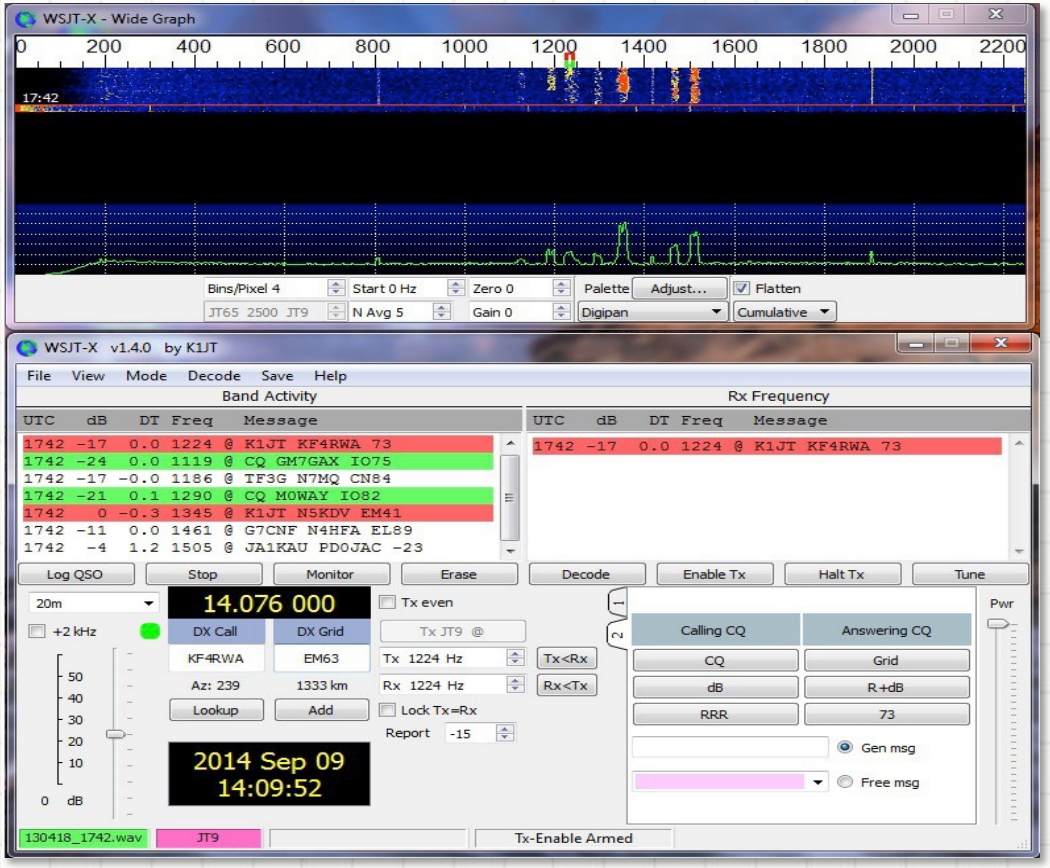
Note: We will be recording all Bootcamp Sessions. Anyone not wishing to be recorded should mute their video or disconnect.

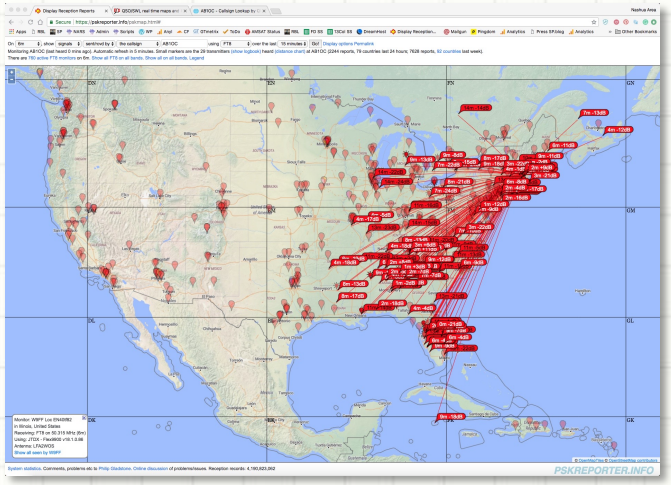


WSJT-X: FT8 AND MORE

Ham Bootcamp

Fall 2022

Topics

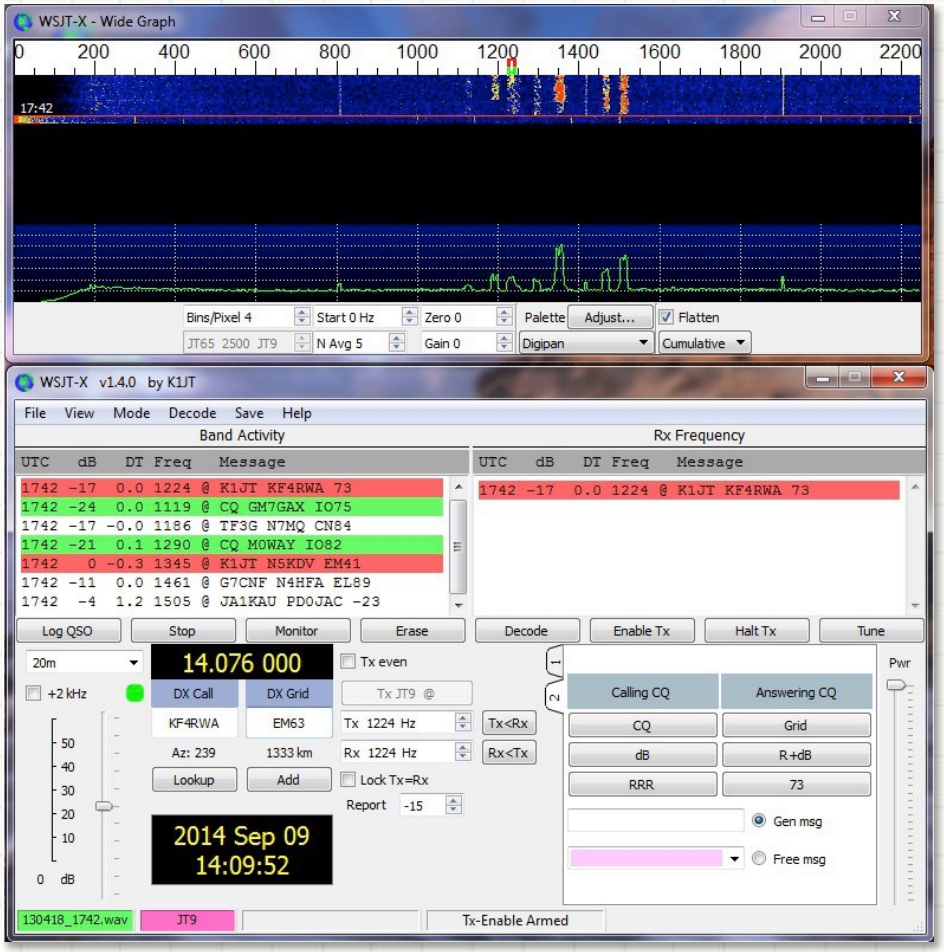


- What can you do with WSJT-X and FT8? How does it work?
- What kind of performance can you expect?
- What's required to get on the air?
- Setting up your Radio and Software
- Using FT8 to make contacts
- Evaluating the bands and your station with PSKReporter

WSJT-X Modes

What can I do?

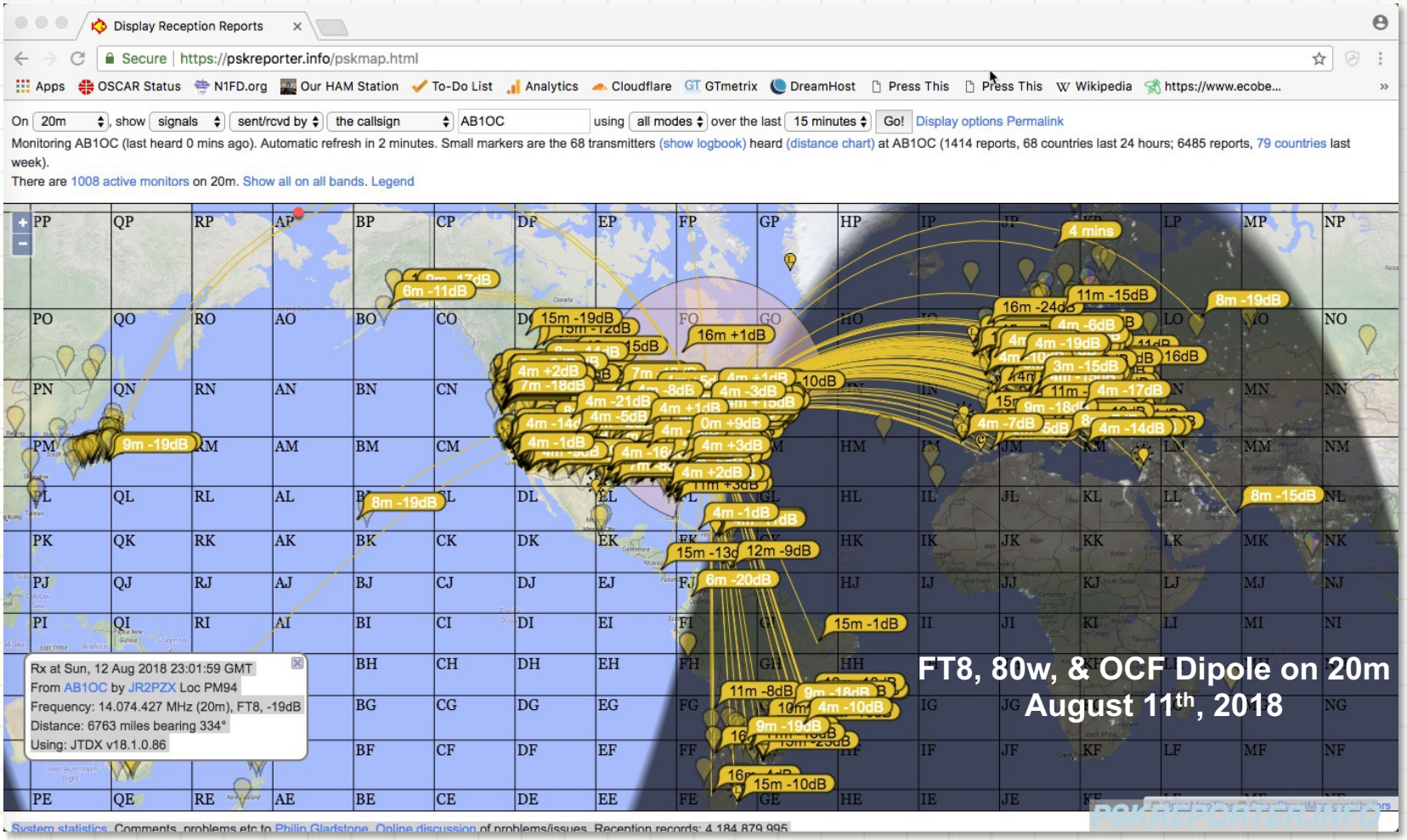
- Weak-signal Digital contacts on VLF, HF, VHF bands and above
- Great for basic stations (100W and a Wire or QRP)
- Exchange includes call signs, grids, and signal reports
- Work DX, make progress on operating awards
  - DXCC, WAS, VUCC, etc.
- Evaluate your station's performance & band conditions
- Make contacts using "exotic" modes
  - Meteor Scatter on 6m
  - Moon Bounce (EME)
  - Airplane & Rain Scatter
  - …



Download The WSJT-X Program and Manual here

What Performance Can Be Expected?

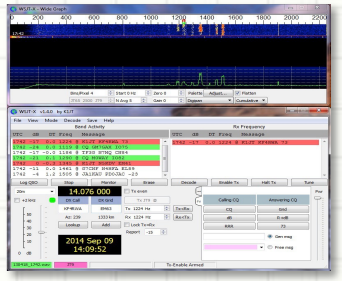
FT8 on the 20m Band: 80w and a Wire Antenna



- The [PSKReporter website] is a **Reverse Beacon Network** (RBN) that supports WSJT-X modes (and other digital modes too)
- Display where your signal is being heard and how strong your signal is around the world in real-time. More to come on PSKReporter later…

WSJT-X Exchange

Typical Example

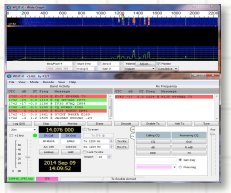


```
CQ K1ABC FN42                    #K1ABC calls CQ
                 K1ABC G0XYZ IO91    #G0XYZ answers
G0XYZ K1ABC -19                  #K1ABC sends report
                 K1ABC G0XYZ R-22    #G0XYZ sends R+report
G0XYZ K1ABC RRR                  #K1ABC sends RRR
                 K1ABC G0XYZ 73      #G0XYZ sends 73
```

- Exchanges include Callsigns, Grid Squares, and Signal Reports
- ***Auto Sequence*** and ***Answer 1st Caller*** options for fast protocols (more coming in the demos)
- Software allows for custom messages which often include simple antenna information, power, etc.
- Special options exist for compound callsigns, contest exchanges, and other purposes (see WSJT-X manual for details)
- WSJT-X knows where “watering holes” for QSOs are on each band
  - They are usually just above the PSK sub-band

WSJT-X Exchange

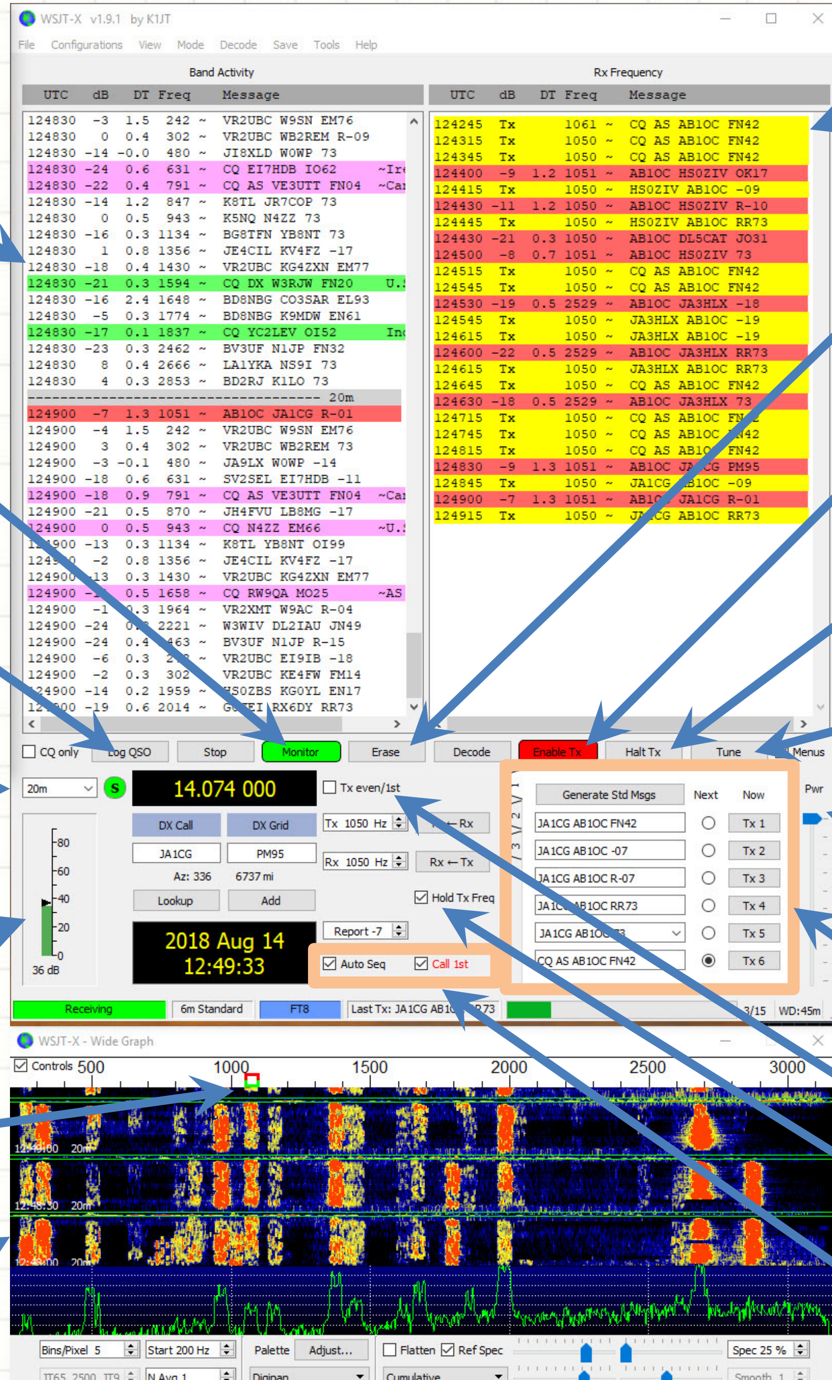
Tx/Rx Sequences using FT8 (a ”Fast Mode”)



CQ K1ABC FN42		#K1ABC calls CQ	**00:00 (Even)**
	K1ABC G0XYZ IO91	#G0XYZ answers	**00:15 (Odd)**
G0XYZ K1ABC -19		#K1ABC sends report	**00:30 (Even)**
	K1ABC G0XYZ R-22	#G0XYZ sends R+report	**00:45 (Odd)**
G0XYZ K1ABC RRR		#K1ABC sends RRR	**01:00 (Even)**
	K1ABC G0XYZ 73	#G0XYZ sends 73	**01:15 (Odd)**

- In this example, **K1ABC** is using ***Tx Even***
  - **K1ABC** can only hear stations who are using ***Tx Odd***
- **G0XYZ** is using ***Tx Odd***
  - **G0XYZ** can only hear station who are using ***Tx Even***
- For weak signal modes on VHF and above (6m and higher), the convention is stations in US ***should Tx Odd when DX is open to EU***
  - *Especially important when a DX opening exists!!!*
  - *Ok to work single contacts in* ***Tx Even BUT IT’S NOT APPROPRIATE TO CALL CQ! Watch power levels if doing this.***

WSJT-X



All Messages Decoded

Turn on Decoding

Log Completed QSO

Current Band & Sub-Band

WSJT-X "S Meter"

Tx (Red) & Rx (Green) Freqs.

Waterfall "Wide Graph"

Messages On Your Rx Freq.

Erase Messages

Enable Tx

Stop Tx

Tx Tone Only

Tx Power Control

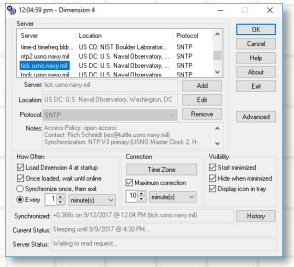
Standard QSO Messages

Even/Odd Tx Sequence and Hold Tx Freq.

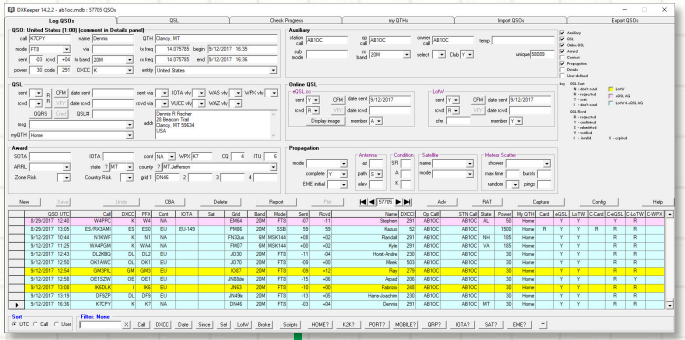
QSO Step Automation

WSJT-X and Related Software

Components and Interfaces



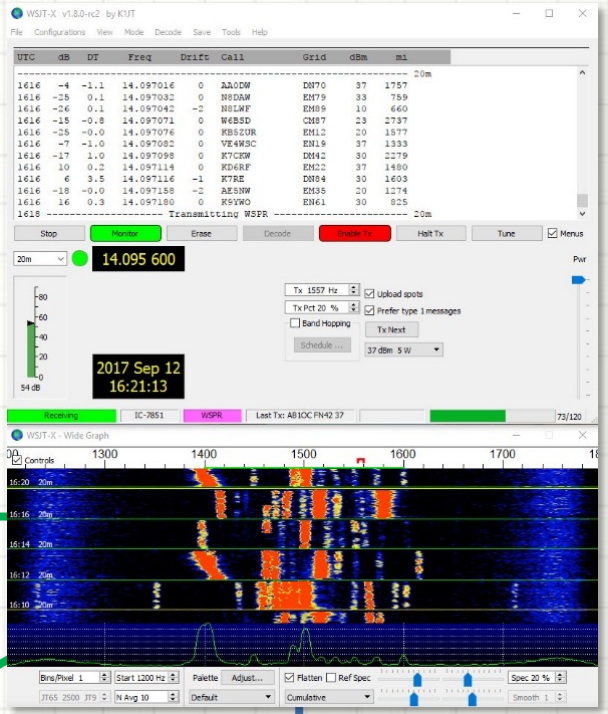
Dimension 4
(Sync's PC Clock)

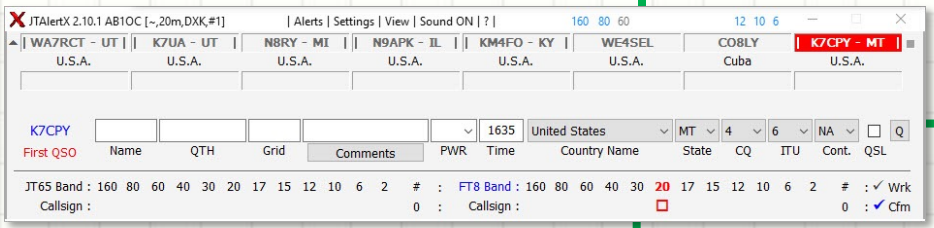


Your Log
(ex. DXKeeper)

IP/
DDE

WSJT-X



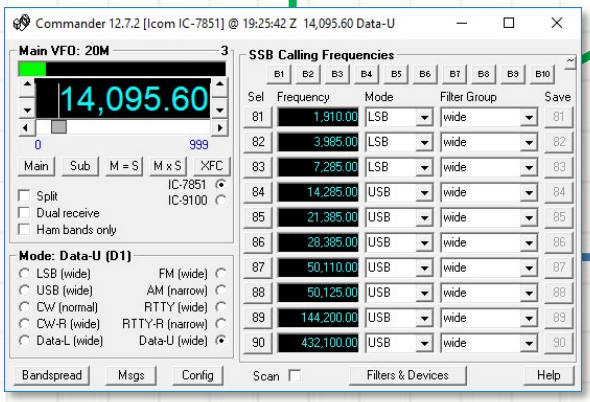


JTAlert

IP

IP

IP



Radio Interface
(ex. DXLab Commander)

USB
CAT

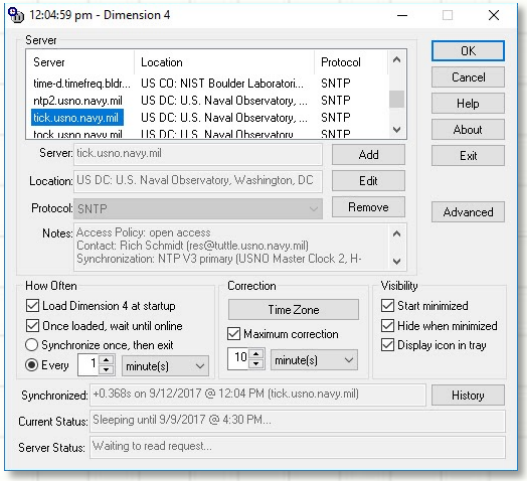
Your Radio

USB Audio
(Direct or Sound Card)

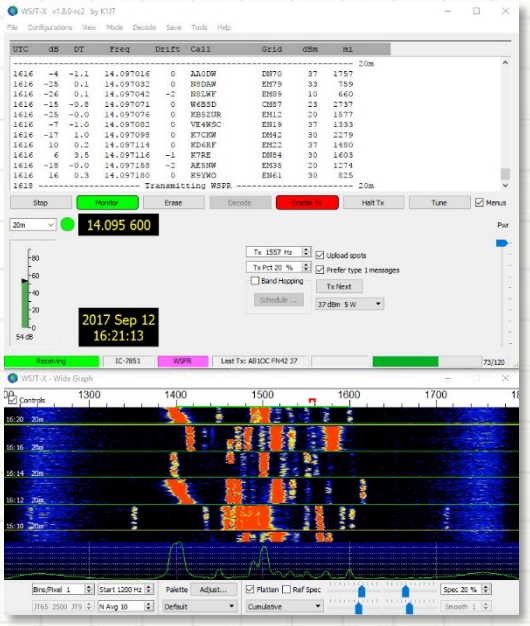
- Configure IP/DDE Interfaces
  - WSJT-X
  - Radio Interface
  - JTAlert
- Manuals cover the details

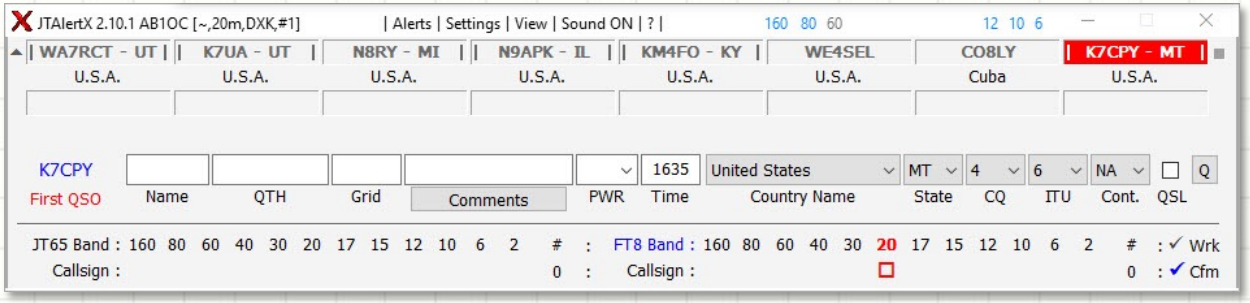
WSJT-X and Related Software

What's Needed?



- PC Clock Sync to +/- 1 Second via NTP
  - Disable Windows/Mac time sync – they are not accurate enough!
  - Recommend ***Dimension 4*** http://www.thinkman.com/dimension4
- WSJT-X 2.5.4, or the latest version
  - https://www.physics.princeton.edu/pulsar/K1JT/wsjtx.html
- Linkage to your logger is useful (Bridge App)
  - For DXLab, and HRD – recommend JTAlert http://hamapps.com
  - Use single control interface to radio (ex. ***DXLab Commander*** or equivalent)



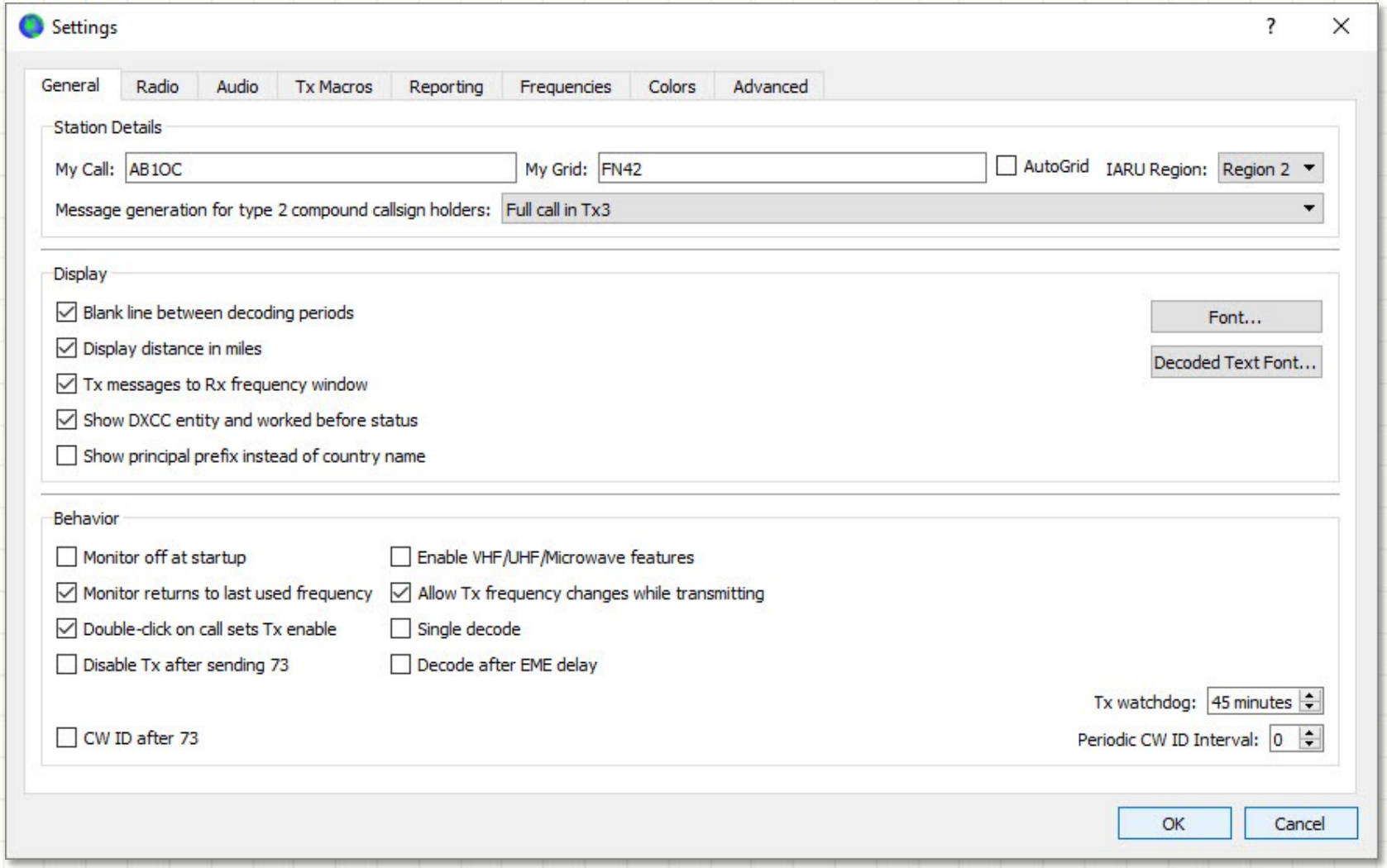


WSJT-X and Related Software

Basic Setup Steps

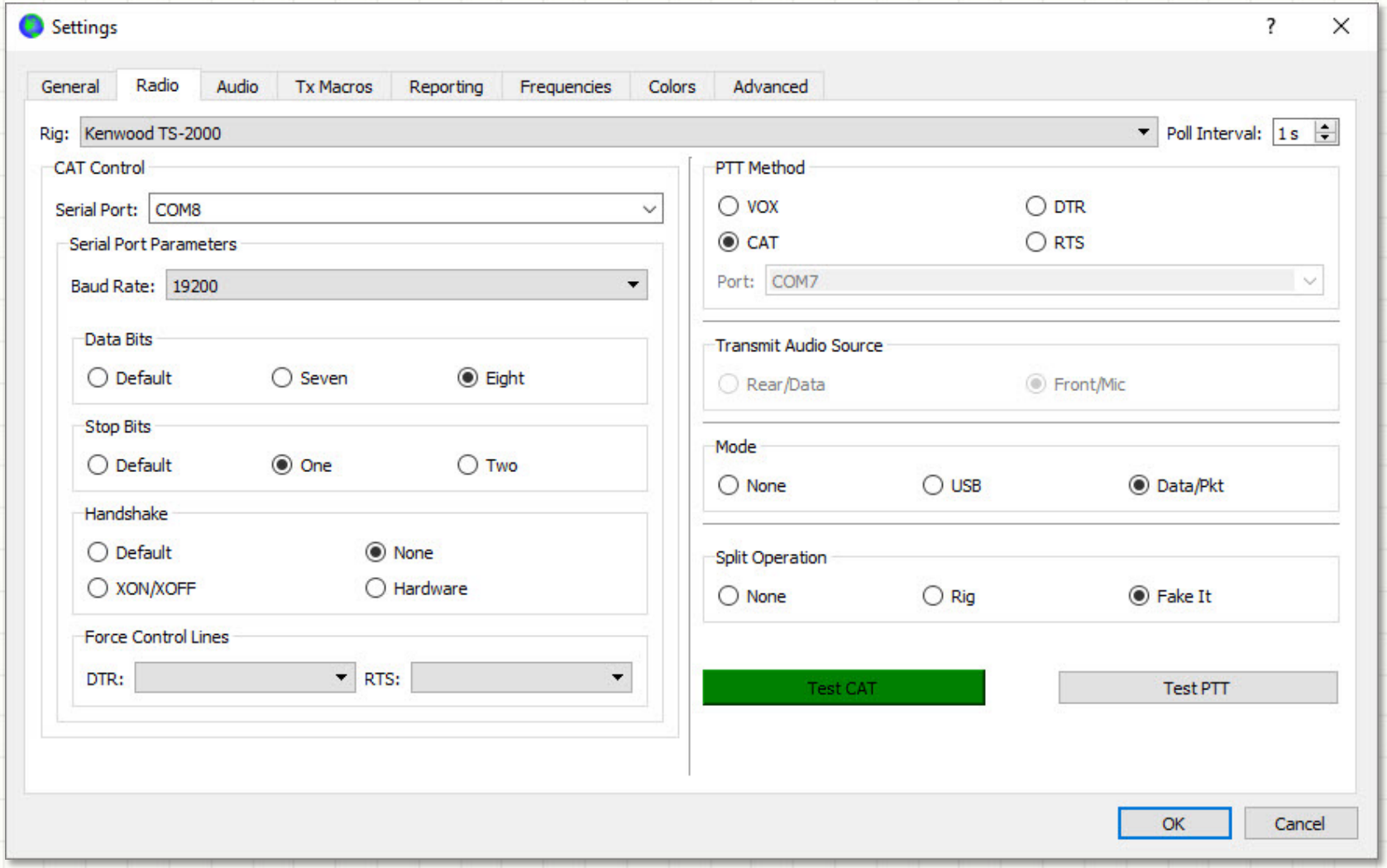
- ✓ **Install and configure Dimension 4** – use a single time server that's reliable
  - ❑ Run Dimension 4 as a service at windows startup
  - ❑ Turn OFF windows time updates
  - ❑ Automatically adjust your clock every 3 - 5 mins
- ✓ **Connect radio sound card and CAT control interfaces to your PC**
  - ❑ Details depend on radio and optional sound card
  - ❑ Always use **USB Mode: Digital Upper** option (**DIGU**) if your Transceiver has it
  - ❑ Set Radio Tx and Tx Bandwidth for 3 kHz (or max. if less)
  - ❑ Turn off Noise Reduction, Compression, Equalization and any audio processing (**DIGU mode usually** does much of this)
- ✓ **Install and Configure WSJT-X**
  - ❑ Set program options in the **General Tab**
  - ❑ Setup radio controls for PTT and CAT control in **Radio Tab**
  - ❑ Set "**Fake It**" option to optimize radio Tx
  - ❑ Configure Audio Tab for radio "sound card" devices on your PC
  - ❑ Configure Logging in the **Reporting Tab**
  - ❑ Turn on Two Pass Decoding in the **Advanced Tab**
- ✓ **Set your Audio Levels on you Radio, Sound Card, or windows**
  - ❑ **Radio is best approach, windows only as a last resort**
  - ❑ Adjust Tx levels for full output power with ***NO ALC ACTION*** (Power slider at Max, use the **Tune** Button)
  - ❑ Adjust Rx levels for ~30 dB when only band noise (no sigs) is present
- ✓ **Set WSJT-X to use default frequencies (Freqs. Tab, Right-Click, Reset)**

WSJT-X General Settings



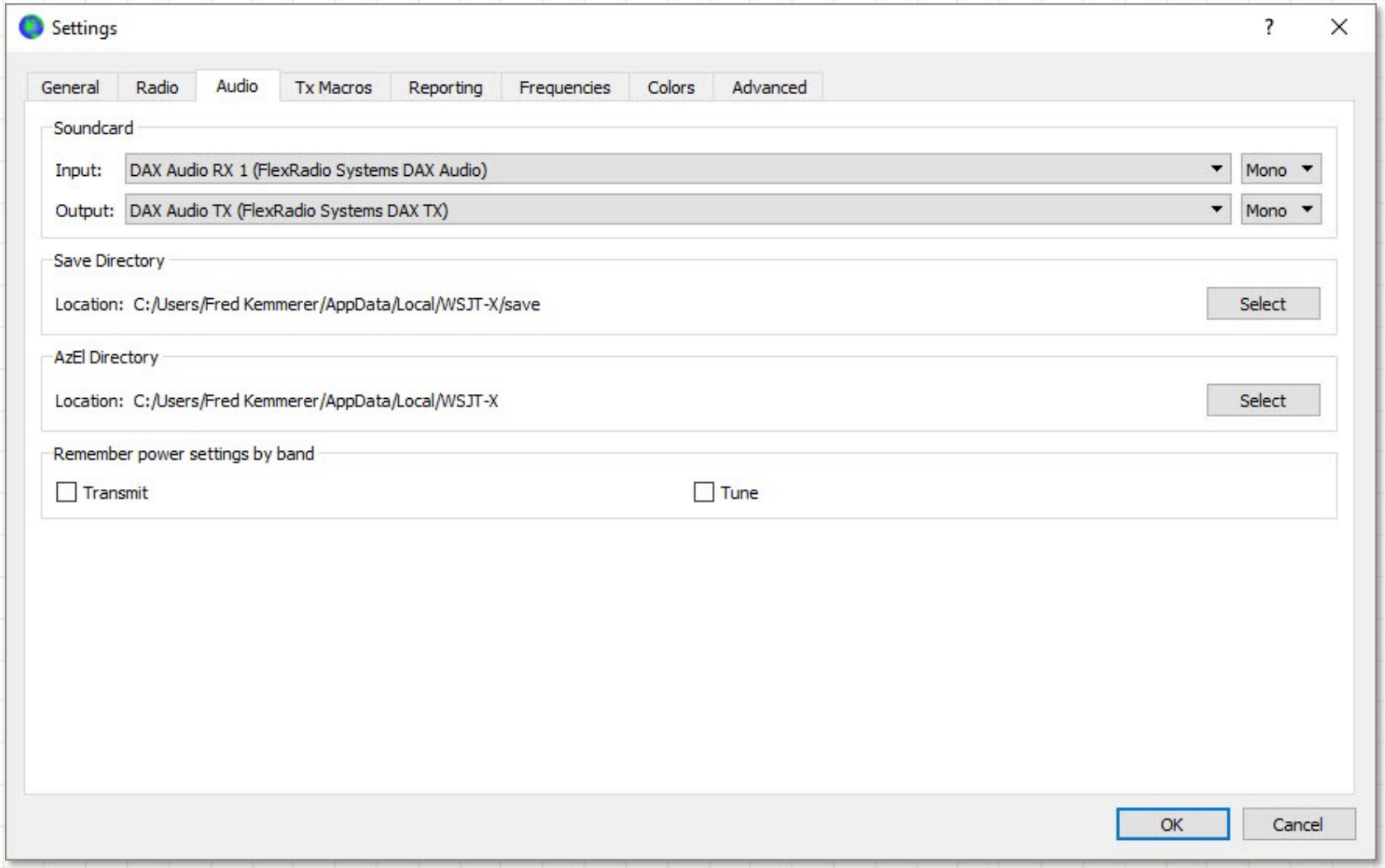
- ✓ Set your **Callsign** and **Grid Square**
- ✓ Set **IARU Region** to “2” (U.S. Stations)
- ✓ Other options as shown above or to your preferences…

WSJT-X Radio Settings



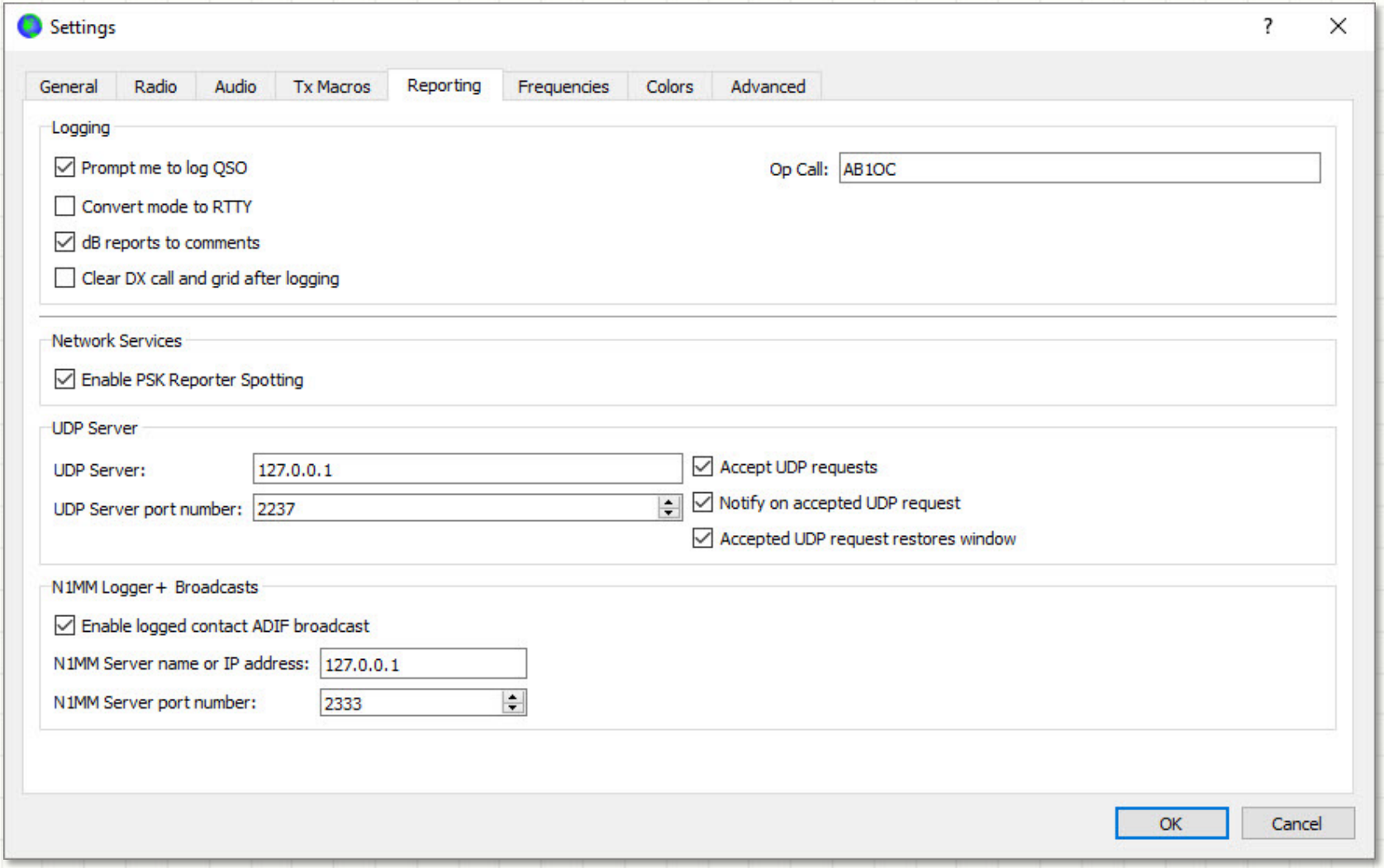
- ✓ Set **Serial Port** for CAT interface for your radio
- ✓ Set **PTT Method**
- ✓ Set **Mode** = Data/Pkt (if you have it) or USB
- ✓ Set **Split Operation** = “Fake It”

WSJT-X Audio Settings



- ✓ Set **Input** to Sound Device from your Receiver
- ✓ Set **Output** to Sound Device going to you Transmitter

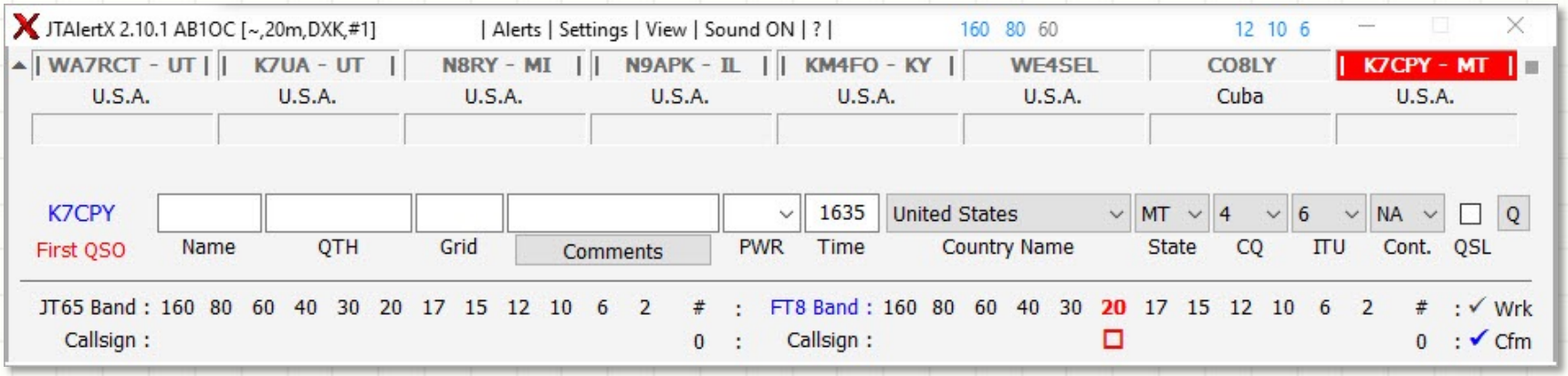
WSJT-X Advanced Settings



- ✓ Set **Prompt to log QSO**
- ✓ Check **Enable PSK Reporter Spotting**
- ✓ Set **Op Call** to your Callsign
- ✓ Other options depend upon logger/JTAlert & your preferences

WSJT-X Related Software

Additional Steps for Logger Integration via JTAlert

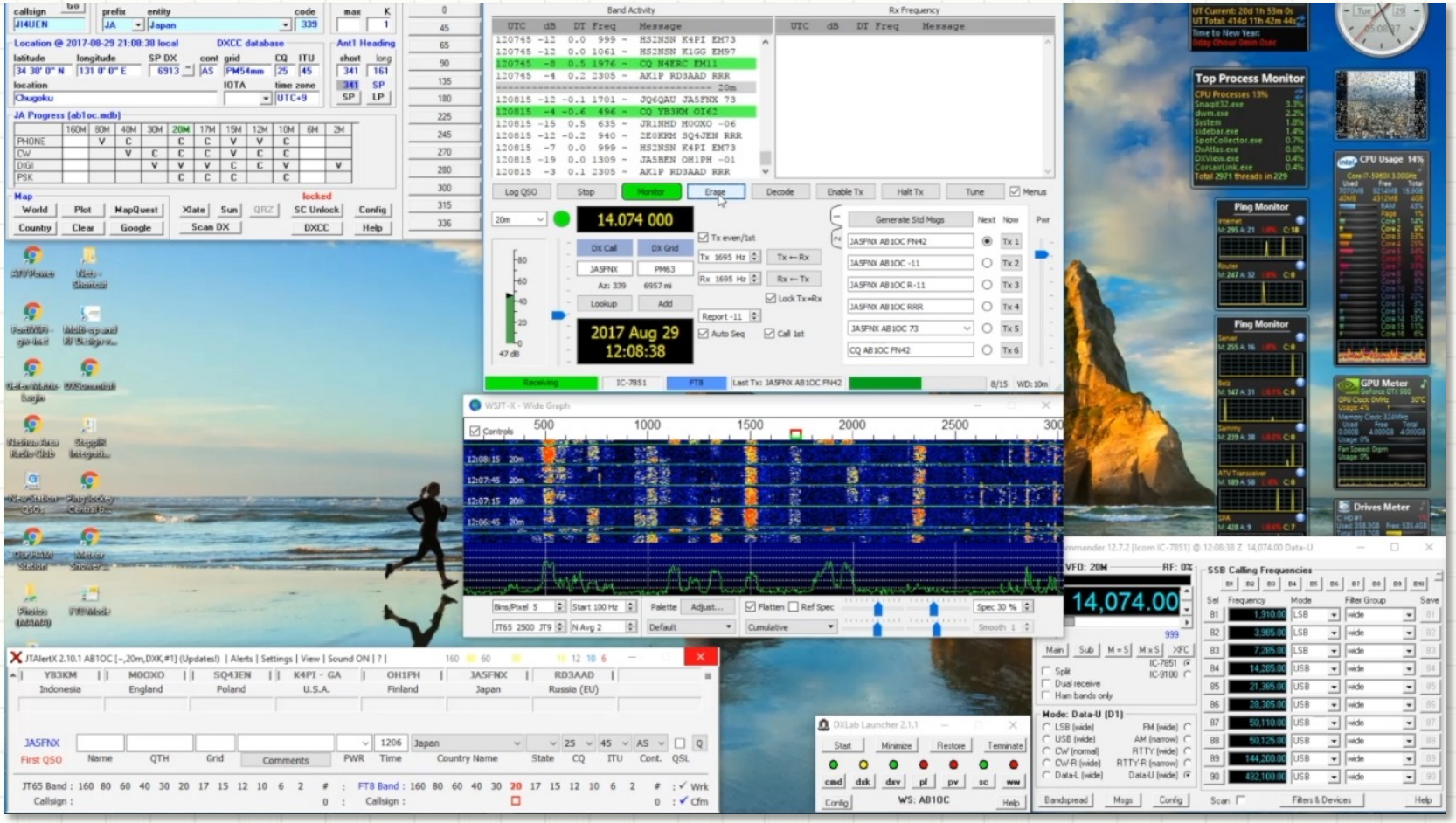


- ✓ **Install and configure your logger** – DXLab Suite works well at AB1OC/AB1QB
- ✓ **Connect radio sound card and CAT control interfaces to your PC**
  - ❑ Must have a means to share CAT and PTT control for your radio between WSJT-X and your logger
  - ❑ Recommend using DXLab Commander as a CAT and PTT Gateway for both programs
  - ❑ Configure WSJT-X to use DXLab Commander in the **Radio Tab**
- ✓ **Install and configure JTAlert –** be sure to install ***Sounds*** and ***Callsign Database*** add-ons
  - ❑ Integrates WSJT-X and DXLab Suite (other loggers supported as well)
  - ❑ Consult the JTAlert help file to configure these integrations
  - ❑ Setup your alerts according to your preferences
  - ❑ Many other customizations possible – see the JTAlert Manual for details
- ✓ **Periodically have JTAlert scan your log and update its databases**

FT8 QSOs on 20m

Answer another station's CQ

Link to Video

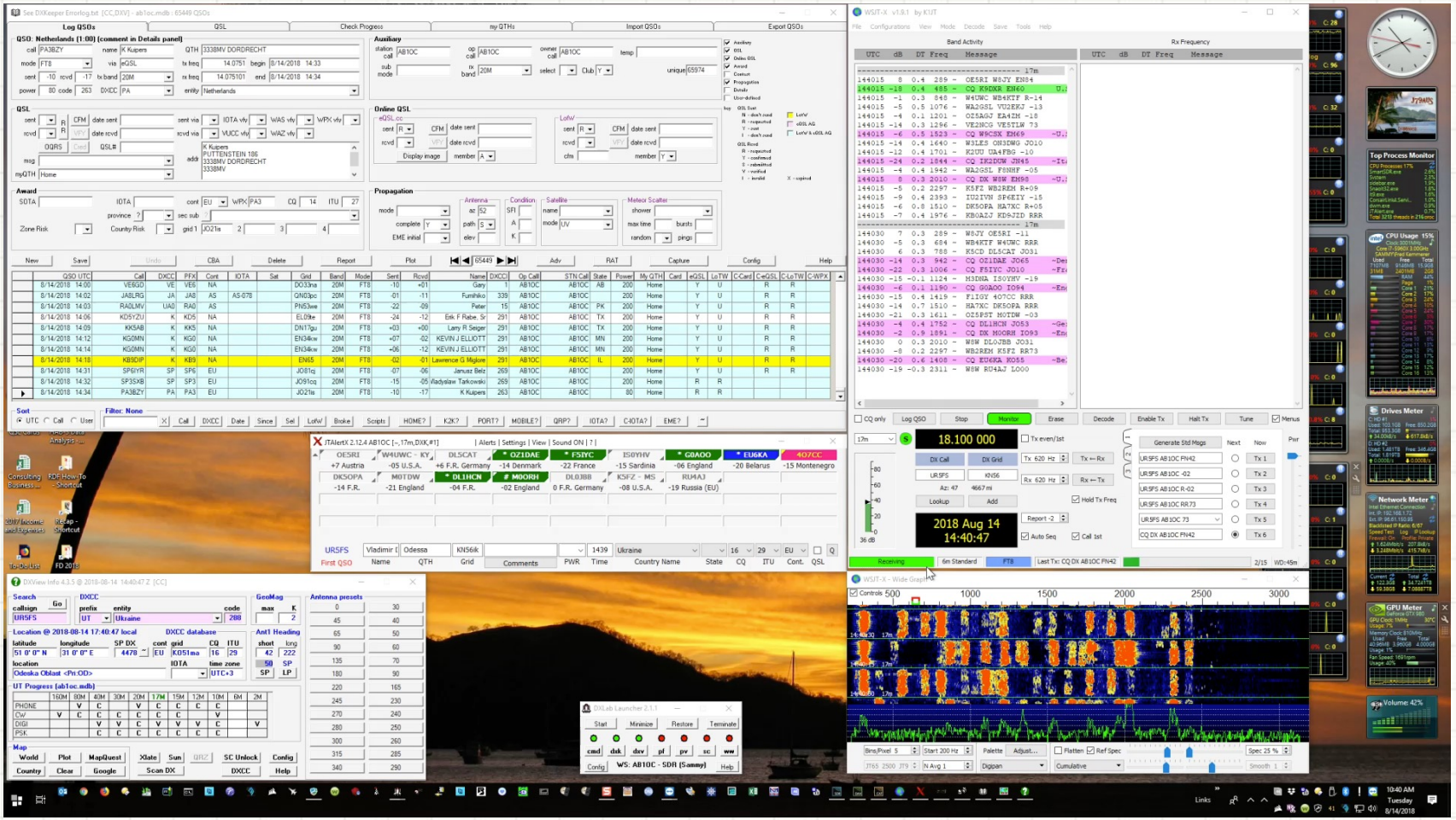


- Answering a CQ from JA5FNX – Tx & Rx Locked (**Hold Tx Freq** *unchecked*)
- Call CQ and work RA3AL – Tx & Rx Unlocked (**Hold Tx Freq** *checked*)
- **Auto Seq** is *On* to keep our QSOs to moving along…

FT8 QSOs on 20m

Calling CQ

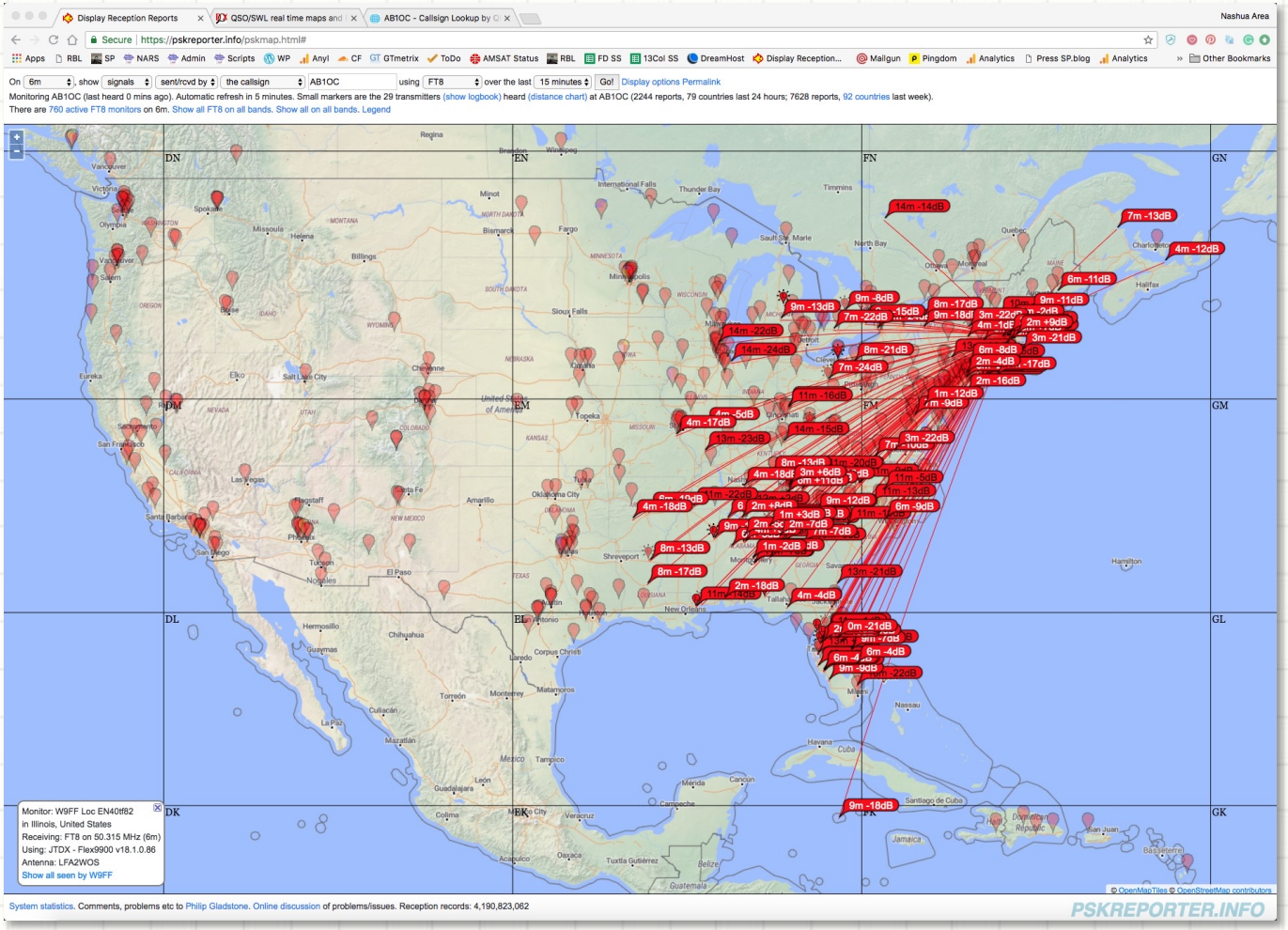
Link to Video



- We are ***Tx Odd*** to follow sequence conventions (not essential on HF)
- Calling CQ so Tx & Rx Unlocked (**Hold Tx Freq** *checked*)
- Auto Sequence is ***On*** to allow the QSO to move along…
- **Call 1st** *checked* – to automatically answer first station responding to our CQ

PSKReporter

Evaluating Your Station and Band Conditions



- Use the [PSKReporter website] to evaluate your station, antennas, and band conditions in real-time – we always have it running along with WSJT-X
- WSJT-X reports all stations heard calling CQ to the [PSKReporter website]
- Use to evaluate and set Tx Power Levels (Reports in -15 to -5 dB range)

WSJT-X Family of Protocols

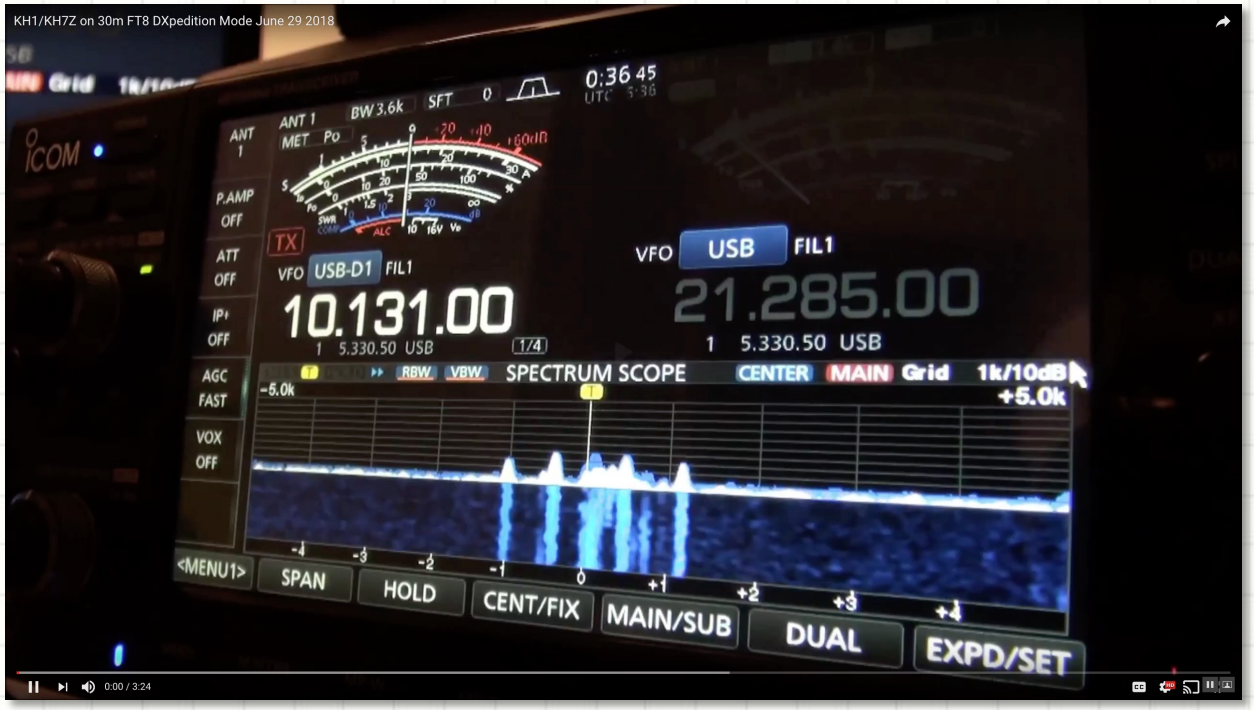
Applications and Bands

Mode	Uses	Primary Bands	Tx Interval	Notes
FT8	LF-VHF Weak Signal Fast Mode	160m – 6m	15 sec.	Best mode for HF & 6m weak signal work
FT4	LF-VHF Weak Signal Contest Fast Mode	160m – 6m	7.5 sec.	Common in contests & when band is “busy”
MSK144, ISCAT, JT9E-H	Brief Signal Enh. Mode; Meteor or Aircraft Scatter	6m and above	5 – 30 sec., 15 sec. typical	Power and antenna gain necessary for these modes
JT65	EME, Weak Signal MF-VHF	6m+ EME, 160m – 6m Weak Signal	1 min.	Several variations; can avg. multiple mins.
Q65	EME, Weak Signal VHF and higher	6m+	15 – 120 sec.	New mode for EME and 6m+ weak signal
JT9	LF/MF/HF Weak Signal	160m and above	1 min.	2 dB better than JT65 , 10% of BW
QRA64 & JT4	EME	VHF – 24 GHz	1 min	Improved EME mode; Variable tone spacings for SHF+ bands

FT8 DXpedition Mode

How it works

Video on YouTube



- DXpedition can work up to 5 stations at the same time; 100+ Qs/hour!
- Consult the DXpedition website (KH1 example) to determine operating frequencies and add them to WSJT-X Frequencies in the **Frequencies Tab**
- Place WXJT-X in **Hound** mode in WSJT-X **Advanced** Settings Tab
- Set your ***Tx Frequency above 1000 Hz***
- Double click on one of the decoded DXpedition's CQ calls and work them!
- Fox Mode for *DXpeditions ONLY* - Not for Field Day, Contest Operation, Casual QSOs, or anything else!

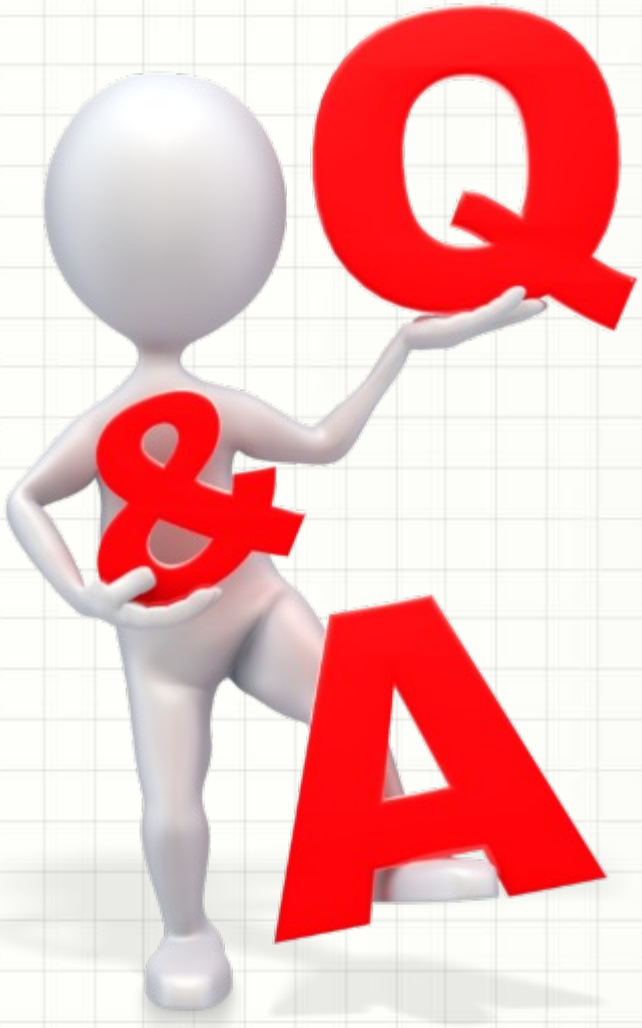
Questions?

To Learn More:

Check out the Nashua Area Radio Society's Tech Night Program at: n1fd.org/tech-night

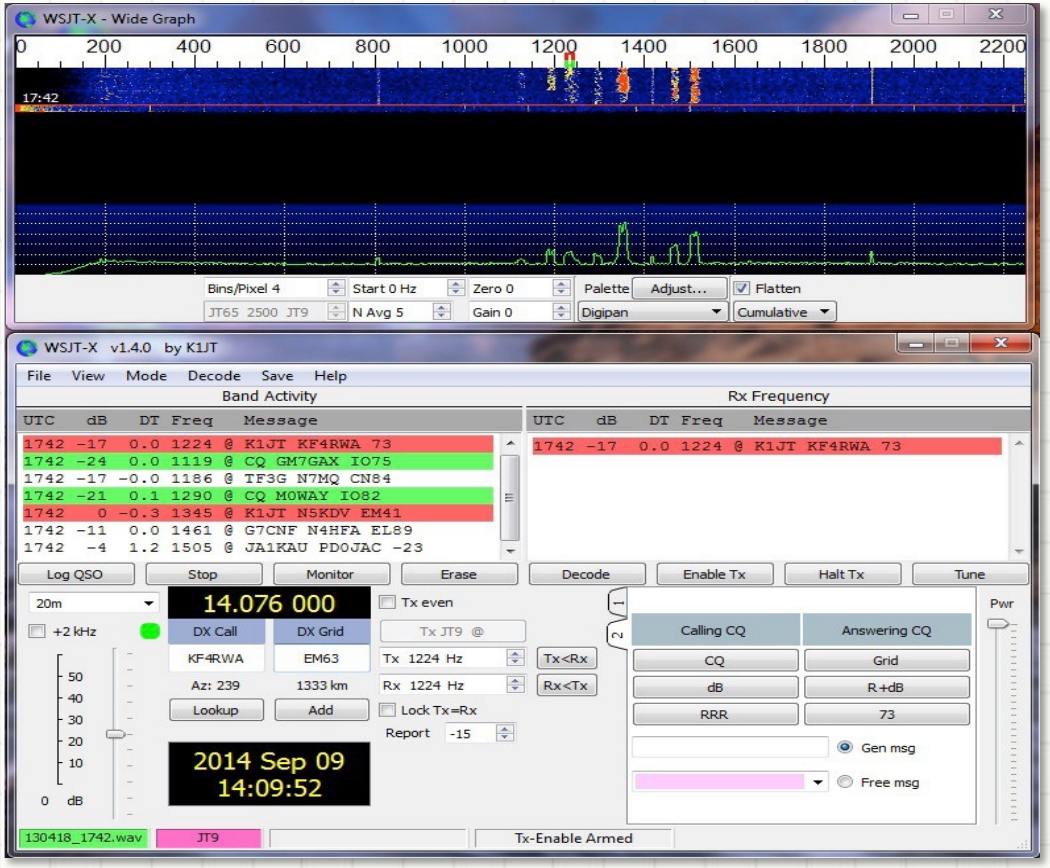
Become an Internet Subscriber (or members of NARS): n1fd.org/join-us

Much more information, pictures and video are available on our Blog at: stationproject.blog



"Over 60% of all QSOs uploaded to LoTW in June and July 2018 were FT8 Mode" – ARRL Podcast

Note: We will be recording all Bootcamp Sessions. Anyone not wishing to be recorded should mute their video or disconnect.



WSJT-X/FT8 On-Air Demonstration

Nashua Area Radio Society

Fall 2022