Activating POTA with FT-8 and QDX
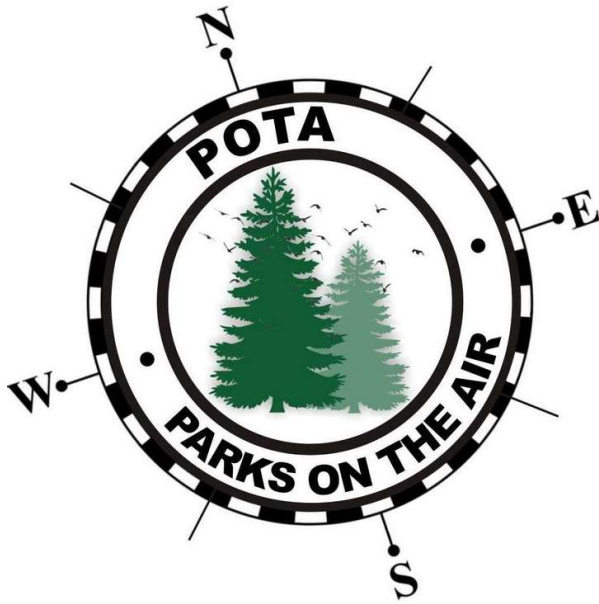
1. Activity
2. Radio Mode
3. Configuration

Bill Reed, KD9PUP

Parks On the Air (POTA)
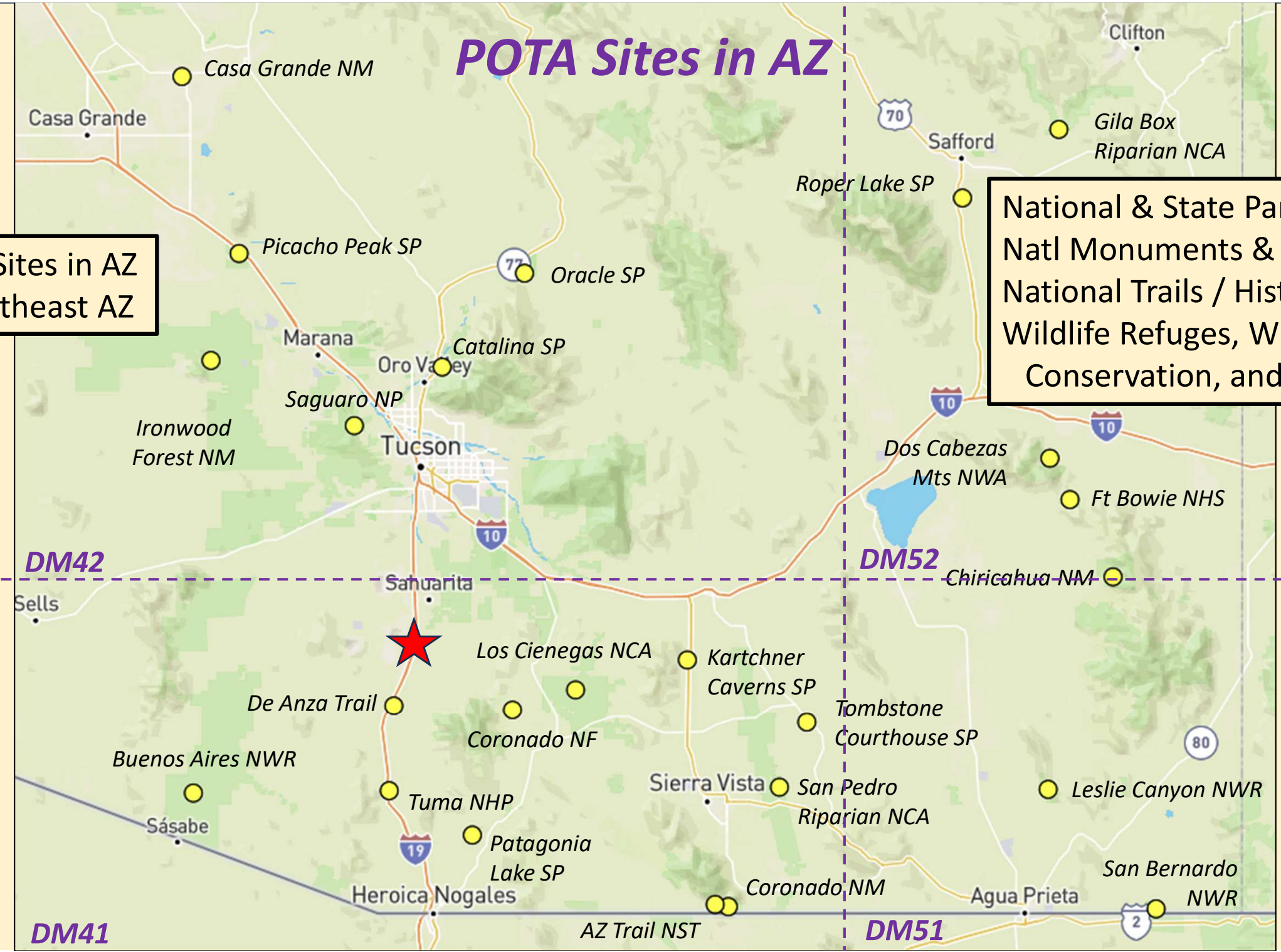
https://parksontheair.com/
https://pota.app/#/

- Popular International RadioSport Award Program
- Encourages licensed amateur radio operators to **visit, enjoy, and operate** portable equipment in [select] parks & public lands.
- Always respecting other park users and local regulations.

- **ACTIVATORS** (in the park) spot themselves and call CQ POTA
- HUNTERS (in their shack) often pile up, competing for contact.

POTA Sites in AZ

Clifton

Casa Grande NM

Casa Grande

Gila Box
Riparian NCA

Safford

Roper Lake SP

National & State Parks
Natl Monuments & Forests
National Trails / Historical Sites
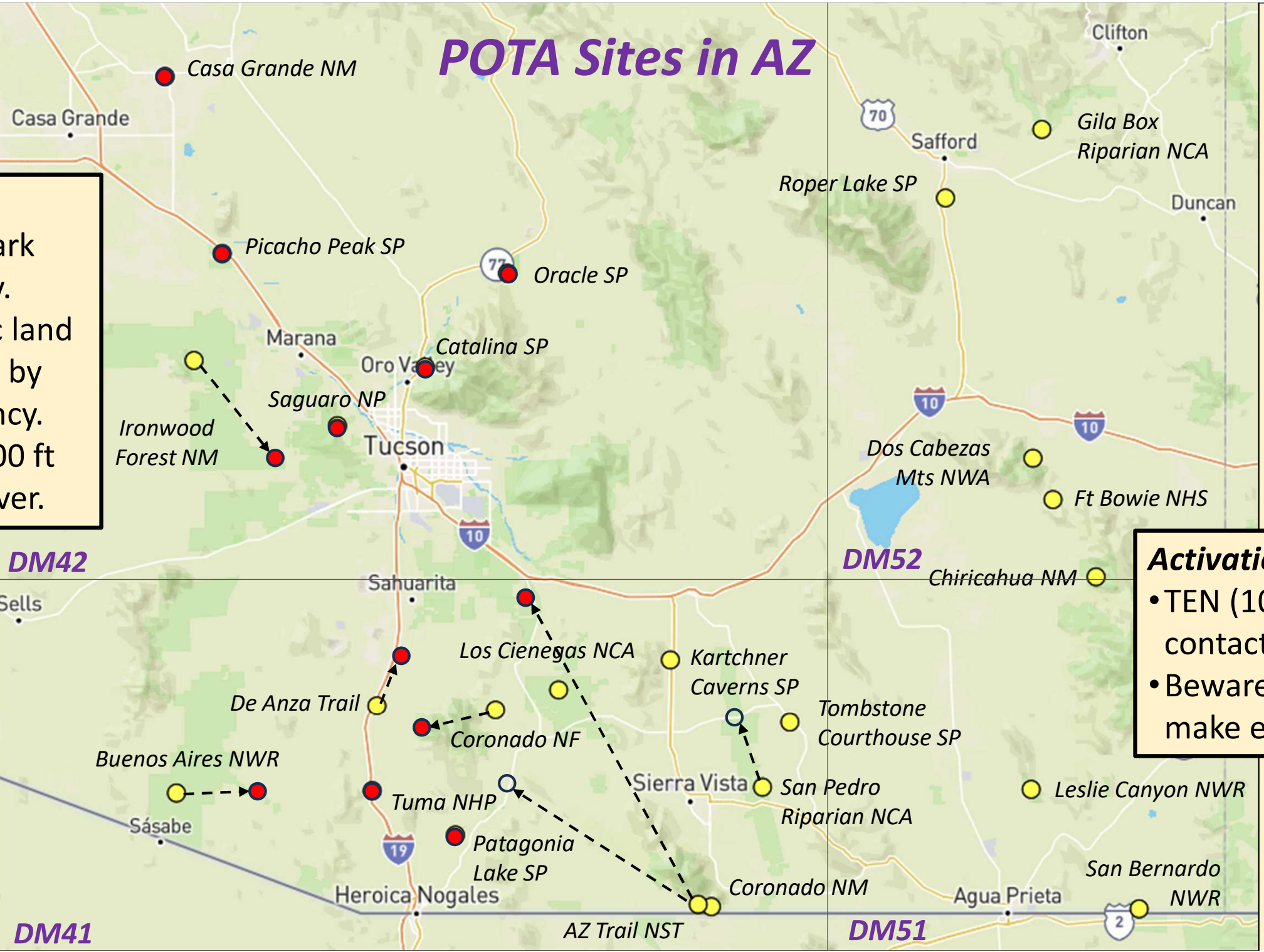Wildlife Refuges, Wilderness,
Conservation, and Rec Areas

89 POTA Sites in AZ
24 in Southeast AZ

Picacho Peak SP

Oracle SP

Marana

Catalina SP

Oro Valley

Saguaro NP

Ironwood
Forest NM

Tucson

Dos Cabezas
Mts NWA

Ft Bowie NHS

DM42

Sahuarita

DM52

Chiricahua NM

Maidenhead
Grid Lines

Sells

Los Cienegas NCA

Kartchner
Caverns SP

De Anza Trail

Coronado NF

Tombstone
Courthouse SP

Buenos Aires NWR

Sierra Vista

San Pedro
Riparian NCA

Leslie Canyon NWR

Tuma NHP

Patagonia
Lake SP

Sásabe

Coronado NM

San Bernardo
NWR

Agua Prieta

Heroica Nogales

DM41

AZ Trail NST

DM51

https://pota.app/#/map

POTA Sites in AZ

Clifton

Casa Grande NM

Casa Grande

🛣 70

Safford

Gila Box Riparian NCA

Duncan

Roper Lake SP

Picacho Peak SP

🛣 77

Oracle SP

Marana

Catalina SP

Oro Valley

Ironwood Forest NM

Saguaro NP

Tucson

🛣 10

Dos Cabezas Mts NWA

🛣 10

🛣 10

Ft Bowie NHS

DM42

Sahuarita

DM52

Chiricahua NM

Sells

Los Cienegas NCA

Kartchner Caverns SP

Tombstone Courthouse SP

De Anza Trail

Coronado NF

Buenos Aires NWR

Sierra Vista

San Pedro Riparian NCA

Leslie Canyon NWR

Sásabe

Tuma NHP

🛣 19

Patagonia Lake SP

Coronado NM

San Bernardo NWR

Heroica Nogales

Agua Prieta

🛣 2

DM41

AZ Trail NST

DM51

Spotting *(Voice & CW)* Activators

https://pota.app/#/

Activator

Hunter

10351 Hams activated a park in 2023
About 85% used voice mode

Activator files contact log with POTA.

36210 Hams hunted a park in 2023
Top hunters made 16x contacts of top activators
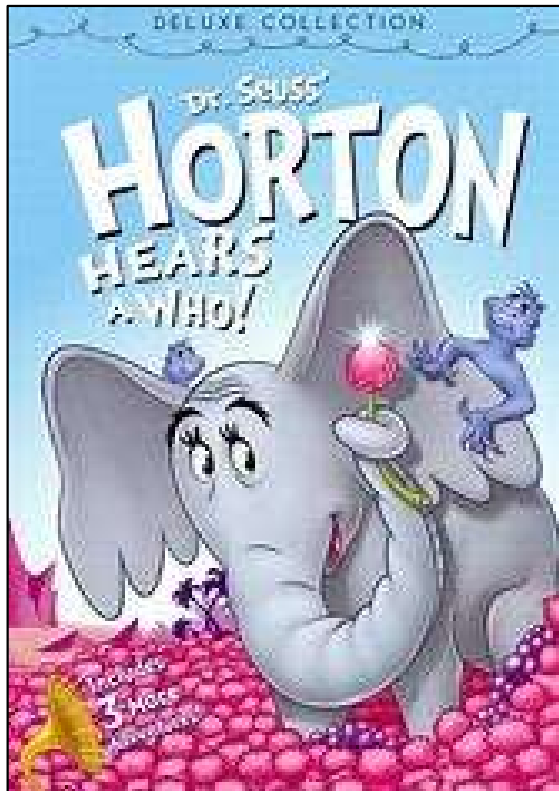
Hunter gets credit only from Activator's log.
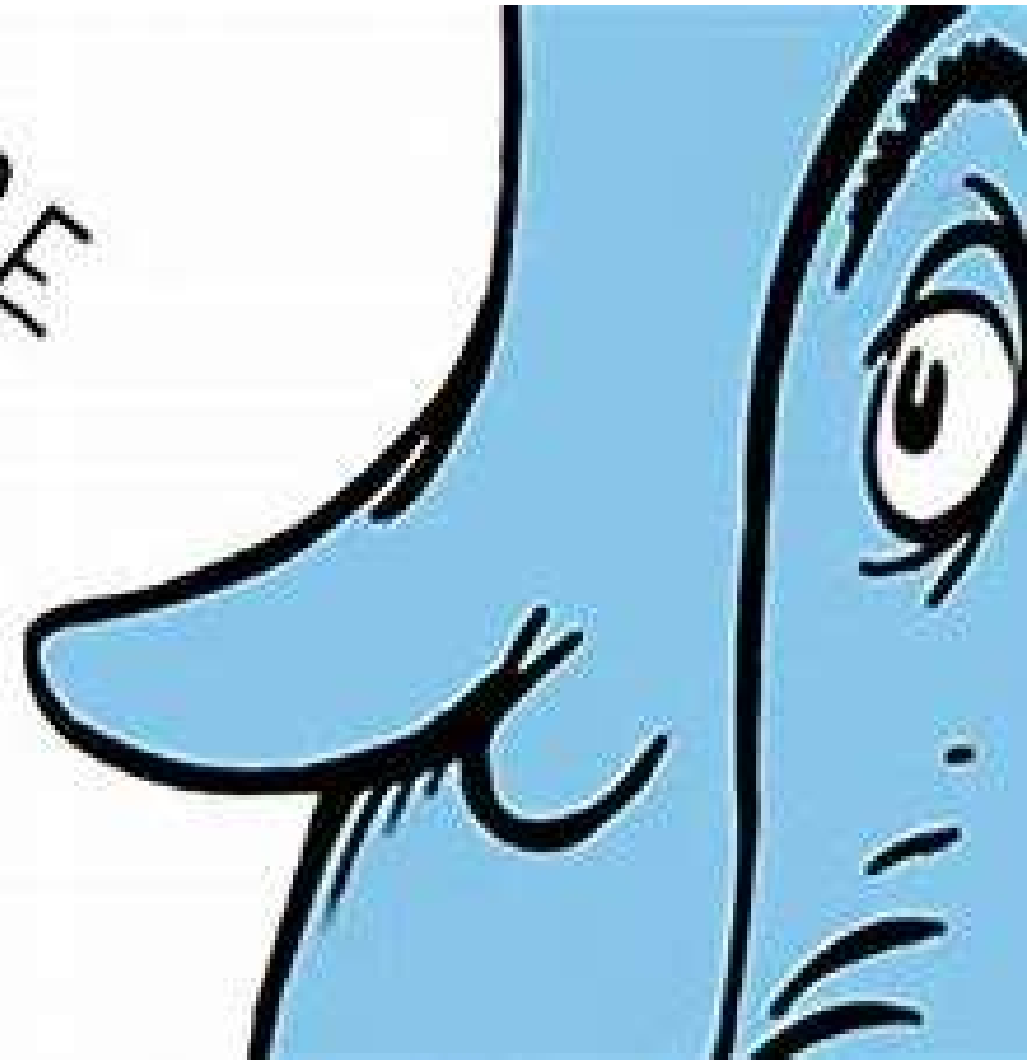
Some Hams Bring their Shack to the Park

ic-705

Other Hams have Specialty Gear

SOTA

Weak Signal Contacts
(from far away and/or low power)

Weak Signal Communication by K1JT (Joe Taylor*)

Some modes are designed for Communication;
Other modes like FT8 are Optimized for Contacts

FST4
FT4
FT8
JT4
JT9
JT65
Q65
MSK144
FST4W
WSPR
Echo

WSJT-X is a **computer program** used for weak-signal radio communication between amateur radio operators. The program was initially written by Joe Taylor, K1JT, but is now **open source** and is developed by a small team.

The **digital signal processing** techniques in WSJT-X make it substantially easier for amateur radio operators to employ esoteric propagation modes, such as high-speed meteor scatter [MSK] and moonbounce [JT65, Echo].

Additionally WSJT is able to send signal **reports** to spotting networks such as PSK Reporter.

* Nobel Prize Winner in Physics

Source: Wikipedia

FT8 stands for "Franke-Taylor design, 8-FSK modulation*" and was created in 2017 by Joe Taylor, K1JT and Steve Franke, K9AN. **FT8 is a digital mode in the WSJT-X software.**

It is described as being designed for "multi-hop Es where signals may be weak and fading, openings may be short, and you want **fast completion of reliable, confirmable QSO's**".

FT8

Important characteristics of FT8 are:

Digital Mode

- T/R sequence length: 15 s   [recent time synch required]
- Occupied bandwidth: 50 Hz
- Multi-decoder: finds and decodes all FT8 signals in passband
- Decoding threshold: -24 dB (with a priori decoding)
- Auto-sequencing after manual start of QSO   [CQ includes Maidenhead grid location]

Example FT8 Exchange

K-1028, Walnut Point SP (IL)
Activated 1 Oct 2023
Mag mount hamstick antenna

```
CQ  POTA  KD9PUP  DM41
KD9PUP  KJ4A  EM77
KJ4A  KD9PUP  +3
KD9PUP  KJ4A  R-6
KJ4A  KD9PUP  RR73
```

Note: a 73 from Hunter is expected but not required for a POTA contact.

Note: a contact can be completed in 75-90 seconds.

Note: KJ4A is my Elmer, John Z of Lexington, KY

WSJT-x FT8 Display

Example FT8 Contact

Log Entry Automatically Created after 73

PSK Reporter

Waterfall (50 Hz)

© W H Reed 3/31/2024

Digital Mode Radio (for POTA Hunters?)

iCOM ic-7300

USB Printer Cable Port

The iCOM ic-7300 is a very popular mainstream HF radio.

Transceiver presents as a PC Sound Card, and can be controlled by audio CAT commands from a computer.

Computer application like WSJT-x takes control of the radio to run digital modes.

QST Magazine
March 2023

Contents

March 2023 ♦ Volume 107 ♦ Number 3

Product Review

QRP Labs QDX 5-Band HF QRP Digital Transceiver

Reviewed by Charles Powell,
NK8O/VE3ISD/5H3DX
nk8o@arrl.net

The QRP Labs QDX Digital Transceiver is a low-power, low-cost radio for digital operations. The reviewed unit covers five HF bands — 80, 60, 40, 30, and 20 meters — and the maximum power output is 5 W, with support for digital modes only. It comes in a kit to be built, and you can buy a fully assembled unit for an extra $45. See Figure 1 for the kit parts packaging. The printed circuit board (PCB) comes with pre-installed surface-mount device (SMD) components (Figures 2 and 3 show each side of the PCB). It includes an embedded software-defined receiver (SDR), 24-bit 48 kilo samples per second (kS/s), a USB sound card, CAT control, and a synthesized VFO with TCXO reference. The QDX transmits a single, clean output signal, as it is not an SSB modulator with associated unwanted sideband and residual carrier, or intermodulation due to amplifier non-linearity (more on this later).

The QDX is suitable for single-tone operations. It is reported on the QDX forum that successful RTTY operation has been accomplished. It is not suitable for CW operation using *fldigi* or similar programs. It is my
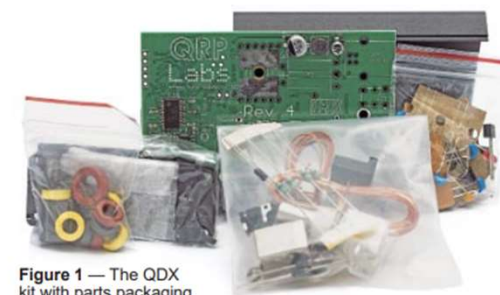
Figure 1 — The QDX kit with parts packaging.

QDX: a feature-packed, high performance, five-band (80, 60, 40, 30, 20m) or six-band (high bands 20, 17, 15, 12, 11 and 10m) 5W Digi-modes transceiver kit, including embedded SDR, 24-bit 48 ksps USB sound card, CAT control, synthesized VFO with TCXO reference.

- QDX outputs a *pure single signal*,
- It is not an SSB modulator with associated unwanted sideband and residual carrier, or intermodulation due to amplifier non-linearity.
- QDX is suitable *only* for single tone FSK modes, which covers the majority of digital modes in use today.

QDX kit = $69 + $20 cover

(Assembled = $134)

QDX Digital Transceiver

Status

QRP Labs

https://qrp-labs.com/

QDX Setup Experience

12V Power
- Auto Plug
- Wall Plug
- Battery

$26 at Amazon

TalentCell Rechargeable
12V DC Output, 3000mAh
Lithium ion Battery

WSJT-x add-ons?
- PSK Report
- Gridtracker

Laptop running WSJT-x
(Tablet or Smart Phone?)

QDX kit assembled
& modified by KJ4A*

QDX Digital Transceiver

Status

QRP Labs

20, 17, 15, 12, and 10m
Reset to replace 11m with 30m

Sharp SF-20
$50 at Amazon

Mobile Antennae
- 10m & 20m Hamsticks
- Tripod mount w/ *radials*
- Mag-mount on car
- EF wire

Notes:
- QDX has no internal tuner; so a balanced antenna required?
- Recent time synch needed (use personal hotspot on phone?)
- May need to change your Maidenhead grid square

K-4429, Coronado NF (AZ)
Activated 30 Jan 2024
Tripod hamstick antenna
12v battery pack

K-4097, Kickapoo SRA (IL)
Activated 23 May 2023
Mag mount hamstick antenna
Cigarette Lighter power

QDX on Discone Antenna
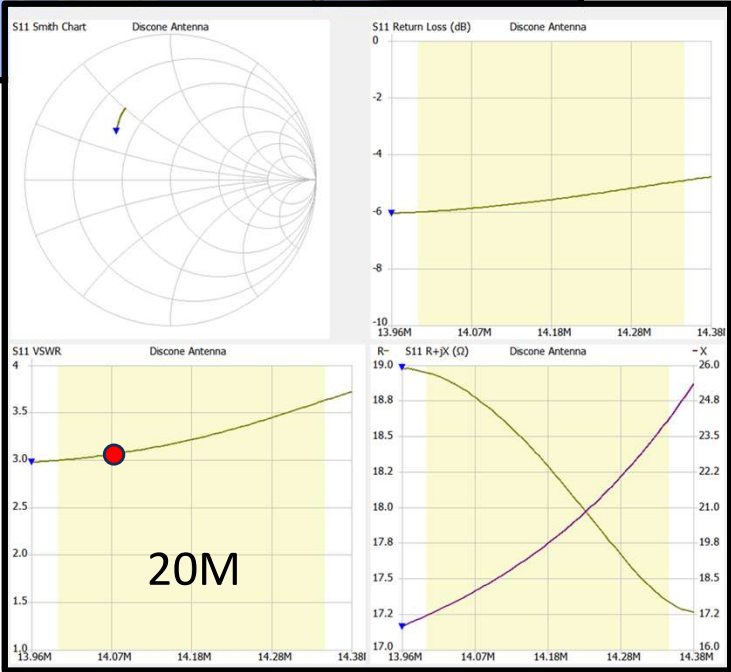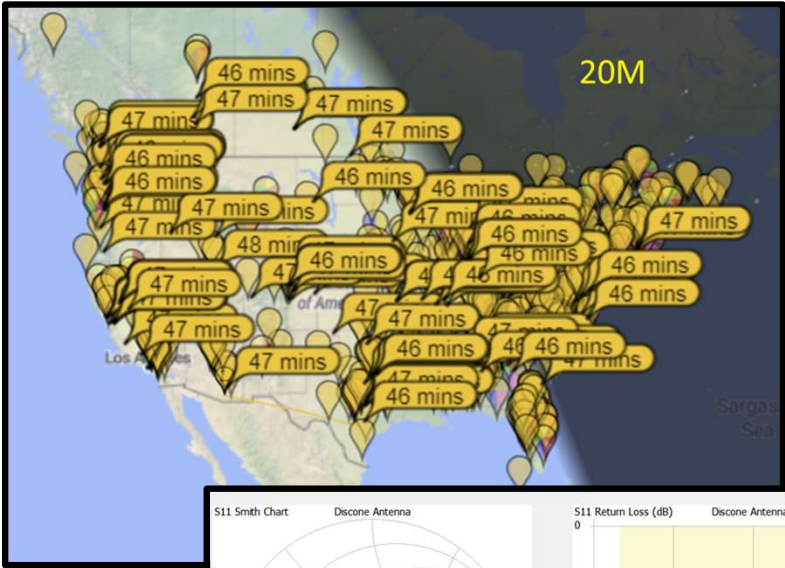
GVARC Resources

Rick Rodgers, K7RCR

POTA Elmer

Randy Walker, K7NOJ

POTA Elmer

Tom Rice, NO7T

FT8 Digital Elmer

Ed Toal, N9MW

FT8 Digital Elmer

See: Feb2023 GVARC presentation by Rick Rodgers – posted on GVARC Website

Why Not?

AZ POTA Event 2024

ARIZONA STATE PARKS & TRAILS

SPANNING THE STATE... TO SERVE YOU!

ARCA

AMATEUR RADIO COUNCIL OF ARIZONA

QDX Modifications

Alert: The QDX transceiver from QP Labs is a Kit Level design that may still evolve. Based on field experience, the following modifications are suggested – for both kits and pre-assembled units.

1. ***Strongly*** recommended that every QDX be equipped with a commutating diode across inductor L14. That has proven to be the single most effective action to prevent failure of the output transistors.

2. Recommend the installation of a 22K ohm resistor at the BNC antenna port. The value is not critical. It serves as a bleed-off for static charges that might build up on an antenna and damage QDX.

3. If building from kit, put a thin layer of thermal paste between the flat side of each of 4 output transistors and the circuit board metallization that they press against. This helps overcome surface irregularities and improves heat transfer from transistors to circuit board. This widens the SWR tolerance performance of QDX a bit.
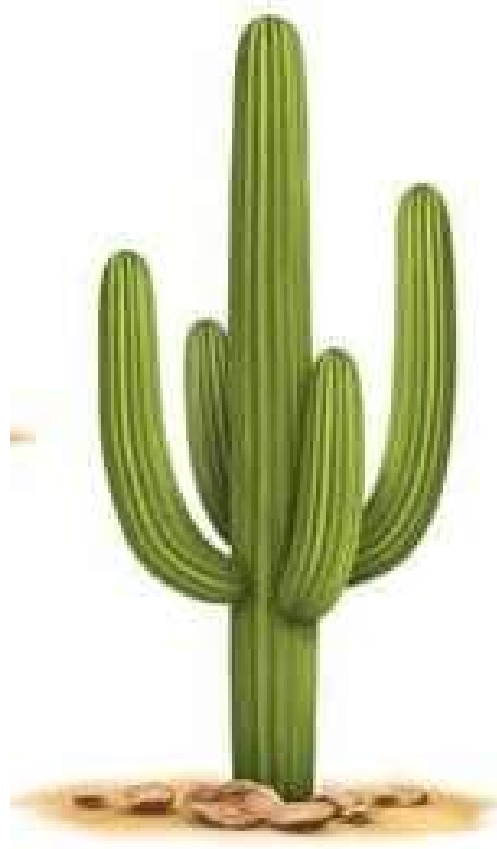
4. An optional suggestion to replace the BS170 output transistors with TN0110 transistors. These are more robust and more performant, producing somewhat higher output on all bands. It is a slightly tricky mod as the transistor pinouts are different.

For QDX Technical Issues, see the forum at: https://groups.io/g/QRPLabs
And QDX troubleshooting at: https://qrp-labs.com/qdx/qdxtrouble.html

Implementing the commutating diode mod

The diode is a garden variety 1N4184, one of the most widely available P/Ns. As you can see in the photo, the banded end goes to one terminal of toroid inductor L14, the power supply side. The other end of the diode goes to the center tap of the binocular output transformer inductor. This effectively places the diode in parallel with L14, oriented properly to commutate harmful voltage spikes.

L14 can be spotted in the bottom center of this schematic diagram:
https://qrp-labs.com/images/qdx/schem5.png

In a stock QDX, a lot of energy is stored in a magnetic field in that inductor during a transmit interval. At the end of the transmission the output transistors turn off abruptly. The magnetic field in the inductor collapses rapidly inducing a huge voltage spike that exceeds the maximum voltage rating of the transistors.

The diode provides a shunt path around the inductor, enabling the magnetic field to collapse more slowly by letting current circulate in the inductor/diode loop and preventing the reactive spike from occurring.

The added diode is the pink-orange glass-bodied cylinder with wire leads that you see in the upper center part of the photo (yellow oval). The toroid L14 is at the lower lead and left of the diode. The binocular output transformer is at the upper lead and to the left of the diode.

https://qrp-labs.com/images/qdx/schem5.png