FT8 Hardware, Software, Configuration, and Operation

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W2UA
Cherokee Amateur Radio Society
Virtual Meeting
October 10, 2020

About W2UA

- Licensed since 1961
- BS / MSEE
- Worked as an Engineer in Computers and Communications for 50 years
- Retired to Georgia in 2019
- Digital DXCC with 199 countries worked / 188 confirmed

FT8 Good or Bad?

- The Good
  - Work DX at Sunspot Minima
  - It’s Fast
  - Have QSOs while doing other things in the shack
  - Learn about Propagation
  - Allows modest stations
  - It’s a new mode/tool we can use
  - Work DX on 6m
- The Bad
  - Boring!
  - Impersonal (If you are a rag chewer or like personal relationships this may not be for you)
  - Full Automation (can be done but frowned upon)
  - Makes our bands seem under-utilized (FT8 frequencies have activity even when the rest of the band is “dead”)
  - Bleak future of operating

Why FT8? (for me)

- Degraded Hearing
  - Hearing loss makes it difficult to operate SSB/FM/DMR/CW etc.
  - FT8 makes no noise (I turn the volume down)
- Keeping up with the times
  - Started as a Novice (1961) with CW
  - Technician (1962) 6 and 2 meter AM
  - SSB (1966)
  - FM Repeaters (1974)
  - Packet (1980s)
  - FT8 (2018)
- Needed a challenge in retirement
  - Digital DXCC (100) from NJ apartment (2018/19)
  - Digital WAS from NJ apartment (2018)
  - 6 meter Digital WAS (need KY, MS, AK, HI) (2020)
  - Digital DXCC (current goal is 200 confirmed) soon!

To work “Digital” (FT8/FT4 etc.) what do I need?

- Computer
  - Hardware
  - Software
- Radio
  - CAT capable
- Data (soundcard) interface to Computer
  - SignaLink or equivalent
  - Built in to Radio (IC-7300 / IC-7610 etc.)
- Cables
- Software

Computer

- Laptop or Desktop
  - Windows
  - Mac
  - Linux
- USB ports
  - 2 or more
- Accurate Time Source –
  - Digital modes need an accurate time reference
    - Internet Time Source
    - GPS Time Source (a must for portable operation)

Radio

- Almost any recent radio can be made to work
  - Icom
  - Kenwood
  - Yaesu
  - Flex
  - Xeigu
  - Elecraft
  - Apache Labs
  - Etc.
- Should be computer controllable
- Separate audio in / out is desirable but not necessary
  - Accessory connector
  - Mic / Speaker connectors
- Watch your power output
  - FT8 has a high duty cycle

Data Interface

- Used to get the data (audio) from the Radio to the Computer
  - Most radios need an external box to convert audio in/out from the radio to USB data for the computer.
  - Some newer Icom rigs have this built in (maybe others?)
  - Popular Data Interfaces
    - SignaLink
    - RigBlaster
    - MFJ-1204
    - Built in computer audio (sound card)
      - Turn off system sounds
      - Turn off internal mic (if present)
    - USB Audio Dongle

Cables

- Data Interface
  - USB between Interface and Computer
  - Audio In / Out between Interface and Radio
  - PTT between Interface and Radio
  - Note: This usually does not accomplish Rig Control (frequency, mode, etc.)
- Rig Control
  - USB cable (rigs with USB CAT interface)
  - USB to RS-232 interface (rigs with RS-232 CAT interface)
  - USB to TTL interface (rigs with 5 volt DC CAT interface)

Other Equipment

- If you are operation away from Internet access
  - Accurate time source
    - FT8 requires precise time synchronization
      - 4 slots per minute
        - :00, :15, :30, :45
      - 13 seconds transmitting data per slot
      - 2 seconds decoding per slot
    - Sync the time on your laptop before you go
    - Check to see how much your clock drifts

Software (mostly FREE!)

- Needed
  - WSJT-X (Data Encode / Decode)
    - Windows, MacOS, Linux (including Raspberry PI)
- Optional
  - JTAlert-X (Audio and Visual Alerts for WSJT-X)
    - Windows only
    - Displays State for US stations
  - GridTracker (Audio and Visual Alerts for WSJT-X including a World Map)
    - Windows, MacOS, Linux (including Raspberry PI)
  - Logging Program (usually NOT FREE)
    - WSJT-X does QSO logging
    - Ham Radio Deluxe (Logging)
  - Spotting Program(s)
    - https://www.ng3k.com/Misc/adxo.html (Announced DX Operations)
    - https://clublog.org/personal_spots.php (DX Spots Needed)
    - https://hamspots.net/ (Spots by Mode / Band)

Now What?

- Have Radio
- Get Data Interface (if needed)
- Get Cables
- Download WSJT-X
- Connect it up
- Configure the Software
- Have fun!

Radio with built-in “Data” Interface

USB

Radio with no “Data” interface

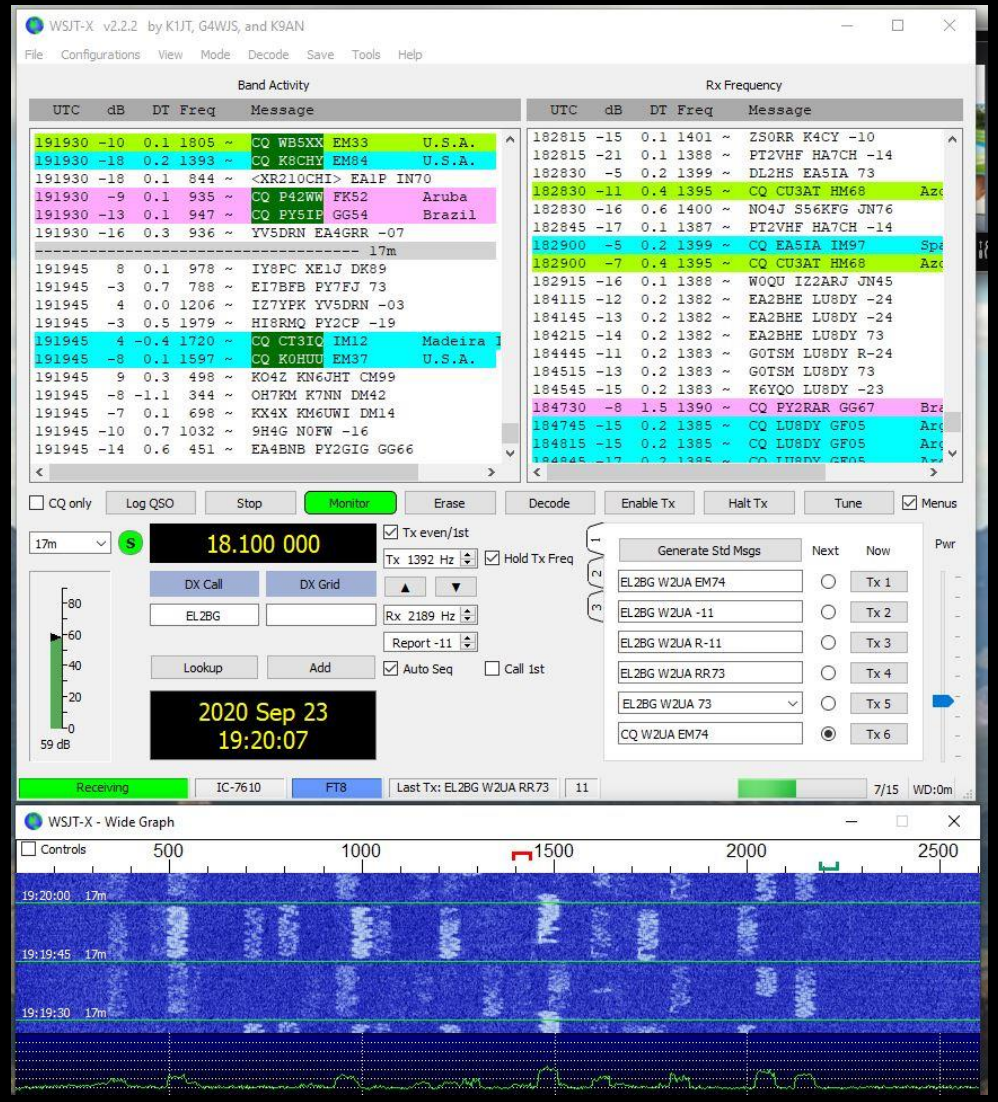
CAT

Audio In/Out
PTT

USB

Software

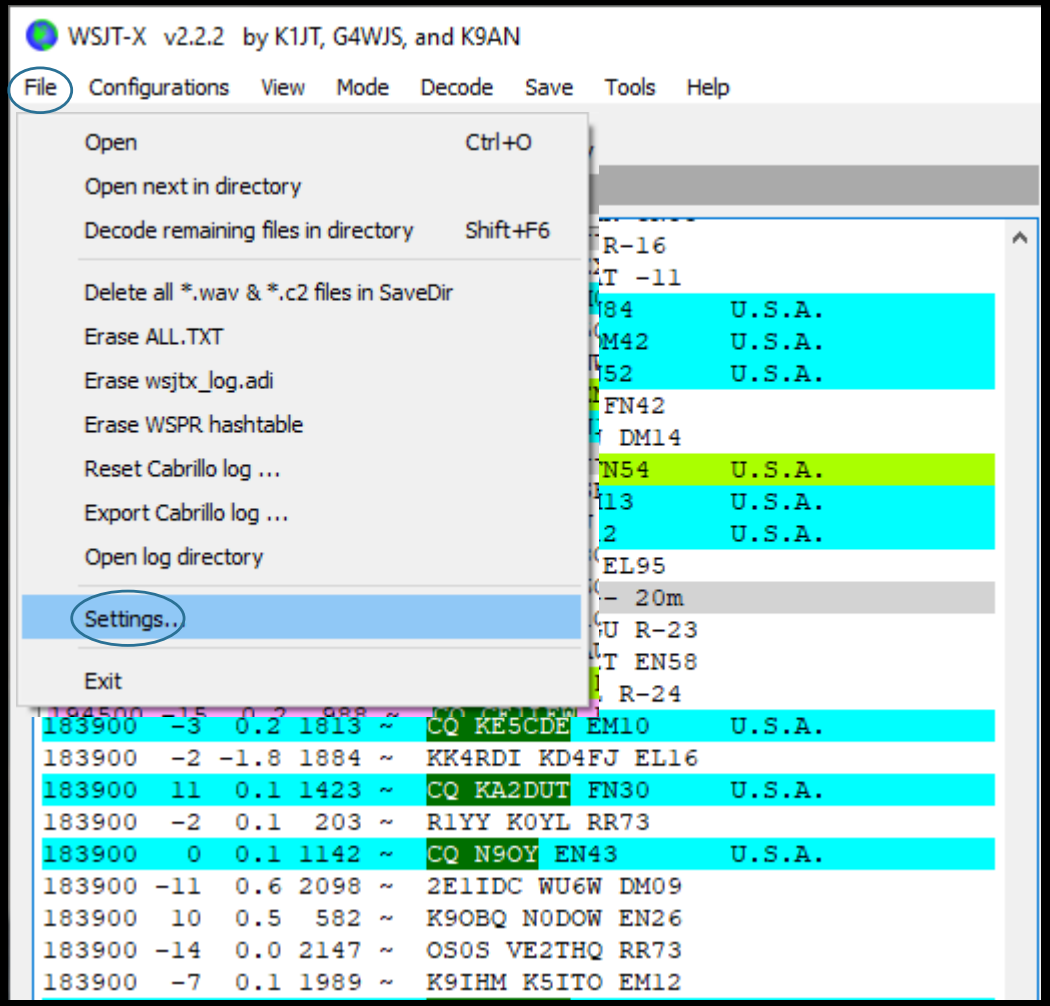
WSJT-X



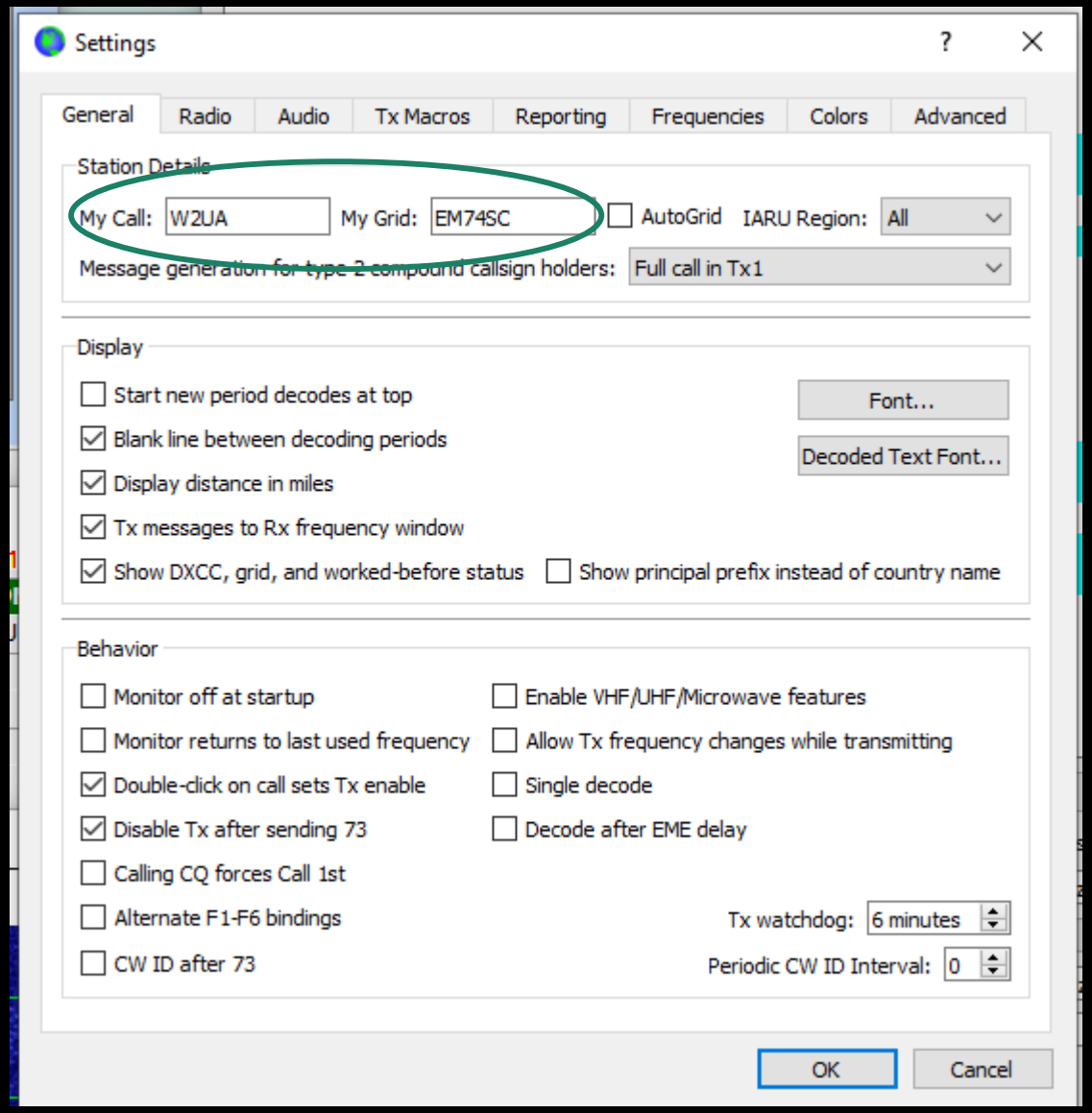
JTAlert-X

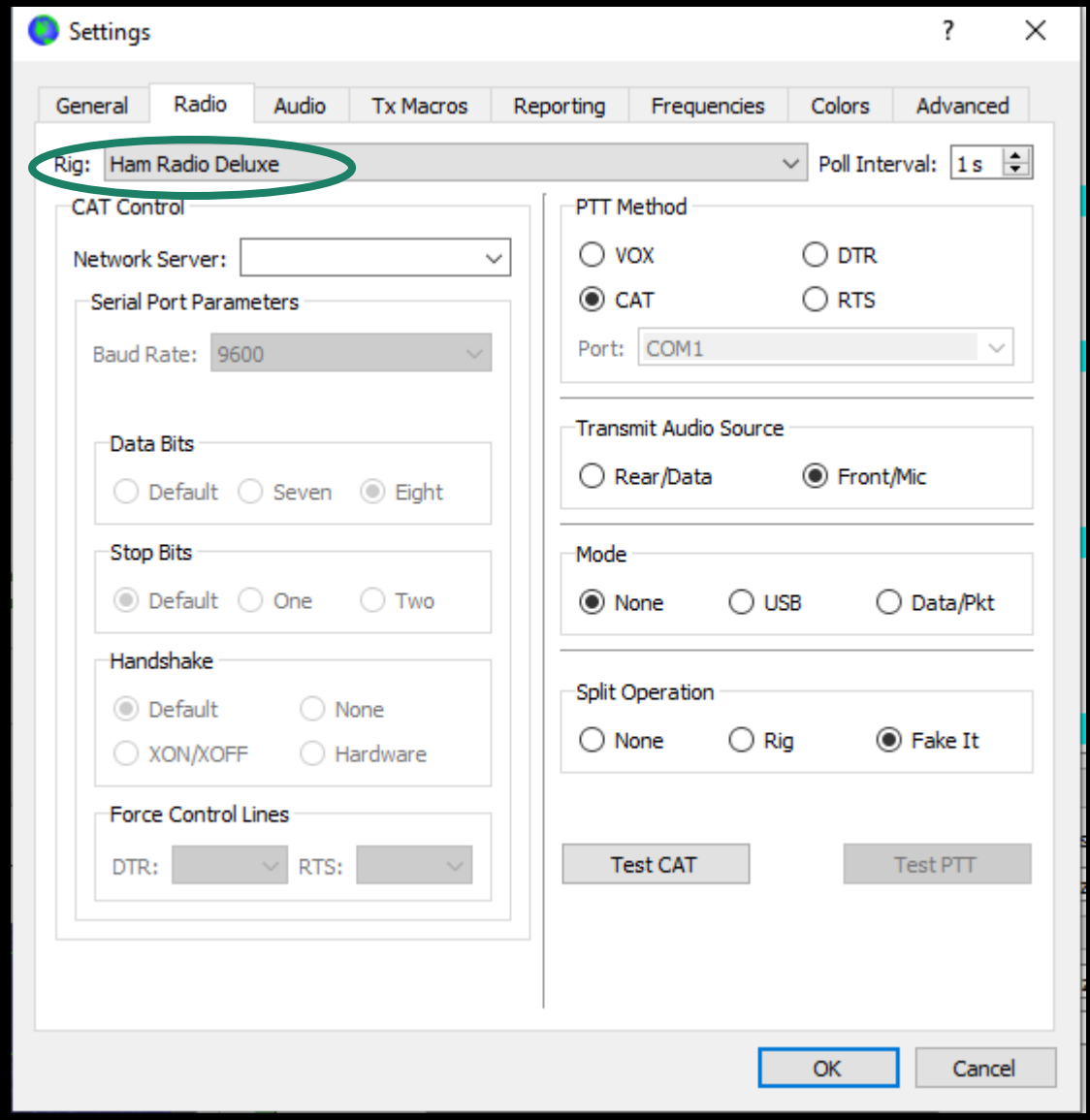
GridTracker

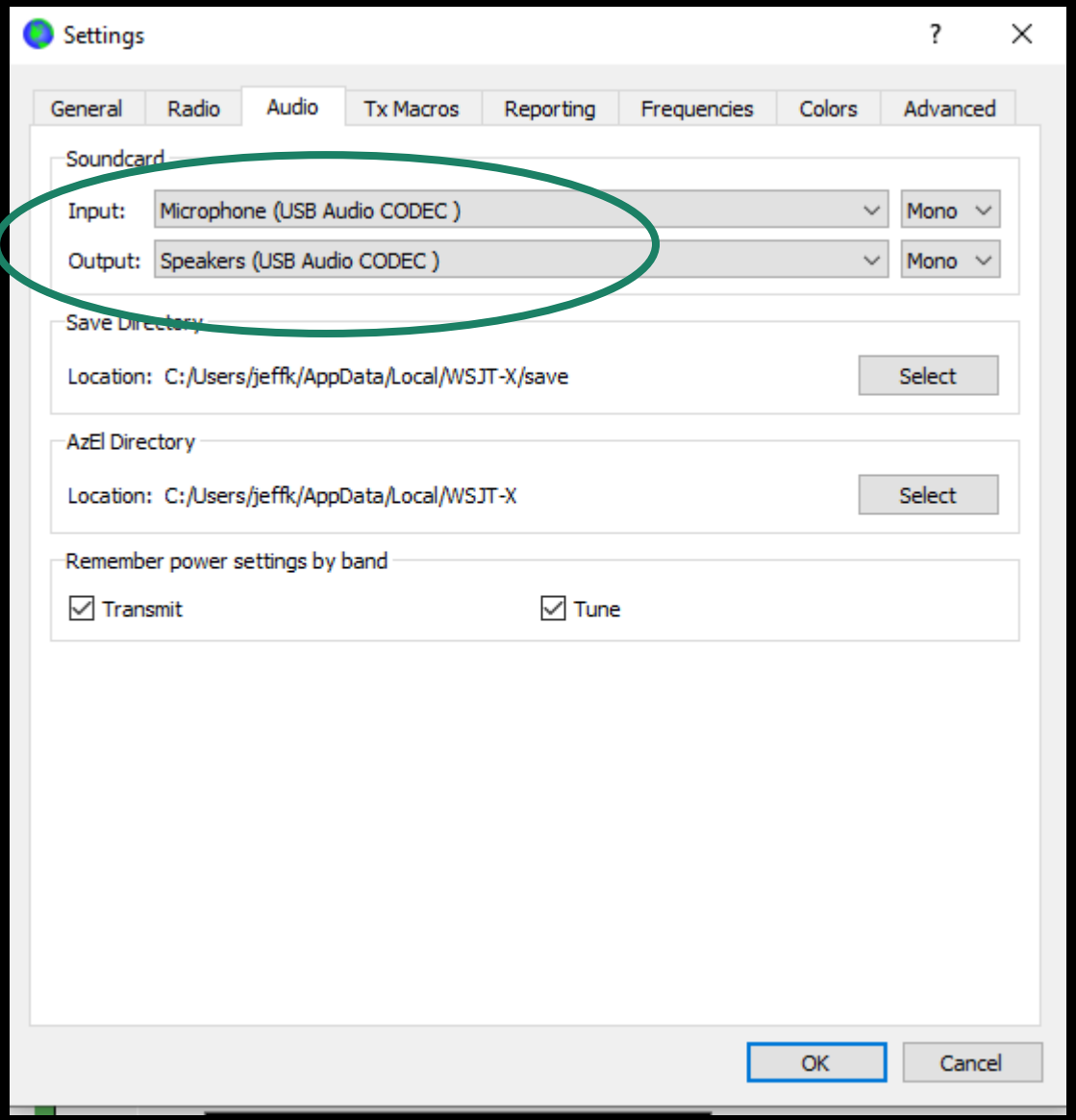
Configuring WSJT-X

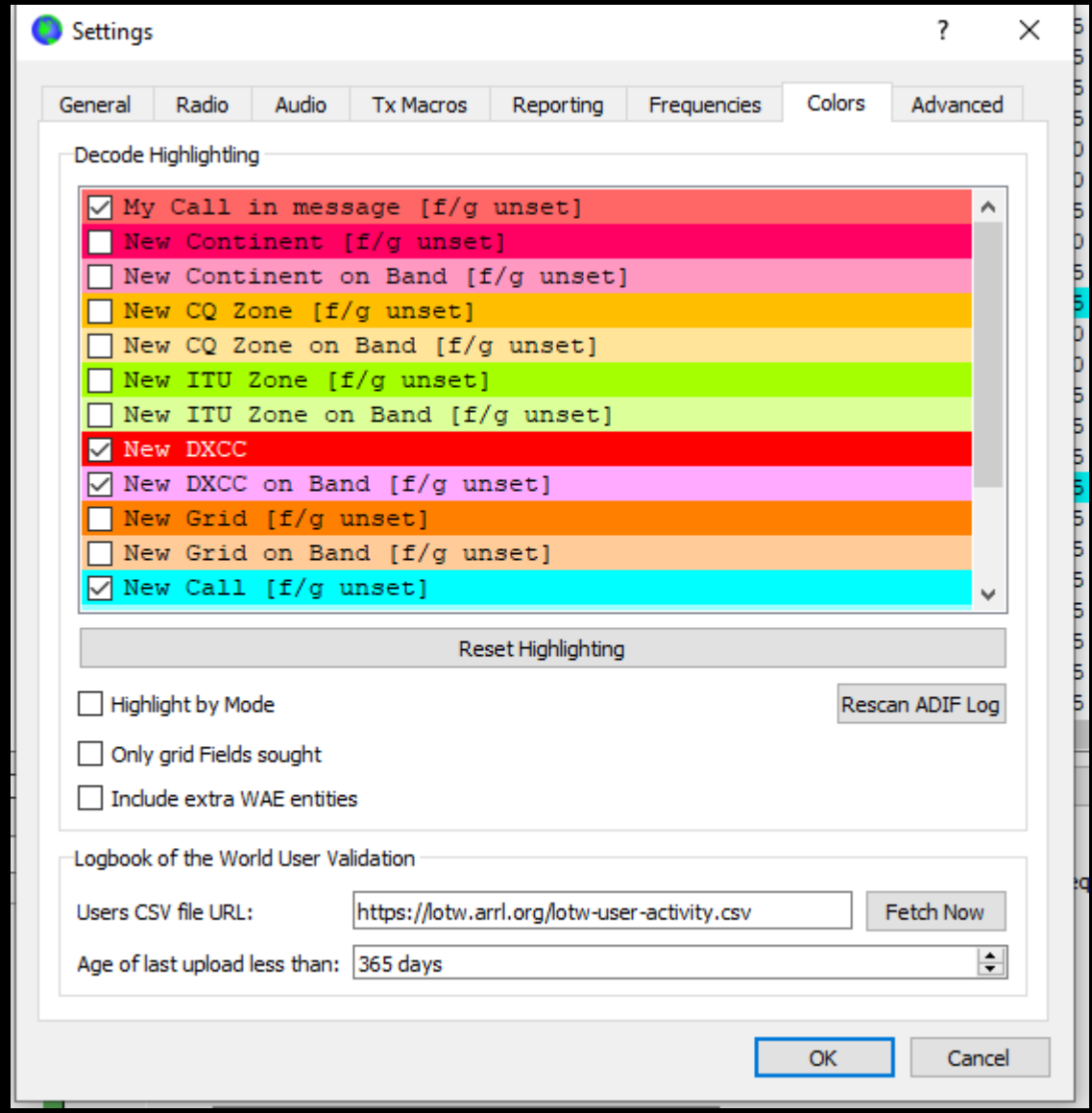


Select File
Then
Settings


Settings
General
Radio
Audio
Tx Macros
Reporting
Frequencies
Colors
Advanced
Station Details
My Call: W2UA
My Grid: EM74SC
AutoGrid
IARU Region: All
Message generation for type-2 compound callsign holders: Full call in Tx1
Display
Start new period decodes at top
Blank line between decoding periods
Display distance in miles
Tx messages to Rx frequency window
Show DXCC, grid, and worked-before status
Show principal prefix instead of country name
Font...
Decoded Text Font...
Behavior
Monitor off at startup
Monitor returns to last used frequency
Double-click on call sets Tx enable
Disable Tx after sending 73
Calling CQ forces Call 1st
Alternate F1-F6 bindings
CW ID after 73
Enable VHF/UHF/Microwave features
Allow Tx frequency changes while transmitting
Single decode
Decode after EME delay
Tx watchdog: 6 minutes
Periodic CW ID Interval: 0
OK
Cancel

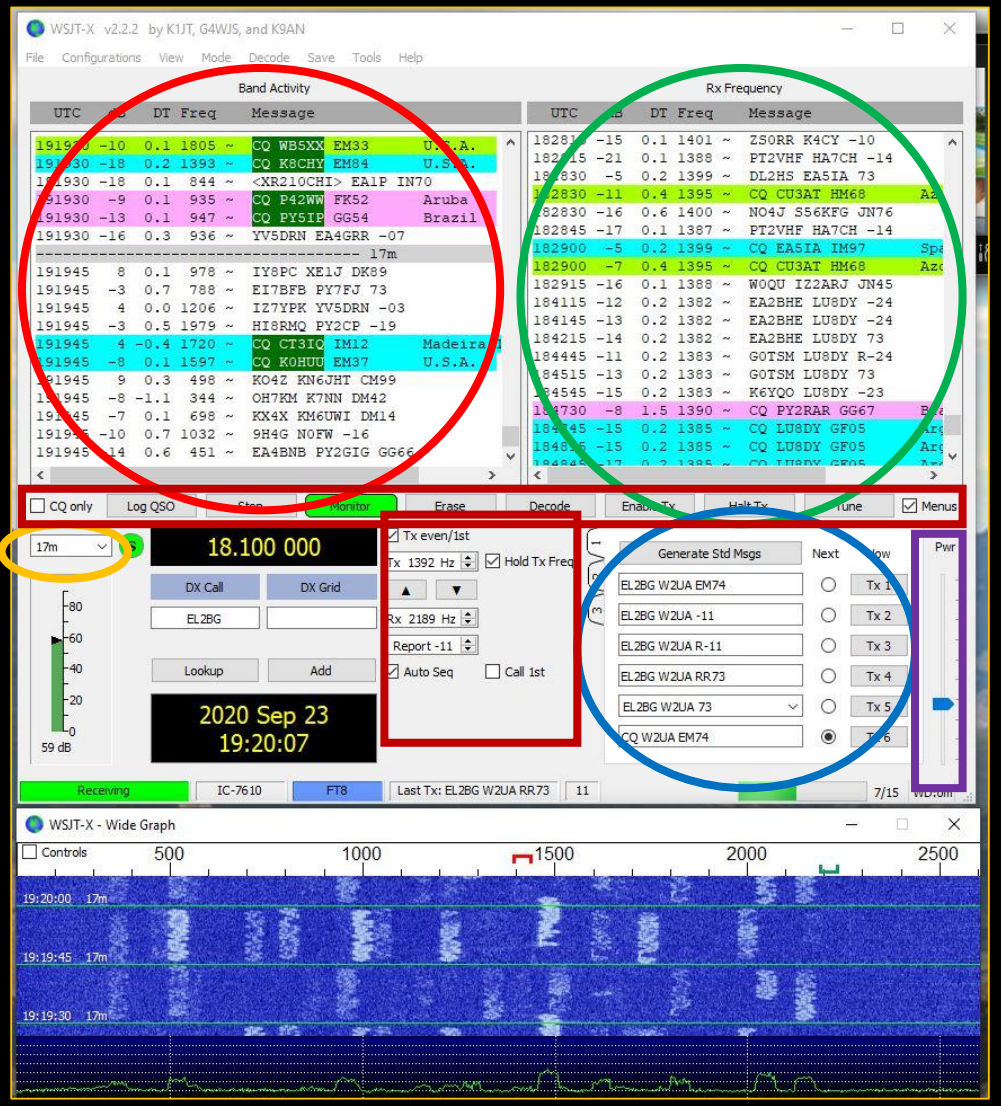

Settings
General
Radio
Audio
Tx Macros
Reporting
Frequencies
Colors
Advanced
Rig: Ham Radio Deluxe
Poll Interval: 1 s
CAT Control
Network Server:
Serial Port Parameters
Baud Rate: 9600
Data Bits
Default
Seven
Eight
Stop Bits
Default
One
Two
Handshake
Default
None
XON/XOFF
Hardware
Force Control Lines
DTR:
RTS:
PTT Method
VOX
DTR
CAT
RTS
Port: COM1
Transmit Audio Source
Rear/Data
Front/Mic
Mode
None
USB
Data/Pkt
Split Operation
None
Rig
Fake It
Test CAT
Test PTT
OK
Cancel


Settings
General
Radio
Audio
Tx Macros
Reporting
Frequencies
Colors
Advanced
Soundcard
Input:
Microphone (USB Audio CODEC)
Mono
Output:
Speakers (USB Audio CODEC)
Mono
Save Directory
Location: C:/Users/jeffk/AppData/Local/WSJT-X/save
Select
AzEl Directory
Location: C:/Users/jeffk/AppData/Local/WSJT-X
Select
Remember power settings by band
Transmit
Tune
OK
Cancel


Settings
General
Radio
Audio
Tx Macros
Reporting
Frequencies
Colors
Advanced
Decode Highlighting
My Call in message [f/g unset]
New Continent [f/g unset]
New Continent on Band [f/g unset]
New CQ Zone [f/g unset]
New CQ Zone on Band [f/g unset]
New ITU Zone [f/g unset]
New ITU Zone on Band [f/g unset]
New DXCC
New DXCC on Band [f/g unset]
New Grid [f/g unset]
New Grid on Band [f/g unset]
New Call [f/g unset]
Reset Highlighting
Highlight by Mode
Rescan ADIF Log
Only grid Fields sought
Include extra WAE entities
Logbook of the World User Validation
Users CSV file URL:
https://lotw.arrl.org/lotw-user-activity.csv
Fetch Now
Age of last upload less than:
365 days
OK
Cancel

What does the WSJT-X screen look like?

- Band Activity
  - UTC – Time in UTC
  - dB – Signal Strength
  - DT – Delta Time (offset from start of slot)
  - Freq – Offset from main frequency
  - Message – Decoded messages
- RX Frequency
- Band Selector
- Messages
- Functions
- Power Level



Make a QSO

- At a minimum have WSJT-X running
  - Make sure your computer's time is synced
  - Under 'Mode", select FT8
  - If there are no messages under "Generate Std Messages" click on it
  - The left side of the screen shows Band Activity
  - Double click on a CQ in "Band Activity"
  - The radio should go into transmit when the station calling CQ responds, the QSO will automatically complete.

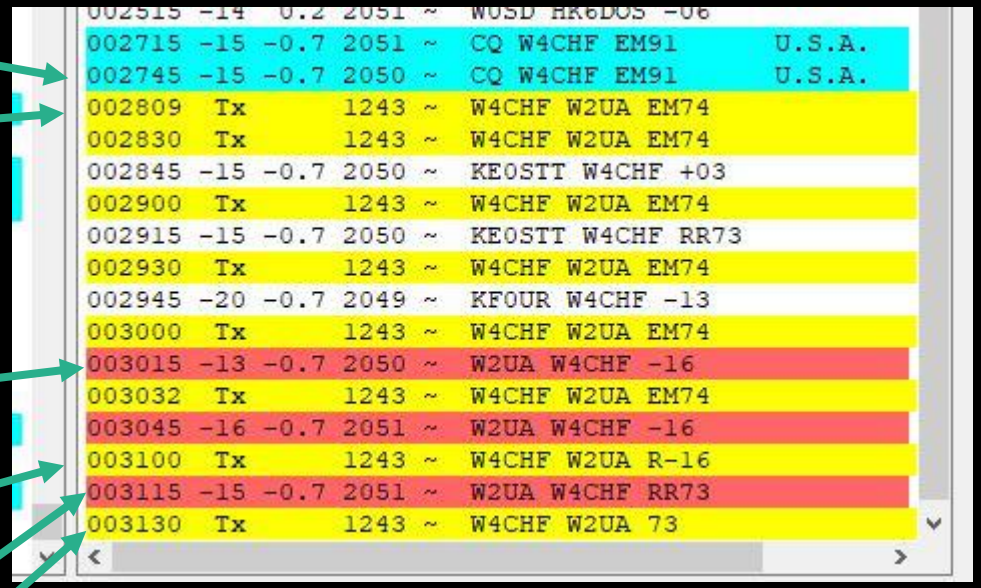
Double Click on someone calling CQ in left or right window.

During the proper timeslot your radio will transmit the first message.

The response will show up with a signal report in a different color

Your radio will automatically return a “Roger” followed by a signal report.

Then 73s are exchanged



That’s all folks

- Thanks for watching
- Questions?
- Want some help?
  - w2uajeff@gmail.com