tx Reports	FST4W-120 Tx Reports	FST4W Multiplier (1.25)	Station Photos Multiplier	Station Design Mulitplier	Final Tx Score
KS6M	CM87vt	2,908		1	1.05	1	3,053
K9WIS	EN52vt	2,704		1	1	1.1	2,974
KI5MPX	DM95e	2,800		1	1	1	2,800
VA3KVB	FN03ib	2,237		1	1.05	1	2,349
PT2FHC	GH64cg	1,972		1	1	1.1	2,169
VE3VPT	FN25ig	2,156		1	1	1	2,156
AF7XJ	DN13wn	1,754		1	1	1	1,754
AD7TI	DM33un	1,750		1	1	1	1,750
AD2L	FN11ir	1,393		1	1	1.1	1,532
VK4EMM	QG62lr		1,029	1.25	1.05	1.1	1,486
KC0FGX	EN30se	1,203		1	1	1.1	1,323
AE6VZ	DM65xp	1,118		1	1.05	1.1	1,291
N5JDT	DM72av	1,126		1	1	1	1,126
W8AN	EN81fi	848		1	1.05	1	890
K7VIT	CN85qn	825		1	1	1	825
VA2CY	FN46lw	585		1	1	1	585
K5VOP	EM13ne	487		1	1	1	487
PY1TCM	GG77xm	453		1	1	1	453
PU3VRW	GF37xx	321		1	1	1	321
VK2GLA	QF54cd	173		1	1.05	1.1	200
K3FHP	EL97aa	153		1	1.05	1	161
KO4NAP	EM74xv	95		1	1	1	95
W0ZW	DM65vc	84		1	1	1.1	92
PY2UID	GG67bx	39		1	1.05	1.1	45

*Final Tx Score = ((WSPR Tx) + (FST4W Tx * FST4W Mult)) * Photos Mult * Design Mult

‘Photos Mult’ and ‘Design Mult’ are scoring multiples earned by stations who submitted photos and station design information as part of their GSSC entries.

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FT4/8 Stations, Rx and Tx

FT4/8 Callsign	Grid Square	FT4/8 Rx Reports	FT4/8 Tx Reports	Photos (x1.05)	Station Design (x1.10)	Final FT4/8 Score*
HB9TMC	CM99df	224,550		1	1	224,550
CT7ANO	FM19gh	13,989		1	1	13,989
PS7JN/P	DN07ds		1,127	1	1	1,127

*Final FT4/8 Score = (FT4/8 Rx + FT4/8 Tx) * Photos Mult * Design Mult

'Photos Mult' and 'Design Mult' are scoring multiples earned by stations who submitted photos and station design information as part of their GSSC entries.

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Addendum 1: Sampling of Station Descriptions

K7VIT: Icom IC-7610, 2 watts, 1/2 wavelength 80m dipole

W1WRA: TRX-Duo (Red Pitaya clone), 80-10m off center-fed dipole

AF1R: SOTAbeams WSPRlite Flexi transmitter, 100 mW, Aerial-51 off center-fed dipole

KE8UZF: Hermes14 transceiver, end-fed half wave

KG5IPA: Yaesu FT-991A, 10 watts, Hex Beam

WB6CXC: Turn Island Systems "Beacon Blaster 6", 1 watt, end-fed half wave

N1HAC: Kenwood TS-2000, 40 meter horizontal full-wave loop

VA7USD: Icom IC-7300, 10 watts, end-fed half wave sloper

VK4EMM: SDRPlay RSP Duo, QRP Labs QDX, 2 watts, dipoles and vertical loop

W0ZW: Ten-Tec Omni VII, 5 watts, shortened 80m vertical (40 ft. with capacitance hat)

N5DCH: Elecraft KX3, 1 watt, 10m vertical dipole

KD8CGH: QRP Labs Ultimate 3S, 200mW, 16.5 ft. tall vertical, ground mounted

JJ1BDZ: Yaesu FT-710, 5 watts, 2.2m long center-loaded horizontal mobile whip

TI4JWC: Turn Island Systems "Beacon Blaster 6", 1 watt, multi-band vertical

K9WIS: Kenwood TS-807S, 10 watts, multi-band vertical, ground mounted

AB4BA: Icom IC-7610, 5 watts, end-fed half wave

W8AN: Homebrew 9-band WSPR transmitter, 3 dBm (0.002 watts)

W3LDB: Yaesu FT-817, end-fed Zepp

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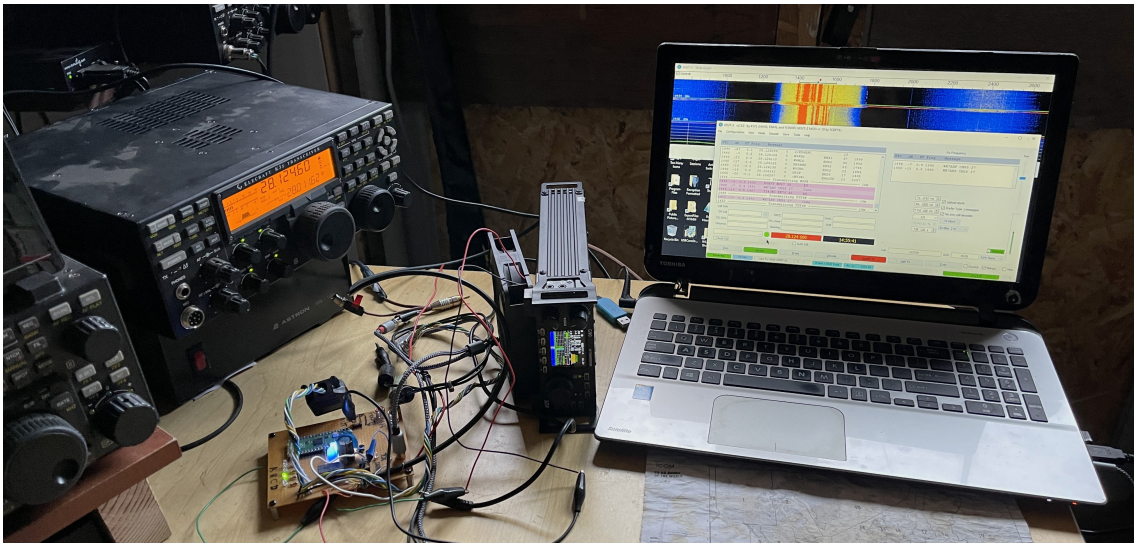
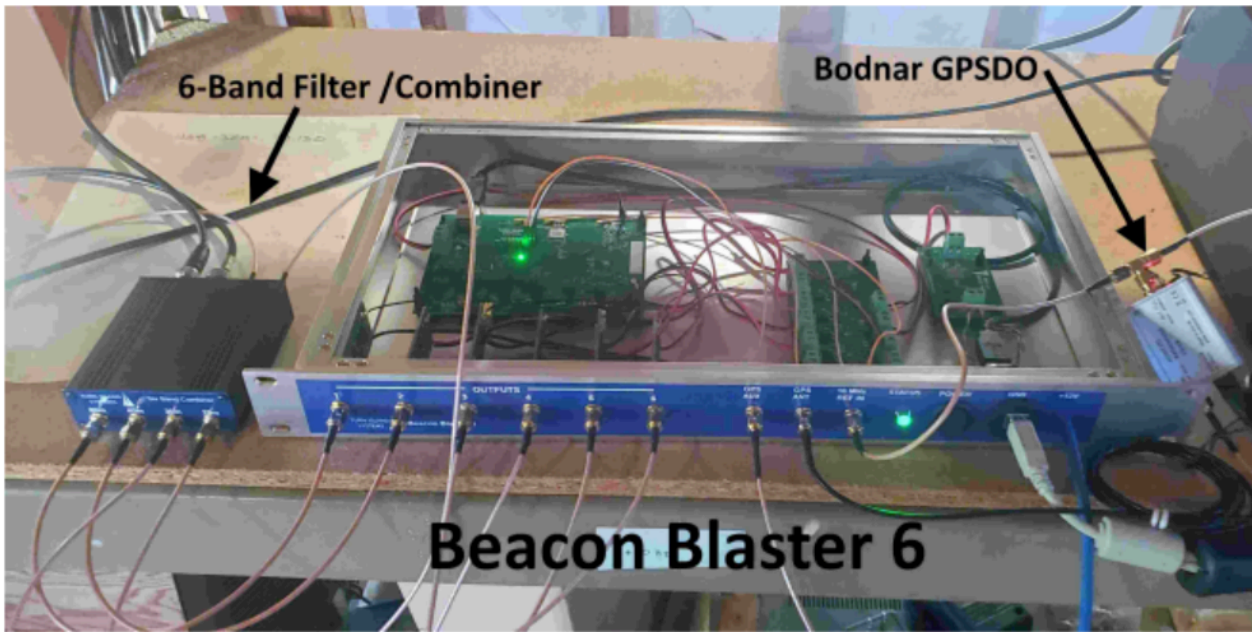
Addendem 2: Sampling of Station Photos

KD8CGH - Tijares, New Mexico, US

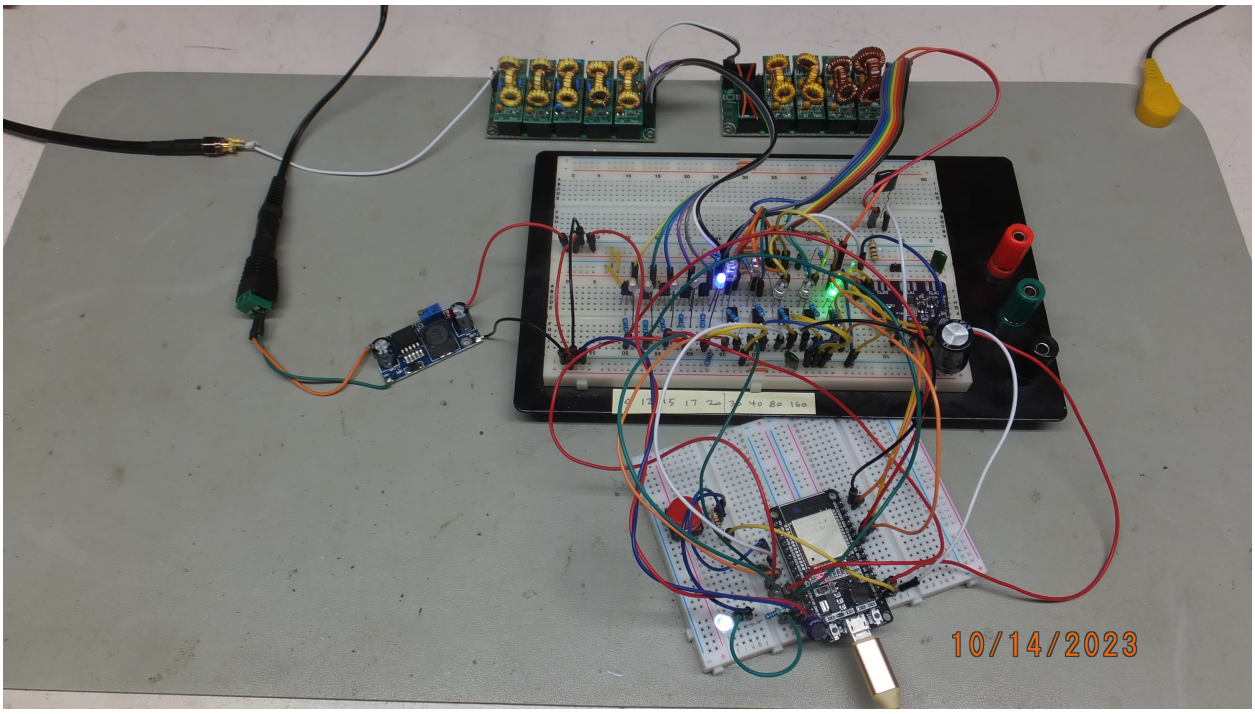


K6XX - Santa Cruz County, California, US

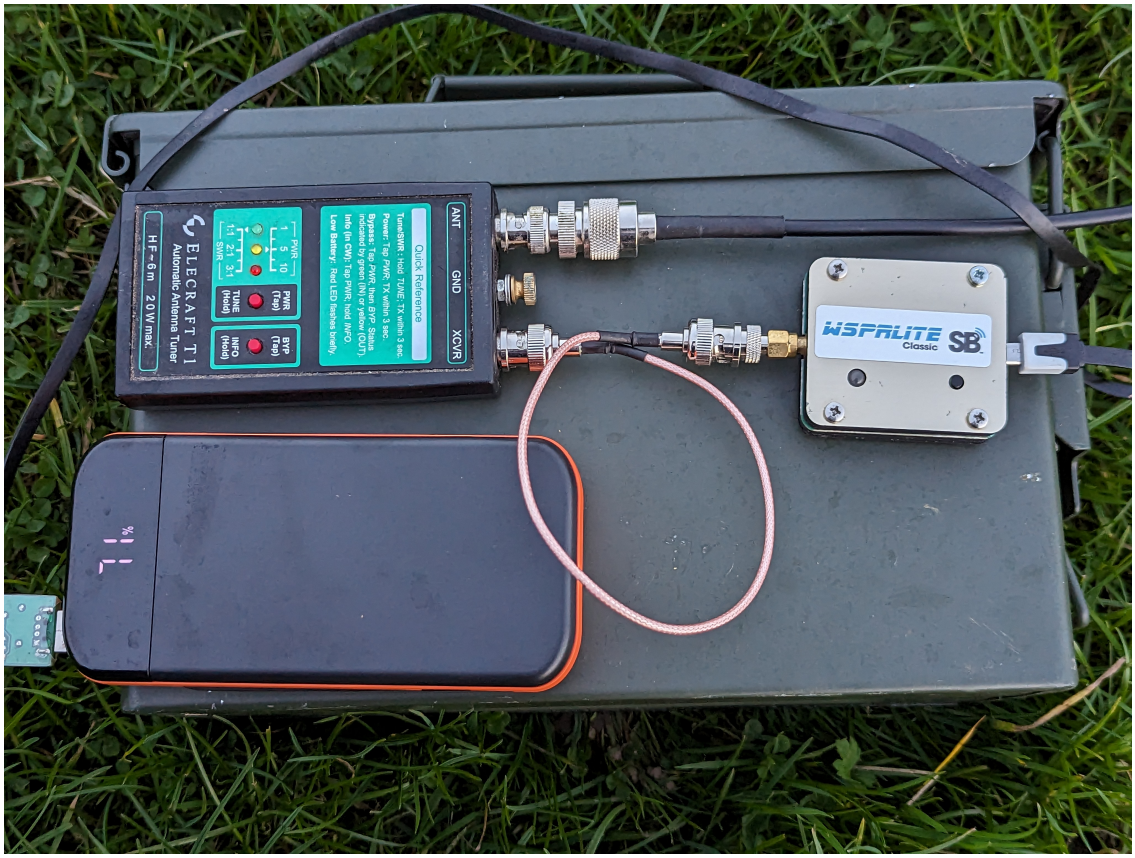
K1ZK - Shelburne, Vermont, US



WB6CXC - Occidental, California, US



W8AN - Bowling Green, Ohio, US



2M0IJU - Erskine, Scotland

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