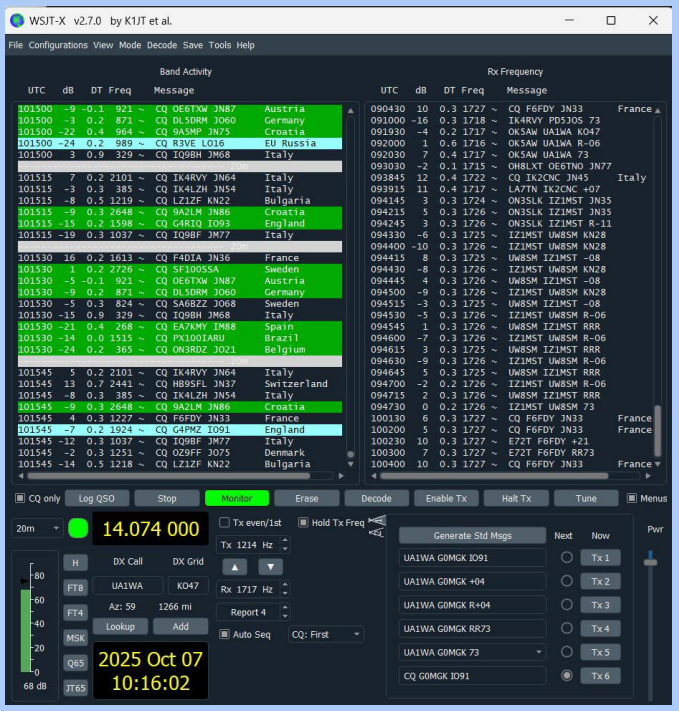
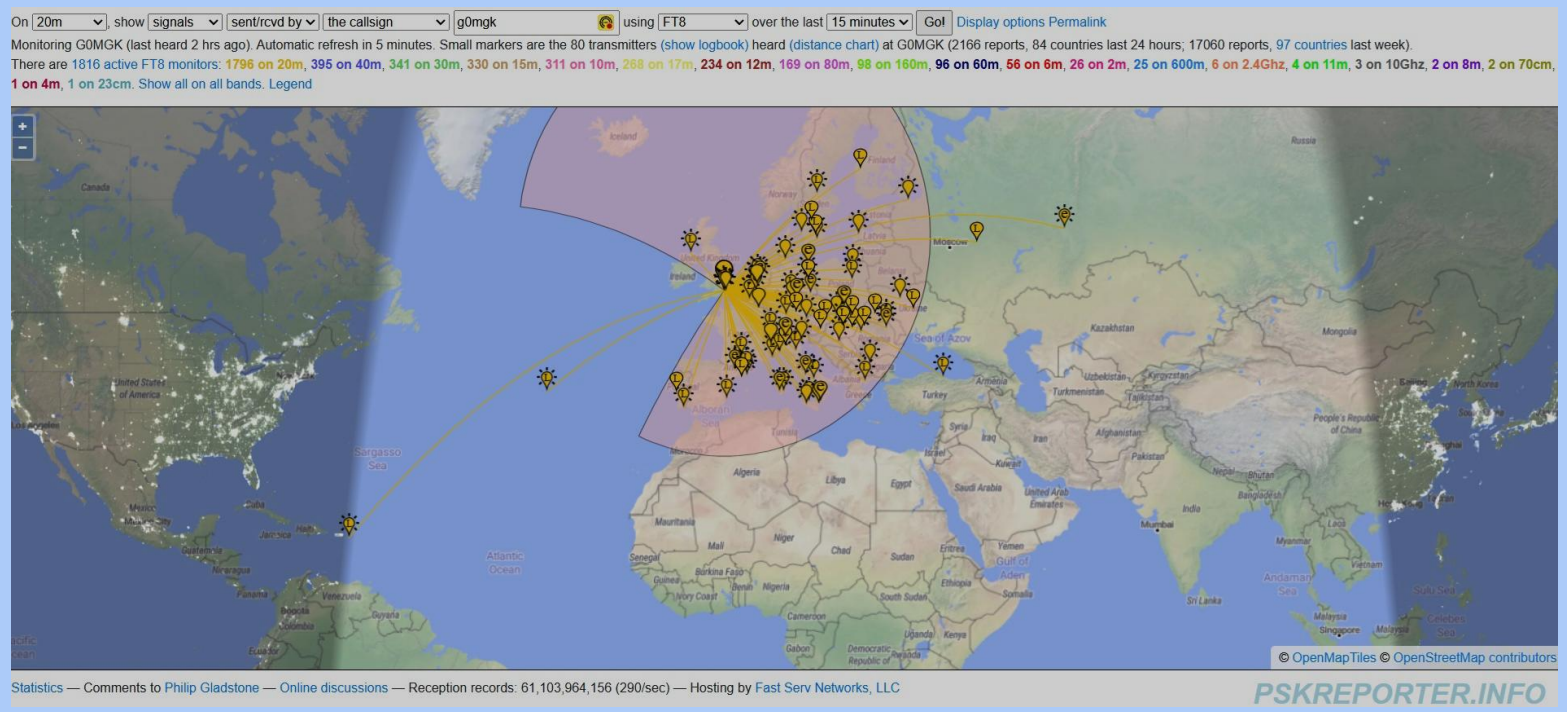
Getting started with FT8 (and FT4)





Mick Kelsey
G0MGK

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FT4 and FT8

- ***Weak Signal DX modes***
- ***Ideal for those running low power***
- ***Ideal for those with compromised antennas or locations***
- ***It is NOT a 'rag-chew' mode***
- ***Minimal exchange of callsign, location, and signal report***

Is it Radio?

On FT8, no one knows you are a dog...

On CW, no one knows you are a cat.....

FT8 – Franke-Taylor 8-FSK Modulation

- ***Developed by:***
  - ***Steve Franke - K9AN***
  - ***Joe Taylor - K1JT***
  - ***Bill Somerville – G4WJS***
- ***Developed from JT4, JT9, JT65 and other digital modes pioneered in WSJT***
- ***The modes utilise:-***
  - ***Time-synchronised transmissions***
  - ***Structured messages***
  - ***Lossless compression***

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History

- ***FT8 was introduced in 2017***
  - ***It quickly became popular, accounting for a large portion of HF amateur radio activity***

- ***FT4 was introduced about 2 years later***
  - ***Uses similar protocols***
  - ***Is a faster mode primarily intended for contesting***

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Message Components

- ***CQ – Calling CQ***
- ***Optional ‘target’ field – eg POTA, SOTA, DX, EU etc***
- ***Callsign***
- ***Locator***
- ***Signal Report – eg -9***
- ***Response – eg 73***

CQ G0MGK IO91

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Message Encoding – FT8

- ***The message CQ G0MGK IO91 is encoded, error correction data added, checksum added***
- ***The result is a string of values, each value in the range 0 - 7***
- ***Each value represents an audio tone deviation of 5.86Hz***
  - ***0 = 0 deviation***
  - ***1= +5.86Hz deviation***
    - ***etc***
- ***This gives a bandwidth of 50Hz***
- ***Actual Tx time is 12.6 seconds (in a 15 second window)***

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Message Encoding – FT4

- ***The message CQ G0MGK IO91 is encoded, error correction data added, checksum added***
- ***The result is a string of values, each value in the range 0 - 3***
- ***Each value represents an audio tone deviation of 20.833Hz***
  - ***0 = 0 deviation***
  - ***1= +20.833Hz deviation***
    - ***etc***
- ***This gives a bandwidth of 90Hz***
- ***Actual Tx time is 6 seconds in a 7.5 second window***

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Message Transmission – FT8

- ***Each message is 50Hz wide***
- ***By convention, USB is used (even on lower frequencies)***
- ***By convention, certain frequencies are assigned for FT modes***
  - ***40m – 7.074 MHz 20m – 14.074***
- ***Tx bandwidth on transceiver is 3kHz***
- ***Theoretically 60 messages in one 3kHz bandwidth***
- ***The software used allows you to select where in the 3kHz the message is placed***

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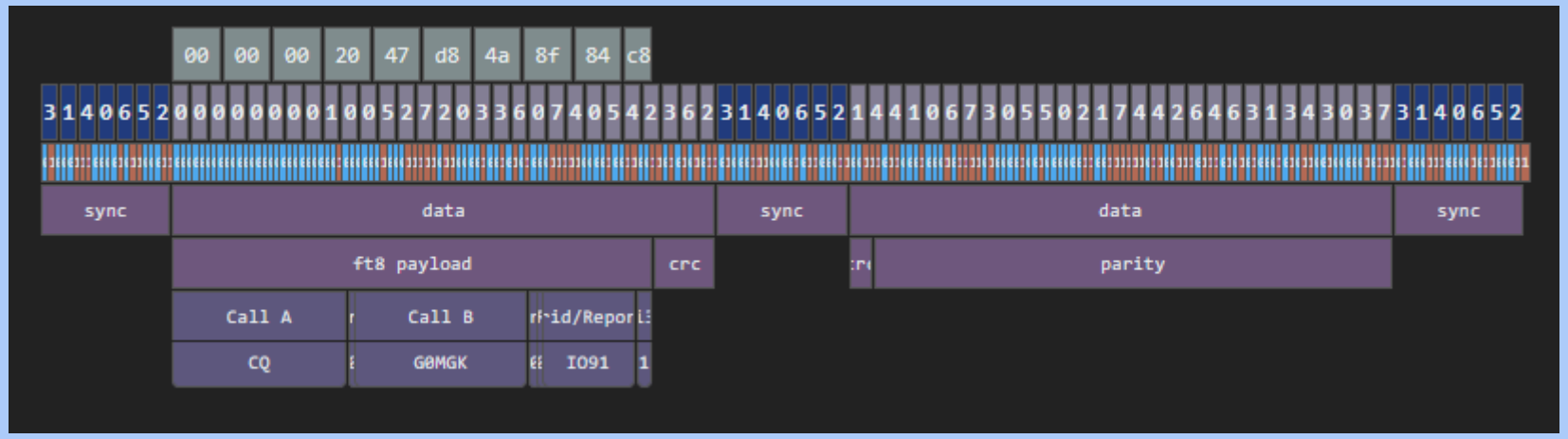
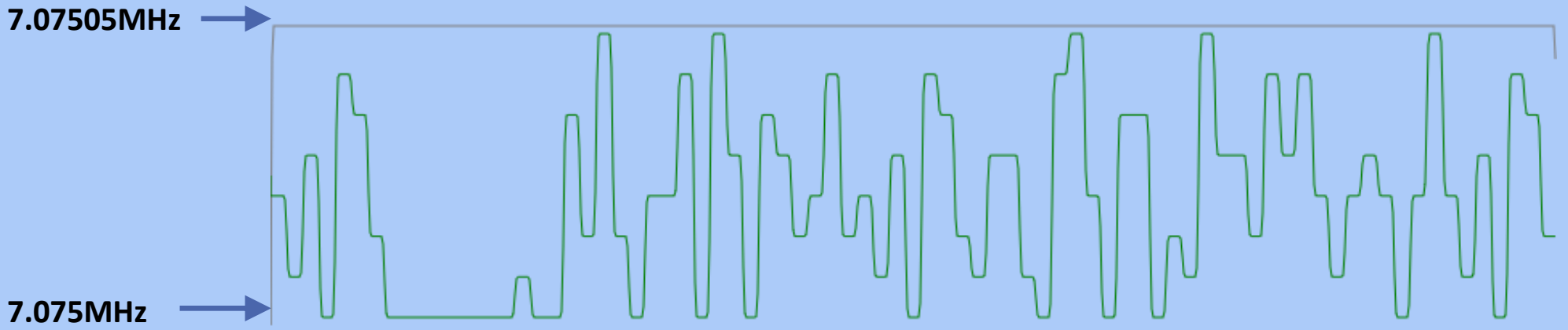
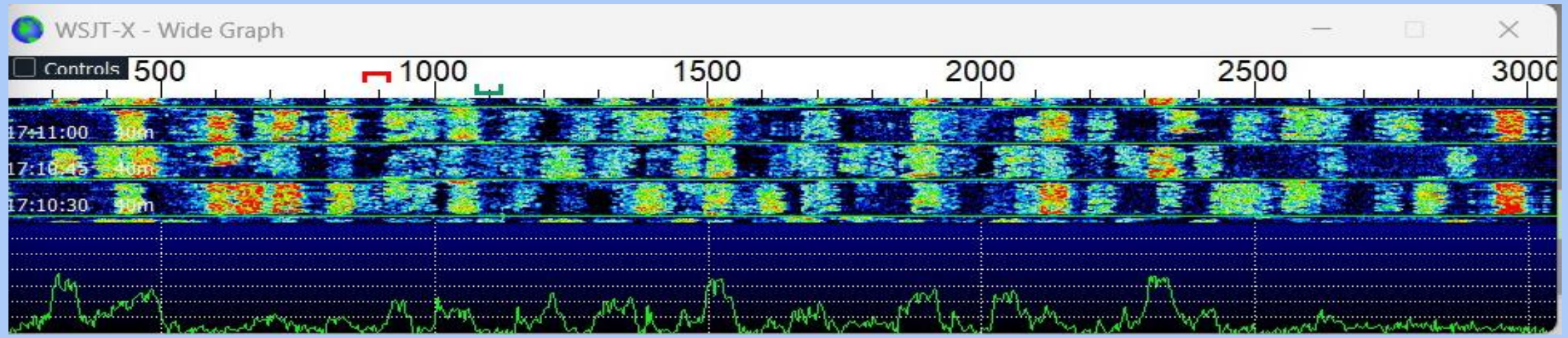
FT-8 - CQ G0MGK IO91





Offset of +1kHz from 7.074MHz

Decoding



- ***The signal received is processed and individual 'streams' produced.***
  - ***A combination of Fast Fourier Transforms, COSTA arrays and other techniques.***

- ***The channels are decoded and displayed in WSJT/JTDX***

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IMPORTANT!

Time!

- ***Computer clock must be no more than 1.8 secs adrift from atomic time***

- ***Sync using JTSync, Meinberg or similar app (or Windows)***

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FT4/8 is a WEAK SIGNAL mode

- ***Not necessarily low power, but NOT QRO!***
  - ***No 'Spinal Tap'!***
- ***High duty-cycle – Don't fry your finals***
  - ***FT-710 50W max (but my mAT-30 says 60W for digi modes)***
- ***I generally run at 35W***
- ***Furthest confirmed QSO is VK2LAW, 10592 miles, 20m, FT8***
  - ***(Shortest was G2DD – 2 miles, 40m!)***
- ***Using my QMX+ at 4.5W on 20m, with a ¼ wave whip, signal was heard in Japan***

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What equipment is needed?

- ***A SSB capable transceiver with CAT control***
- ***A computer (Windows, Mac, Linux)***
- ***A way to get sound to/from computer and transceiver***
  - ***Some transceivers have a built-in USB attached sound card***
  - ***Separate USB 'dongle'***
  - ***A way to get CAT commands from USB/Serial on computer to transceiver***
- ***Software – WSJT-X or JTDX –***
  - ***other software is available.***
- ***Optionally GridTracker and/or JTAlert in addition***

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My Setup
(FT-710 has built-in soundcard)

Doublet in the loft

Yaesu FT-710 (with external Mat-30 AMU)

Two COMM ports presented to computer

USB port

Asus Vivobook Ryzen 7
2GHz 24G Ram
Windows 11 Home
WSJT-X 2.7
GridTracker
JTSync
Log4OM
OmniRig
PSKReporter (Web)

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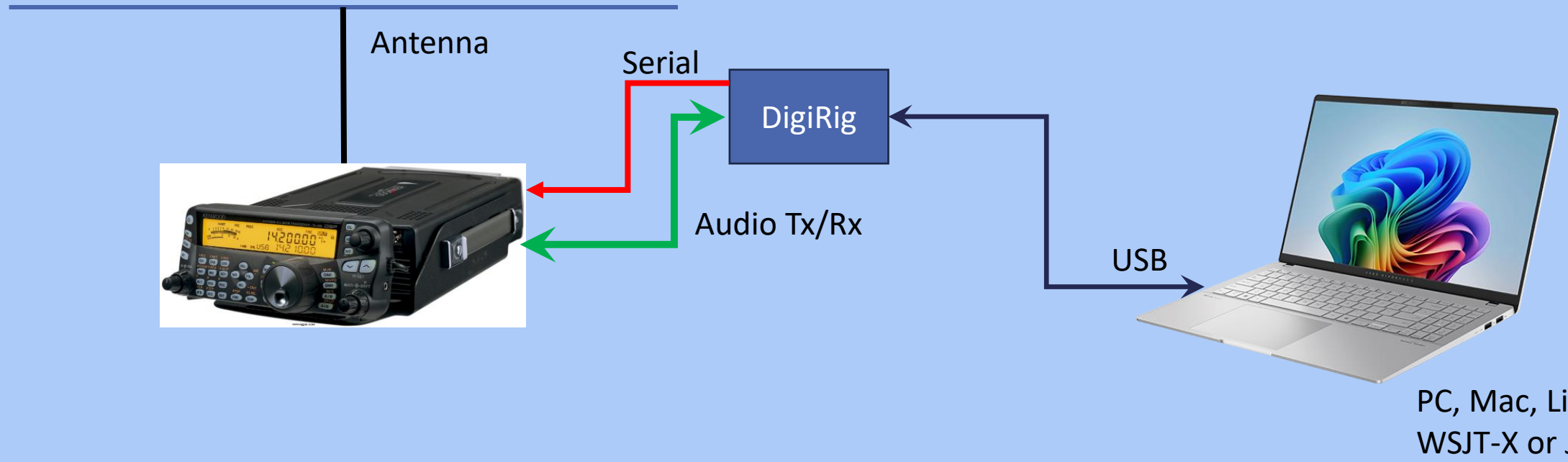
Generic Setup Using DigiRig



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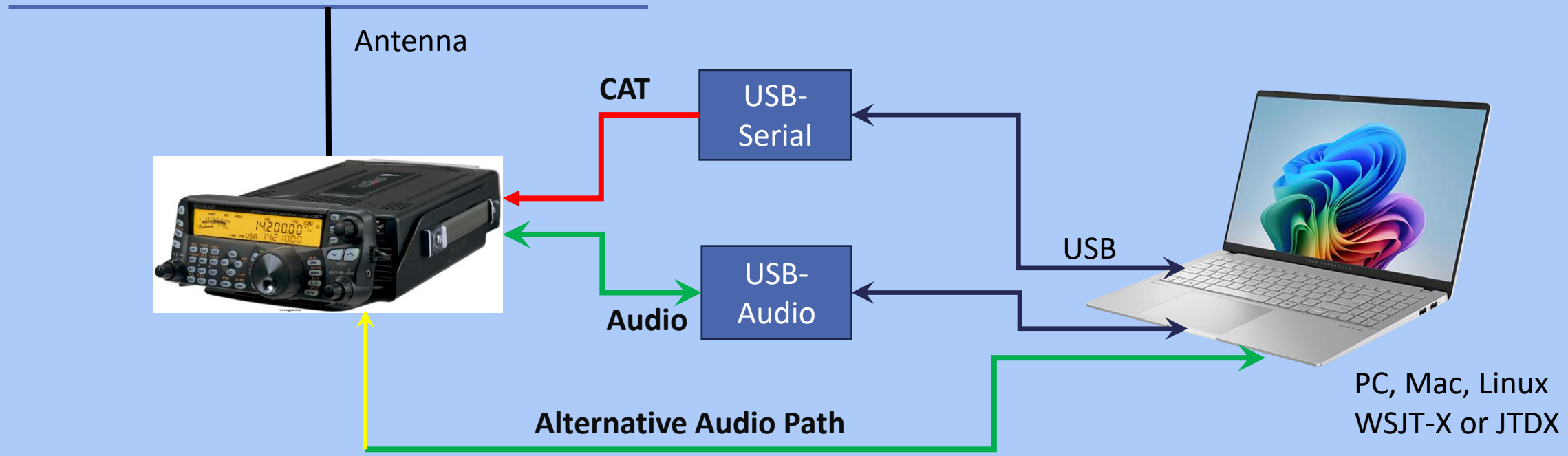
Generic Setup



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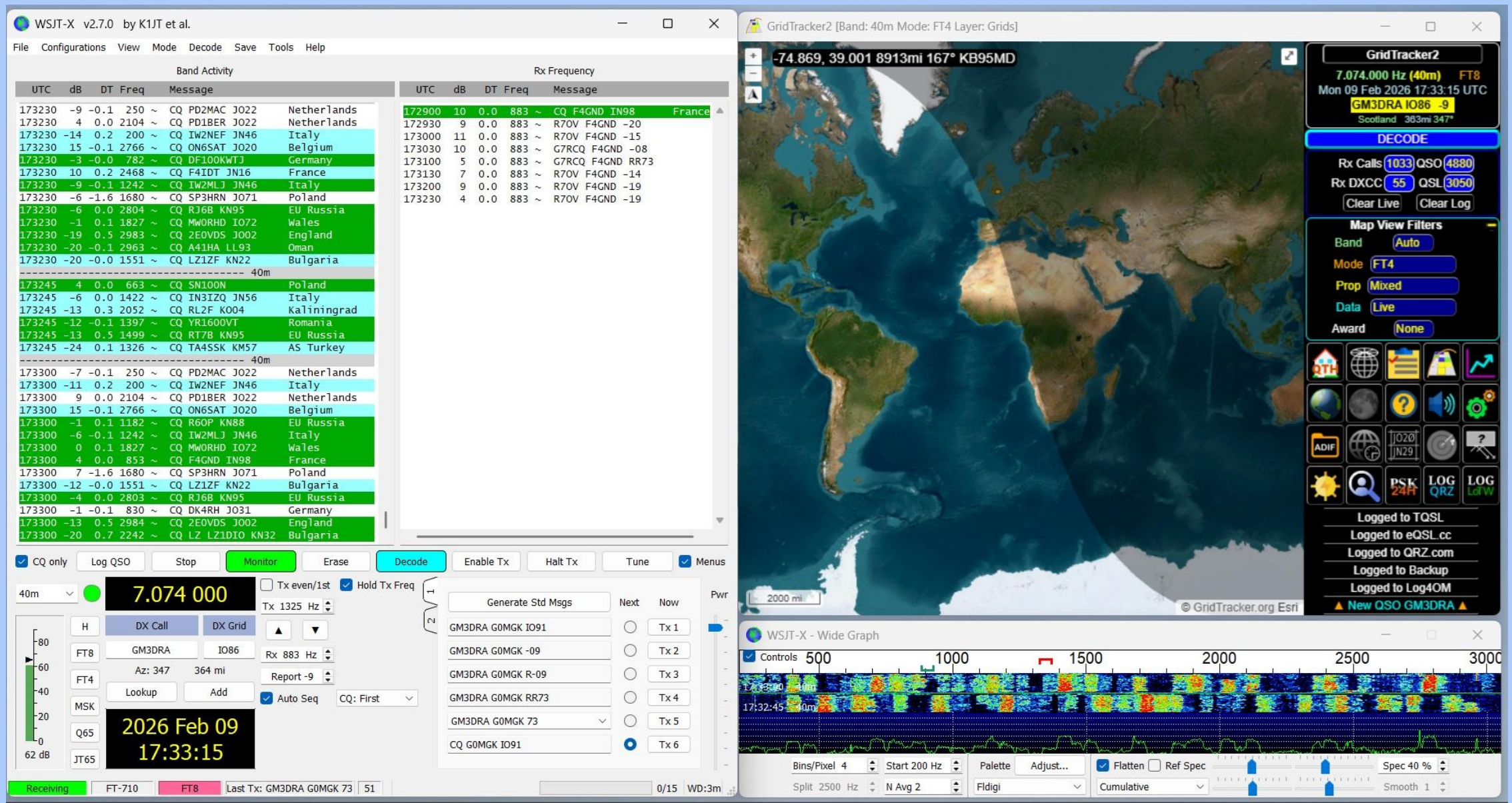
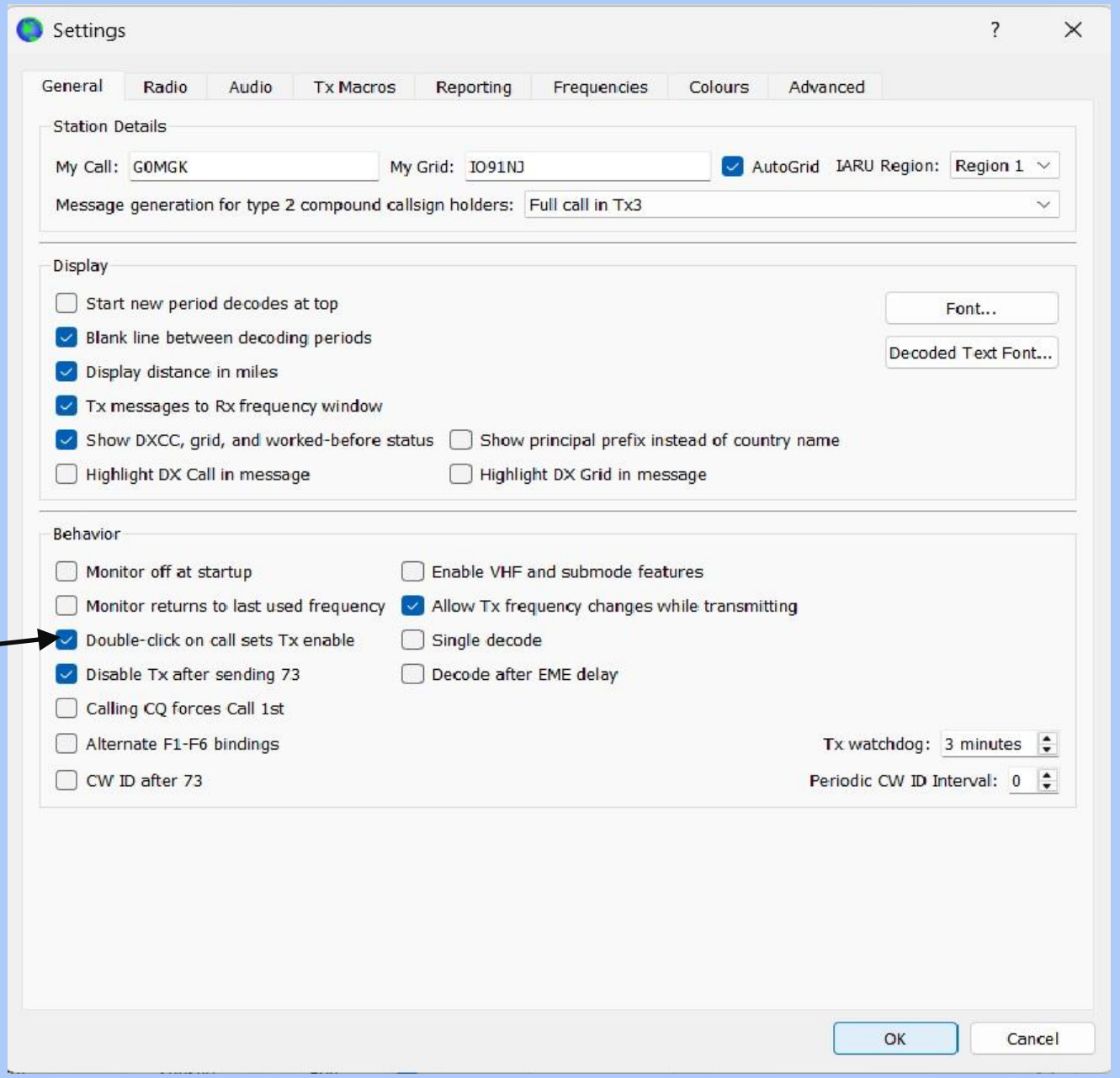
WSJT-X and Gridtracker



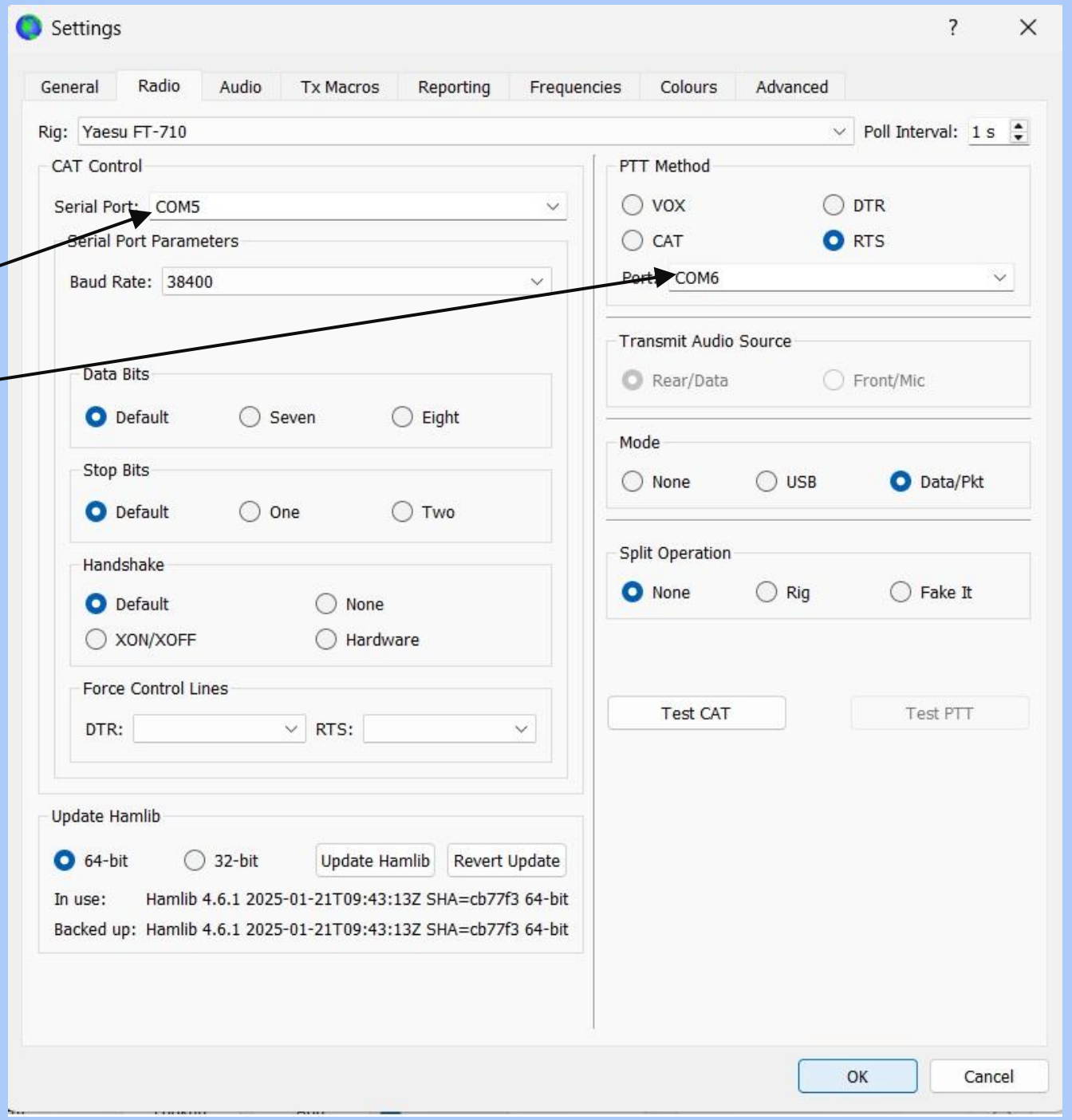
WSJT Settings - General

Choose to check or uncheck after testing both!



WSJT Settings - Radio

Get port numbers from Windows Device Manager



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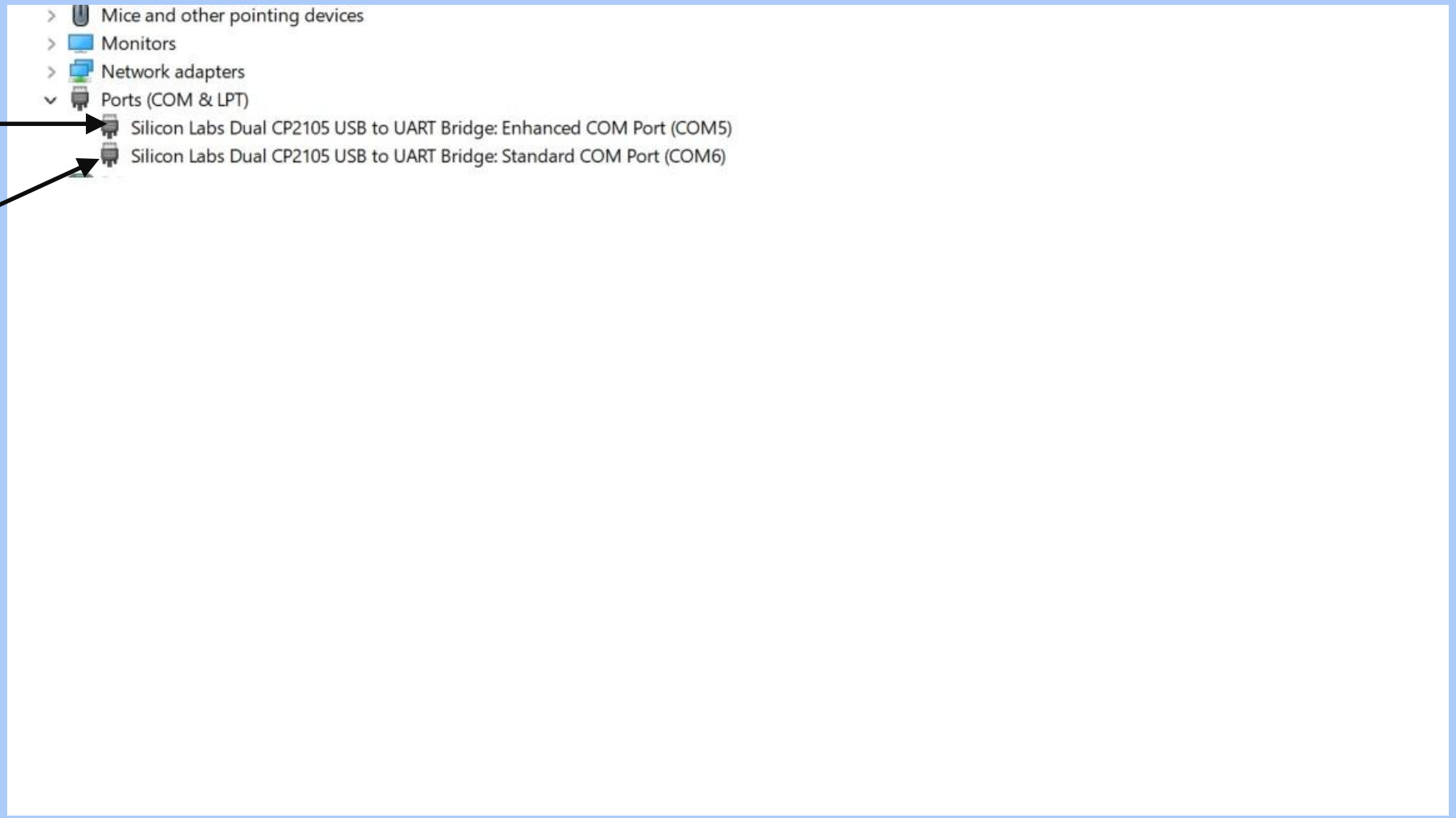
Ports in Device Manager



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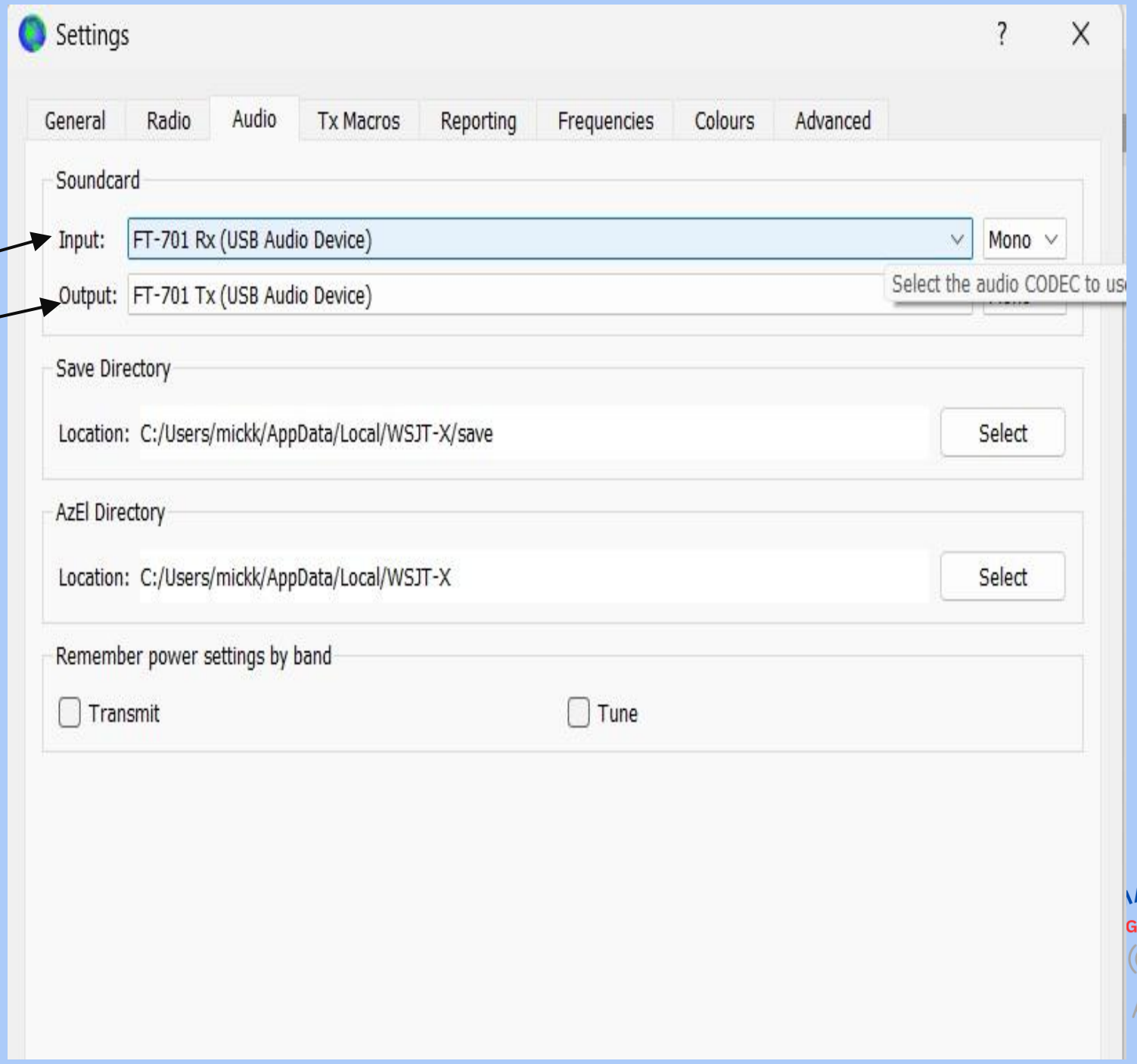
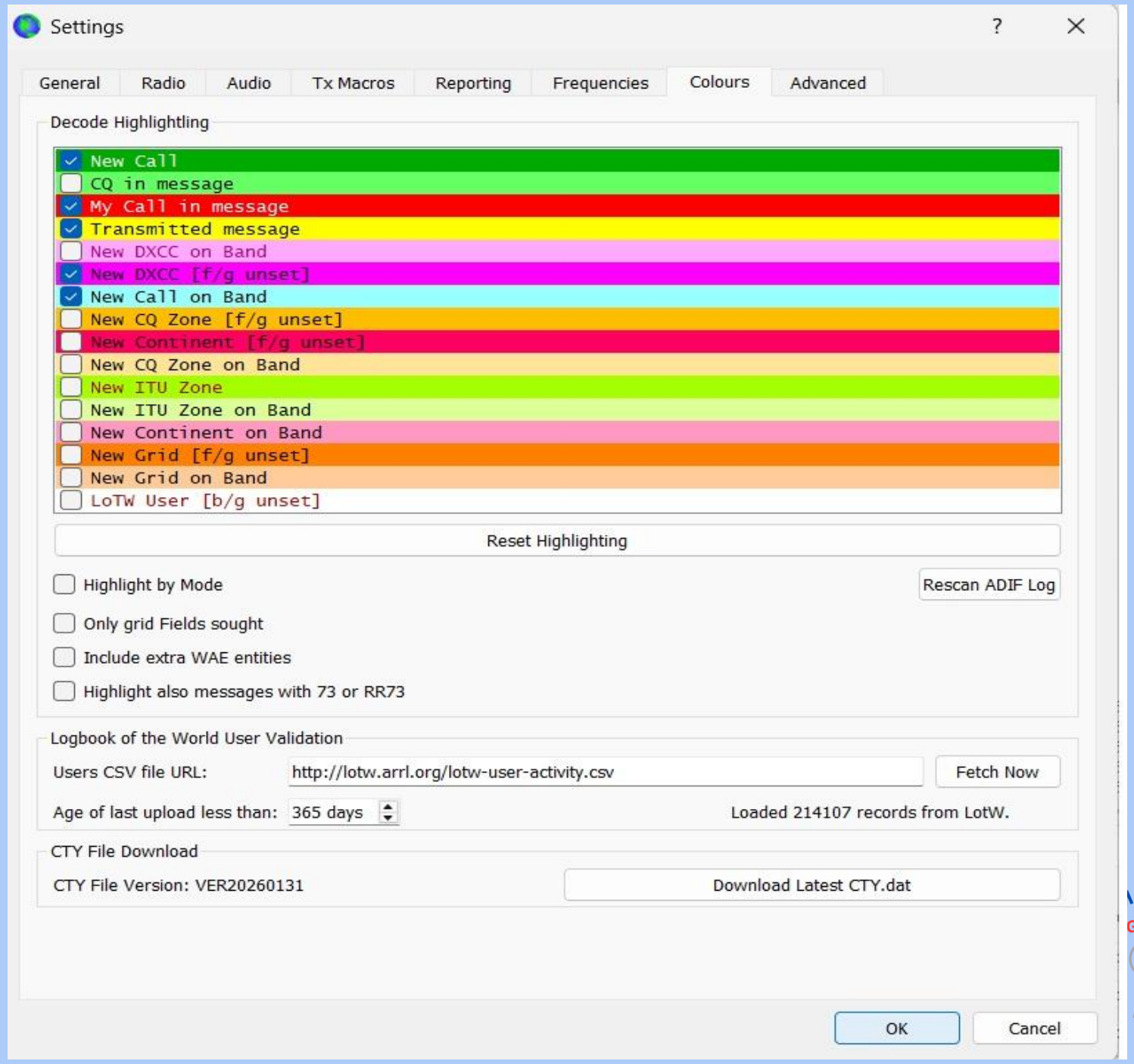
WSJT Settings - Audio

Rename Audio Devices using Windows Control Panel to give them sensible names



WSJT Settings - Colours

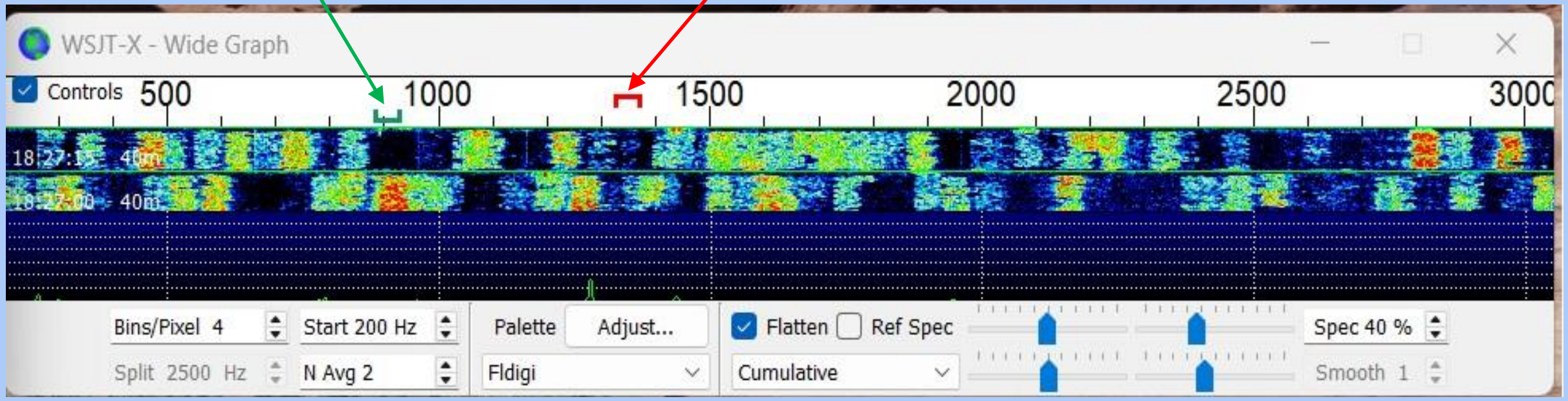
My settings. Personal Preference



WSJT Waterfall

Rx Frequency (offset) – click to set

Tx Frequency (offset) – shift-click to set



Set width to fit on screen

Adjust Bins/Pixel to show 3kHz bandwidth

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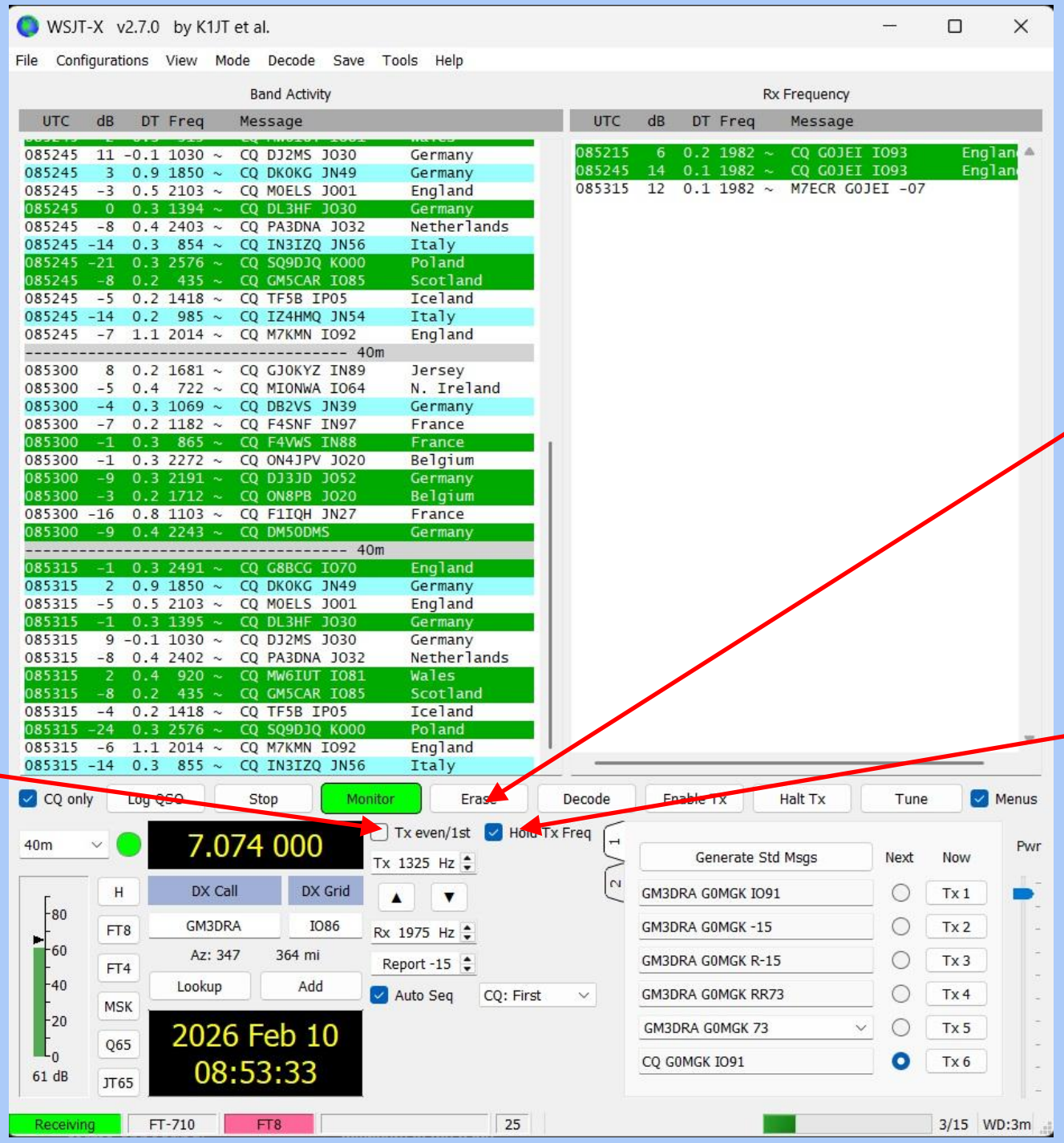
WSJT – Main Window



Checked: Tx on 0 and 30 seconds
Unchecked: Tx on 15 and 45 seconds

Click: Erases RH pane
Double click: Erases both panes

Holds offset as set on waterfall (red mark)

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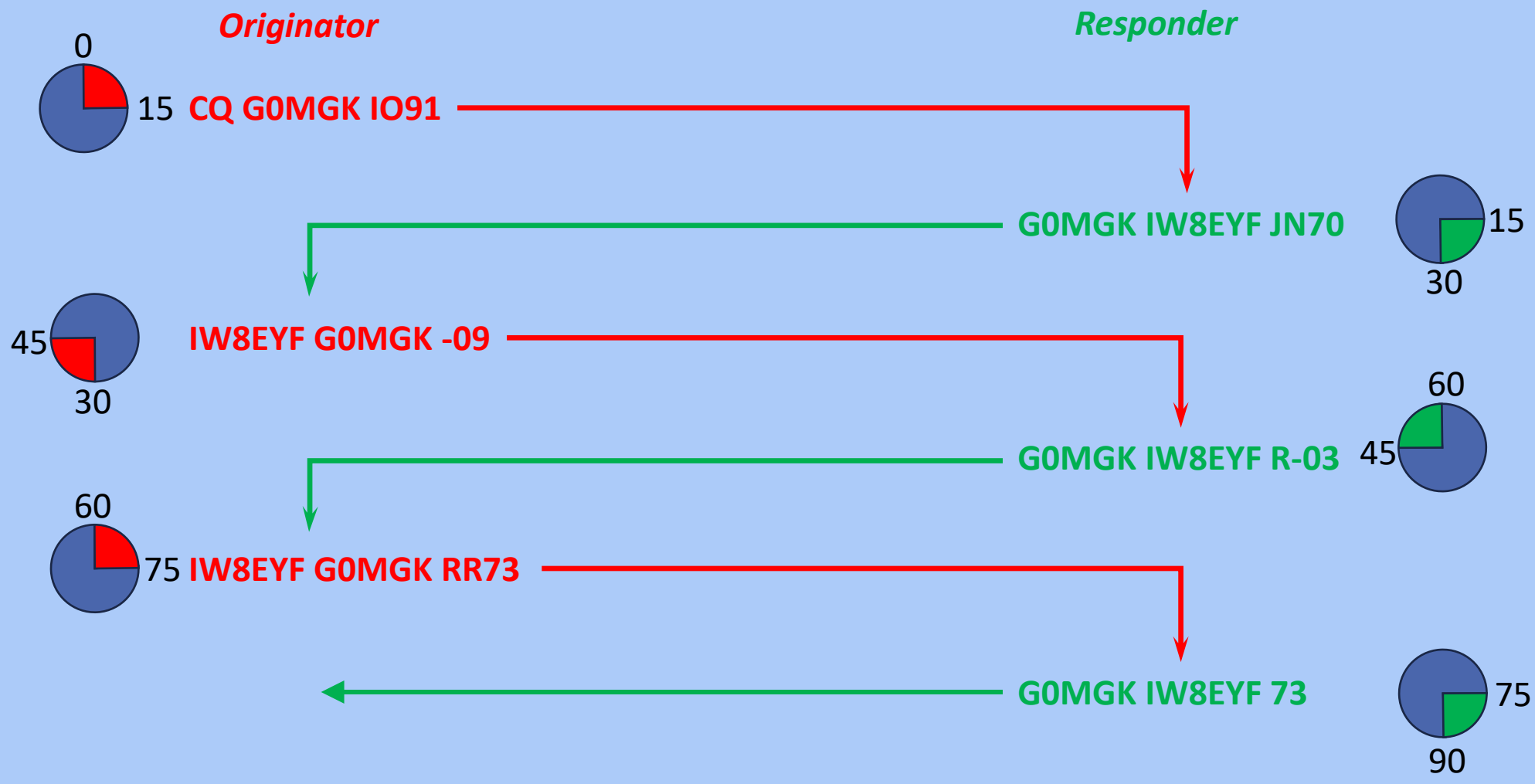
A Typical QSO

Note: Each over is 15 seconds for FT8 (7.5 for FT4)



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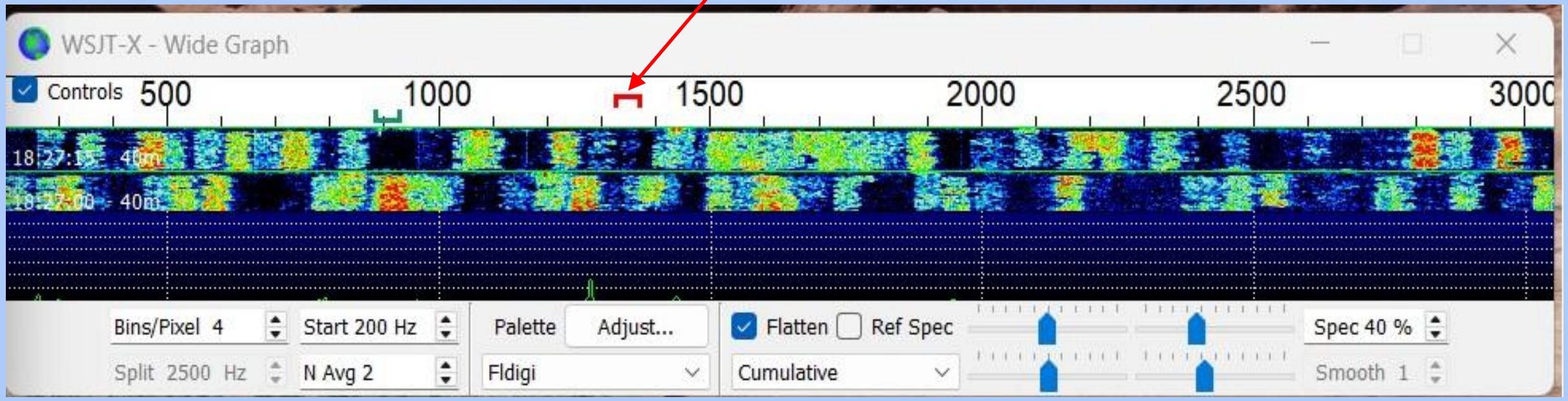
Making a CQ Call

Choose a clear point on the waterfall



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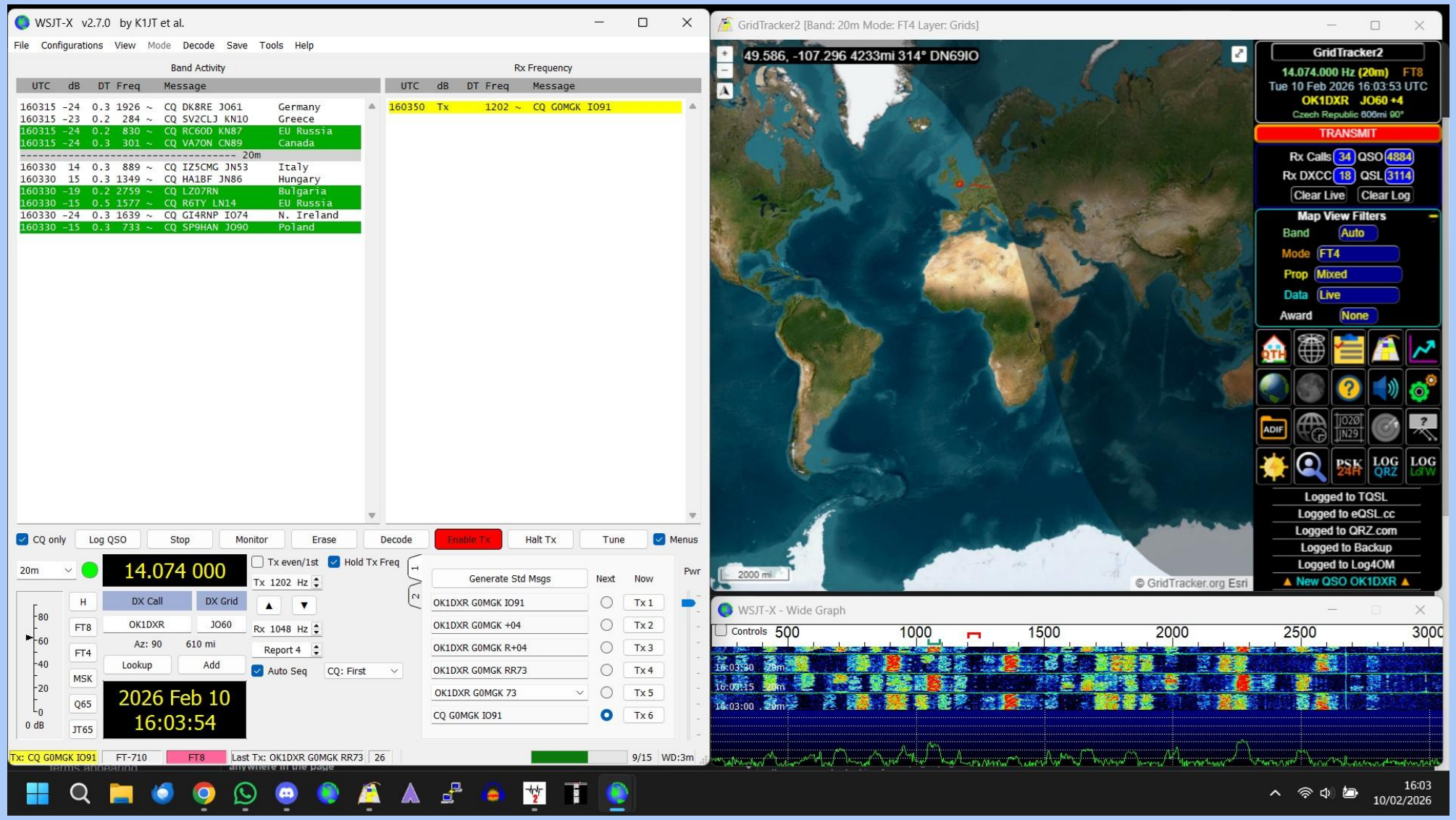
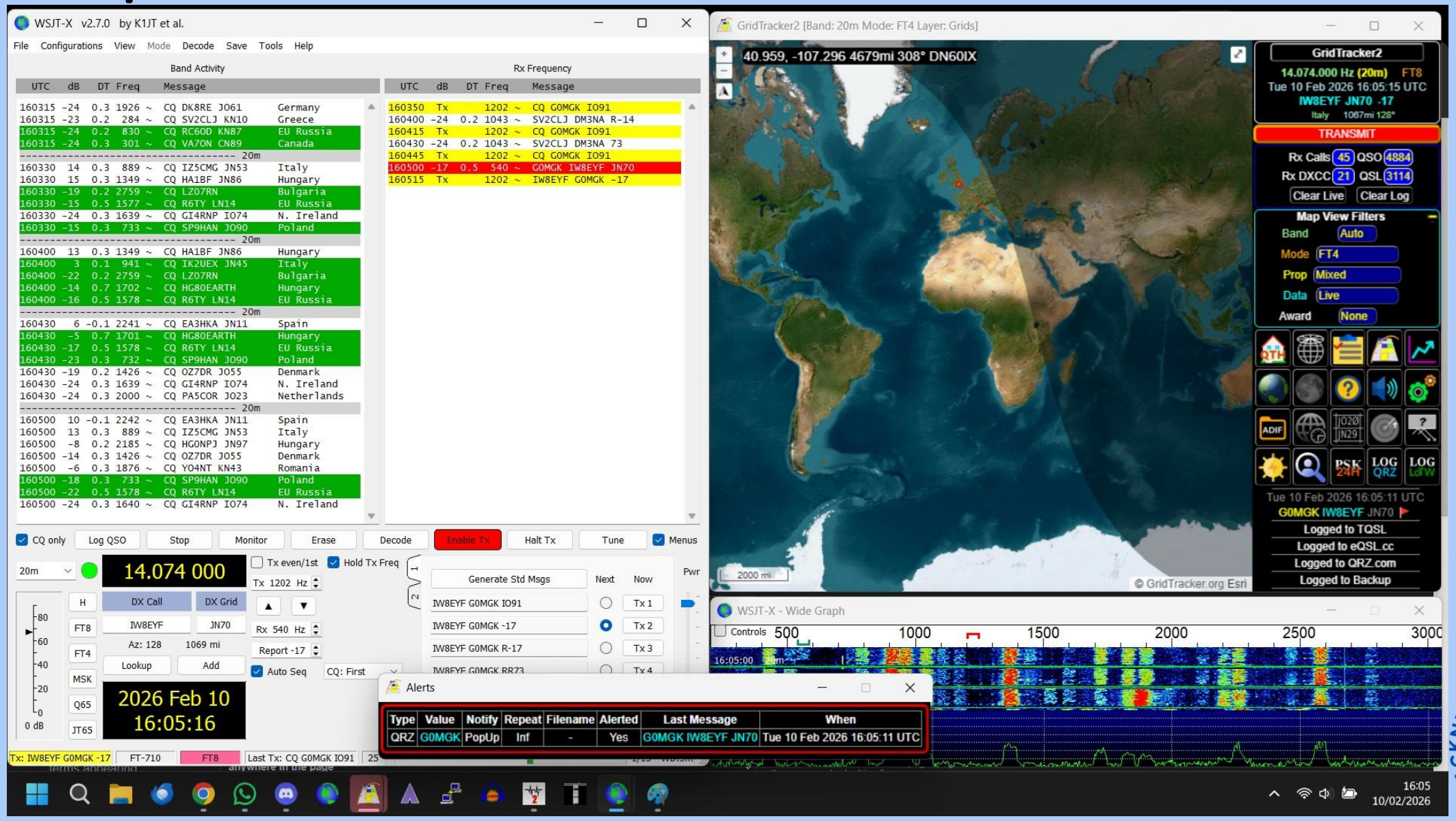
Making a CQ Call



Response to CQ



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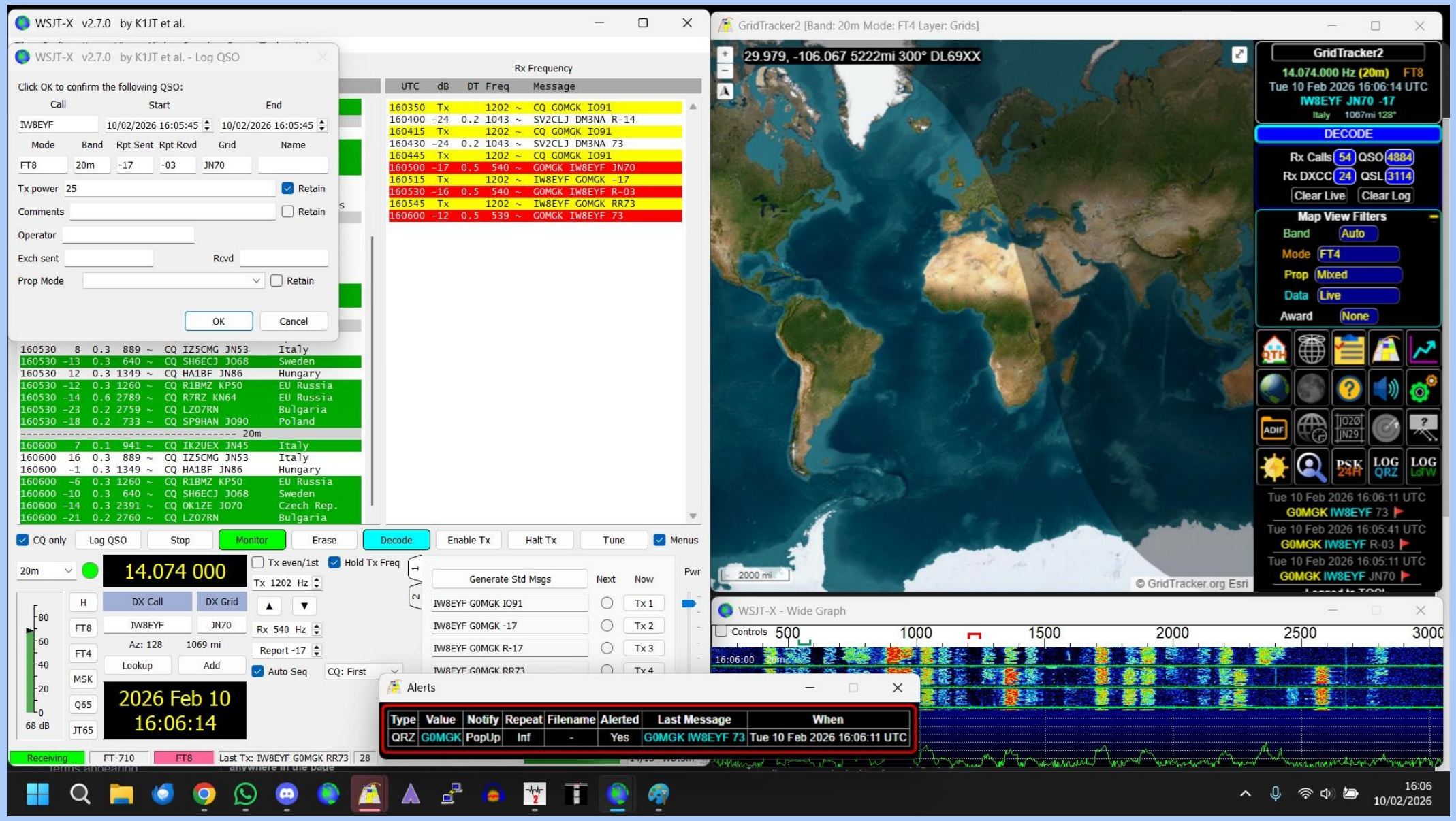
QSO Complete

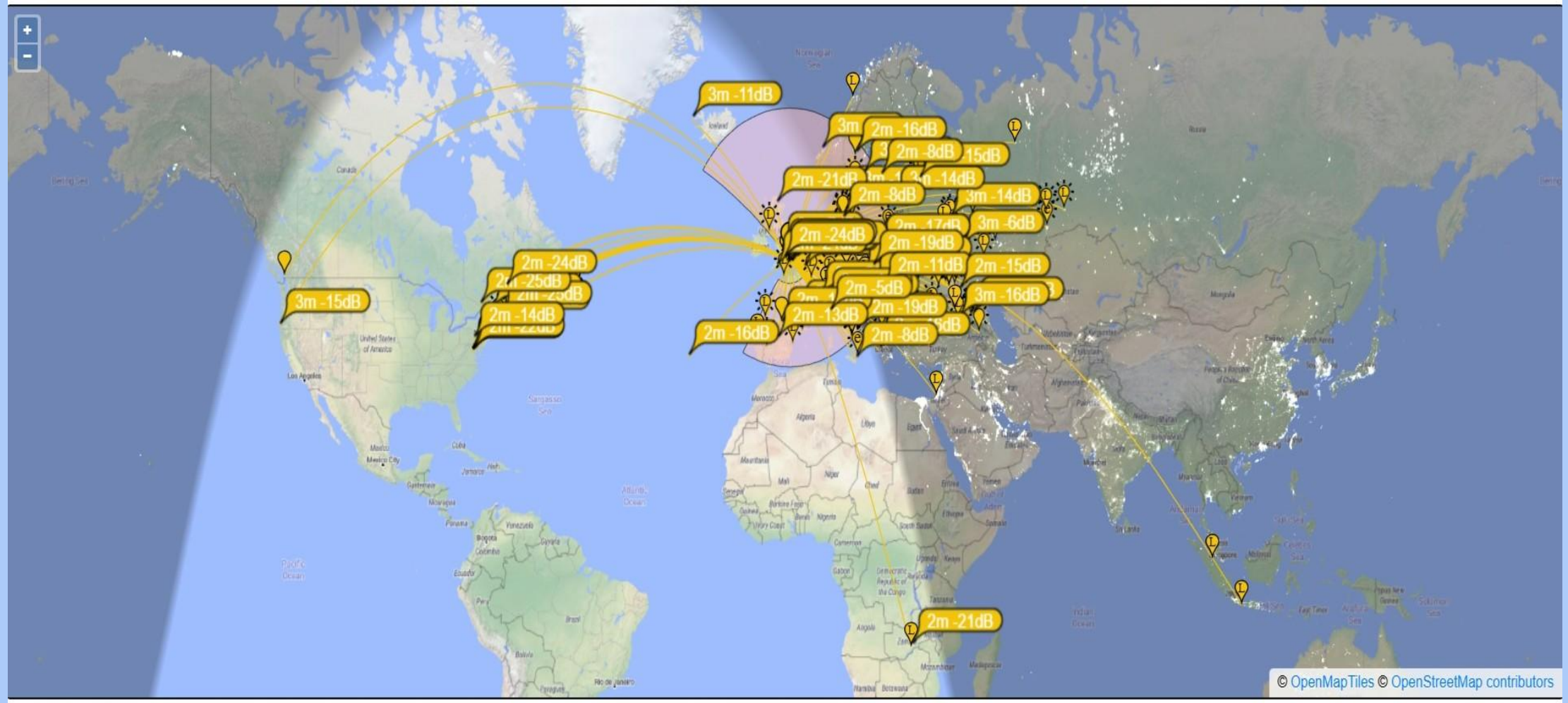


PSK Reporter - Where did my signal go?

On 20m, show signals, sent/rcvd by, the callsign, G0MGK using FT8 over the last 15 minutes Go! Display options Permalink

Monitoring G0MGK (last heard 2 mins ago). Automatic refresh in 5 minutes. Small markers are the 110 transmitters (show logbook) heard (distance chart) at G0MGK (2362 reports, 75 countries last 24 hours; 18418 reports, 83 countries last week).

There are 1948 active FT8 monitors: 1934 on 20m, 426 on 15m, 394 on 40m, 387 on 10m, 374 on 17m, 357 on 30m, 342 on 12m, 189 on 80m, 94 on 60m, 83 on 160m, 25 on 600m, 24 on 6m, 16 on 2m, 8 on 11m, 4 on 2200m, 3 on 10Ghz, 1 on 8m, 1 on 2.4Ghz. Show all on all bands. Legend



Statistics — Comments to Philip Gladstone — Online discussions — Reception records: 65,427,977,141 — Hosting by Fast Serv Networks, LLC

PSKREPORTER.INFO

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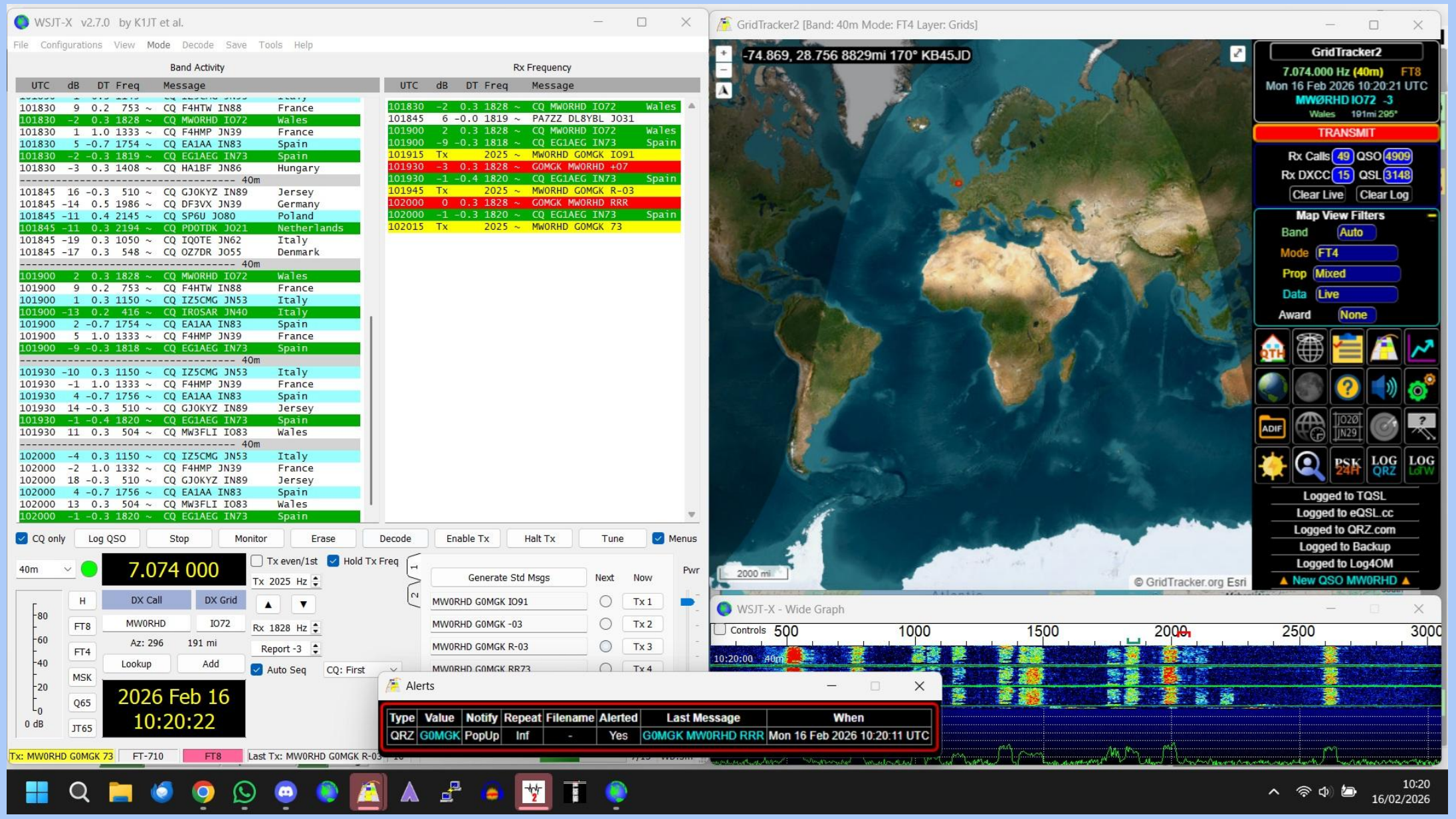
Answer a CQ



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Answer a CQ

- ***If the station you want to respond to is transmitting starting at either 0 secs or 30 secs, then CLEAR the Tx Even/1st box.***
- ***You can then double-click their call***
  - ***If you have 'double-click enables TX' set, then WSJT will Tx at 15 or 45 seconds.***
  - ***If you DON'T have 'double-click enables TX' set, then click 'Enable TX'***

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Other Software

- ***JTDX***
  - ***Similar to WSJT***
- ***FT8CN or FT8TW***
  - ***Android app***
- ***JT Alert***
  - ***Similar to Call Roster on Gridtracker***

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Stop Press!

- ***New – FT2***
  - ***Shorter time - 3.8 secs/cycle (FT4 – 7.5secs, FT8 – 15 secs)***
- ***Less sensitive -10.5dB (FT4 -17.5dB, FT8 -21dB)***
- ***More bandwidth – 150Hz***
- ***Software is Decodium, which appears to be a fork of WSJT rc3.0***
- **EXPERIMENTAL!**

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Resources

- Hinson Tips: https://www.g4ifb.com/FT8_Hinson_tips_for_HF_DXers.pdf
- WSJT: https://wsjt.sourceforge.io/wsjtx.html
- JTDX: https://sourceforge.net/projects/jtdx/
- GridTracker: https://gridtracker.org/
- JTAlert: https://hamapps.com/JTAlert/
- JTSync: https://www.dxshell.com/jtsync.html

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