

Digital Mode Demonstration using WSJT-X software

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April 10, 2018

Updated Sept 3, 2018

- This presentation was given to the Raleigh Amateur Radio Society (RARS)
- Website addresses were added to the end after the presentation.
- It was given again to QCWA chapter 126
With more updates.

Equipment for Demo

- ICOM IC-706MKIIG
- ICOM IC-756
- FTDI USB serial port cables
- SignalLink USB audio interfaces
- WSJT software
- Two power supplies
- Two dummy loads
- Two laptops

Subjects

- Computer to Radio connections
- 1, for setting or reading the frequency
- 2, to send and receive audio signals
- Software
- Software setup
- Demo
- Website URLs at the end

USB to ICOM serial port cable



USB to ICOM

- I have changed to interface cables that use the FTDI chip. That chip works with windows 10.
- Purchased from Valley Enterprises
- Valley-ent.com
- This cable allows the software to read and write the radios frequency and mode.
- Same as ICOM CI-V

USB to ICOM

- Some cables have a Prolific USB to Serial chip inside
- The Prolific chip has been counterfeited.
- The counterfeit parts do not work on Windows 10

During the presentation some people said the FTDI chip has been counterfeited too.

Which Serial Port?

- In Windows use the Device manager to see what port is assigned to the USB cable
- Open the device manager and plug in the cable. A new port will show up
- Right click on the one for the radio and select properties and port settings.
- The setting should match the radio



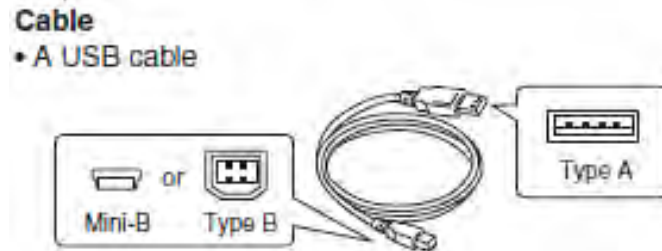
Tigertronics SignalLink USB

- Integrated USB sound card
- USB cable to the computer
- Special radio cable plugs in the back
- Need to set jumpers inside to match the radio and cable you are using.
- They sell a plug and play module to do the jumpers



Newer radios have both interfaces built in

- First download a device driver from the manufacturer and install it.
- Then use an A-B USB cable

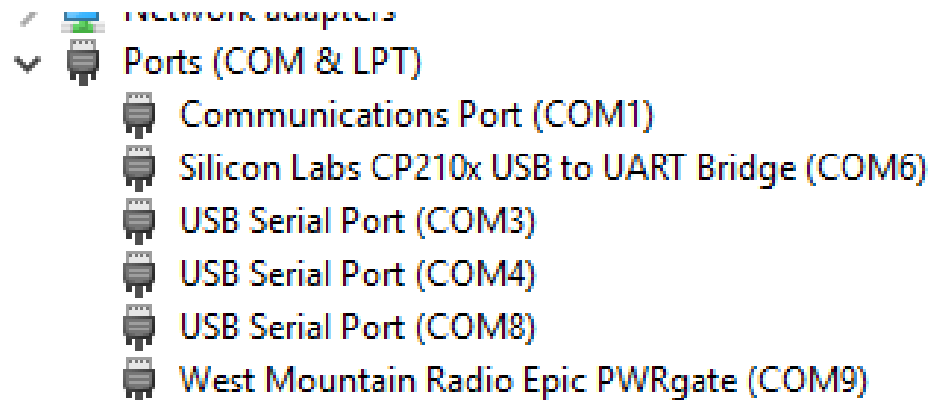


USB Driver

- Check the manufacturers website for your brand of radio.
- I searched on “ICOM USB Driver” in google and found it
- https://www.icom.co.jp/world/support/download/firm/IC-7600/usb1_20/
- CD-301501-003.zip
- Down load and follow instructions to install

ICOM IC-7300

- The USB driver supports the CI-V commands and the audio interface.
- The ICOM manual has: **NOTE: BE SURE** to install the USB driver **BEFORE** connecting the USB cable between the radio and the PC
- COM6 added →
- More if we have time



Other Rigs

Read the manual and follow their instructions.

Tom's Demo Station



- SignaLink USB audio interface
- Power supply
- ICOM IC-706MKIIG
- FTDI USB serial port cables
- Dummy load
- Laptop not shown

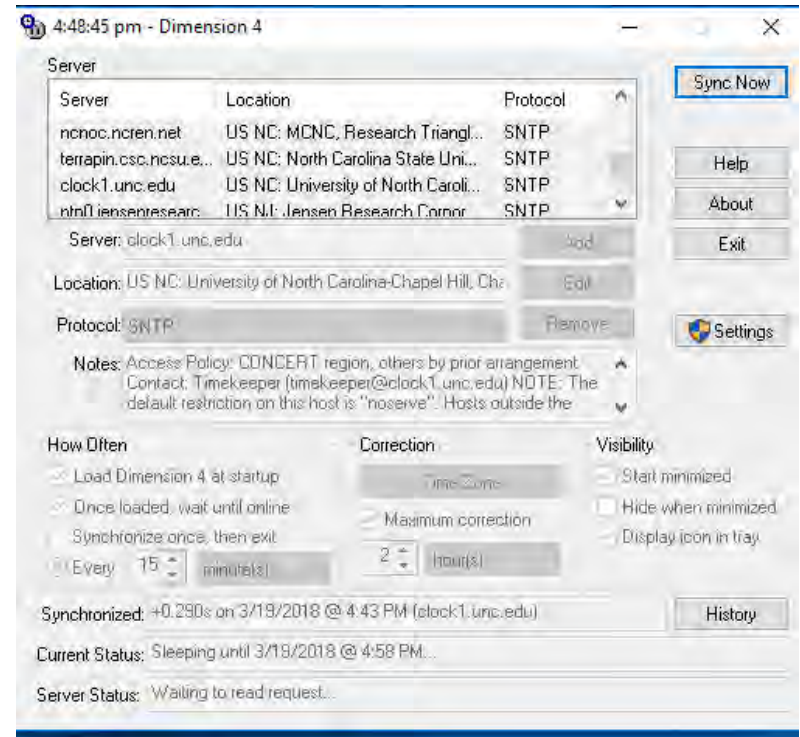
Louis's Demo Station



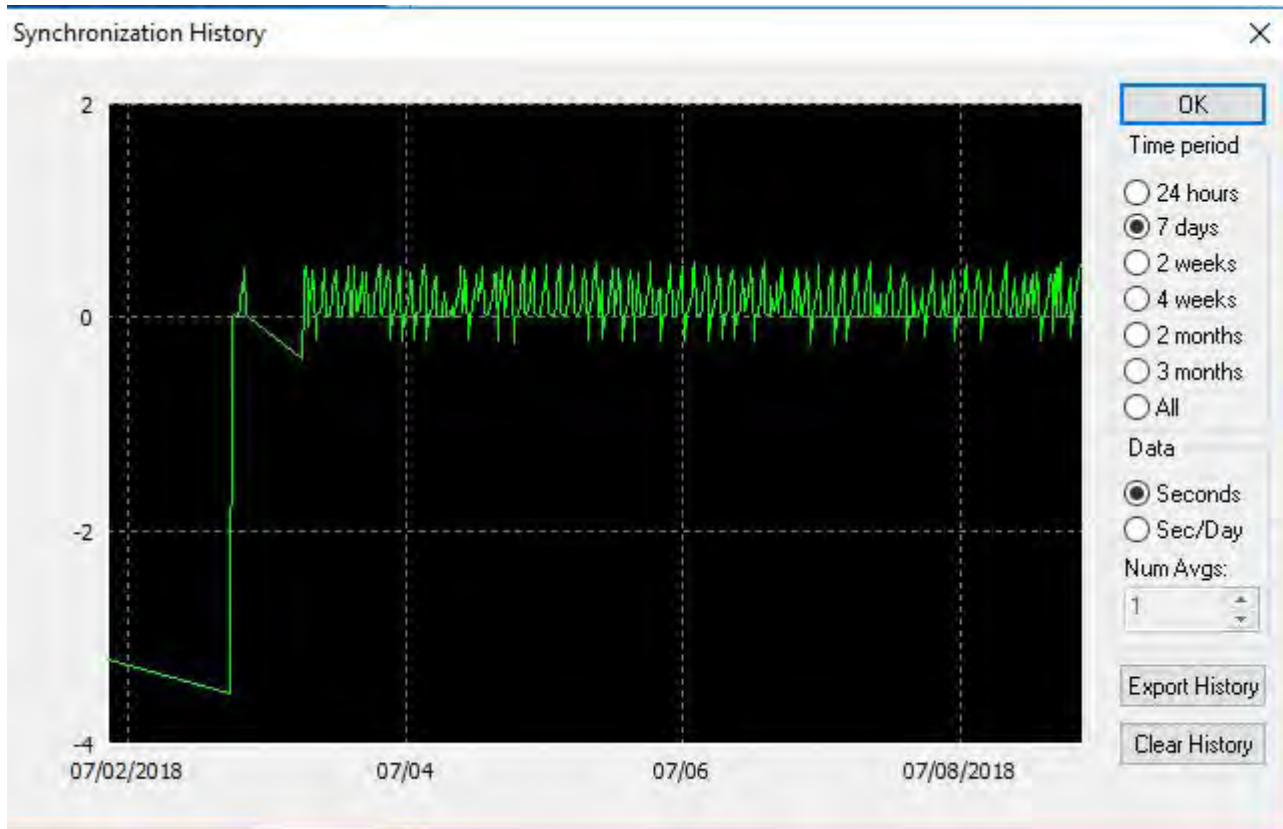
- Laptop
- Power supply
- SignalLink USB audio interface
- ICOM IC-756 & speaker
- Dummy load
- No CI-V cable to the laptop, freq set with the radio's dial

The computer clock has to be correct, Dimension 4

- Install and let it run all the time.
- Don't click Synchronize once and exit
- Settings, Server, clock1.unc.edu
- Click sync Now & make sure no errors



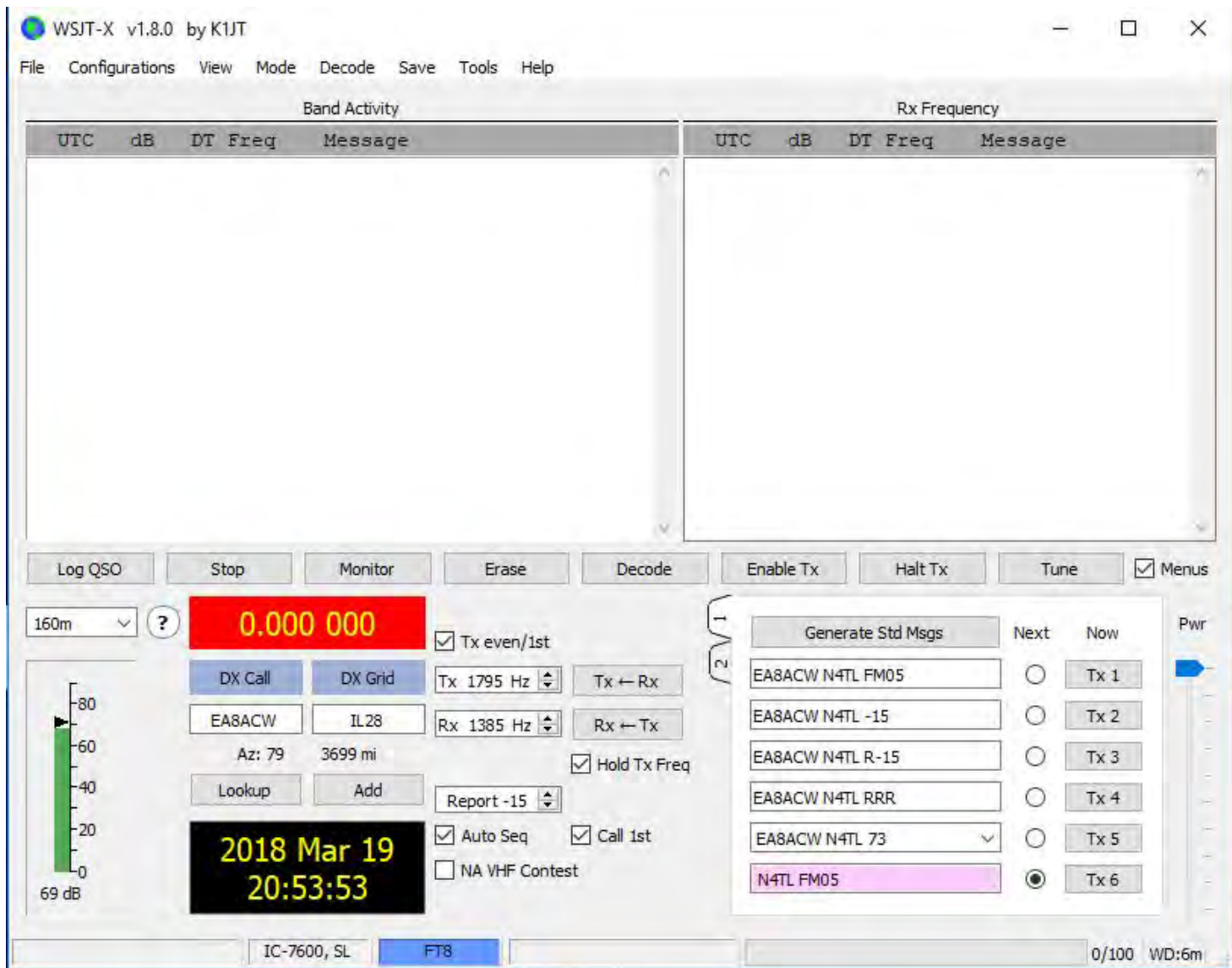
Dimension 4 History



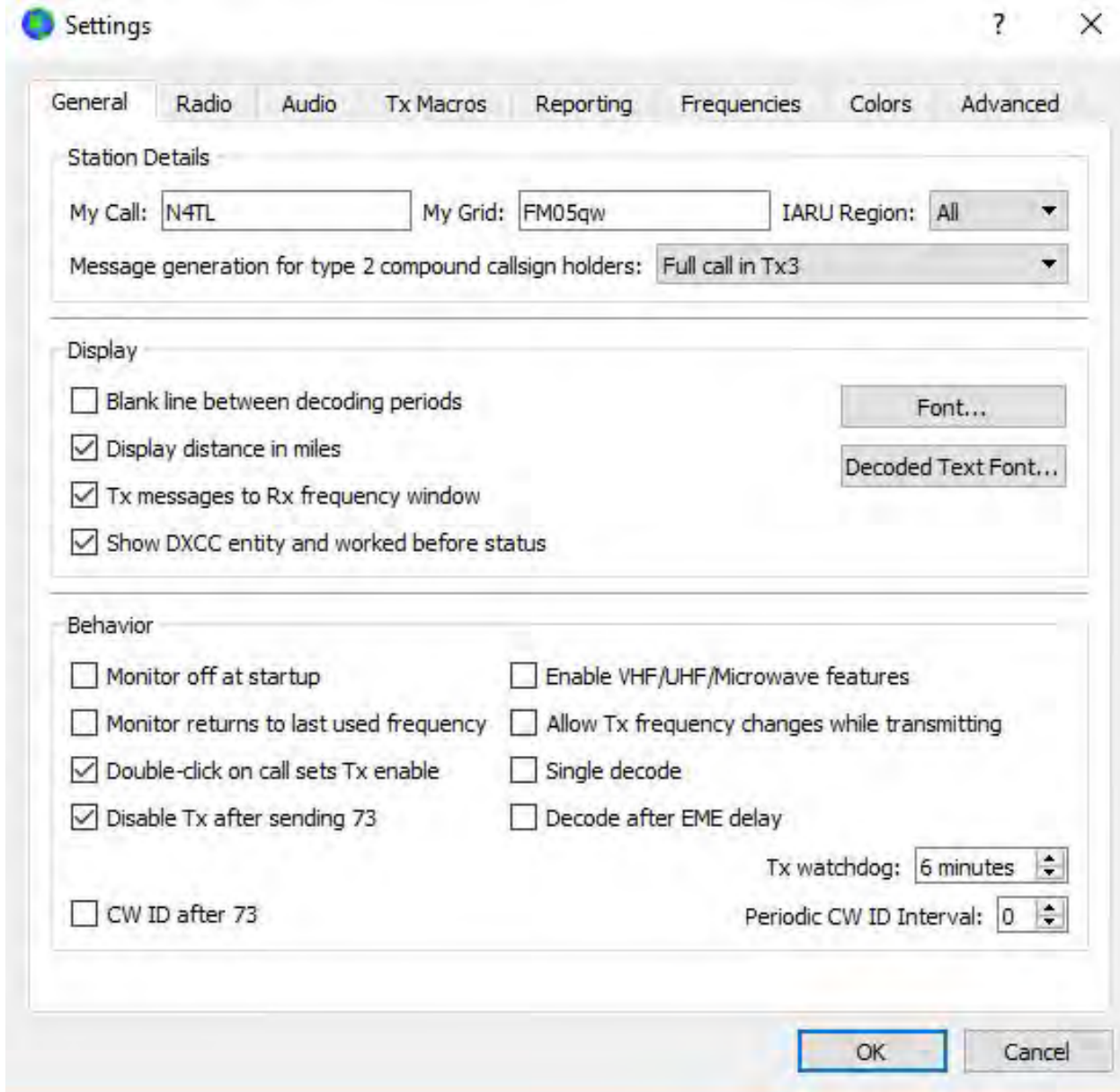
Big correction after the computer was off
Small corrections after that.

WSJT-X software

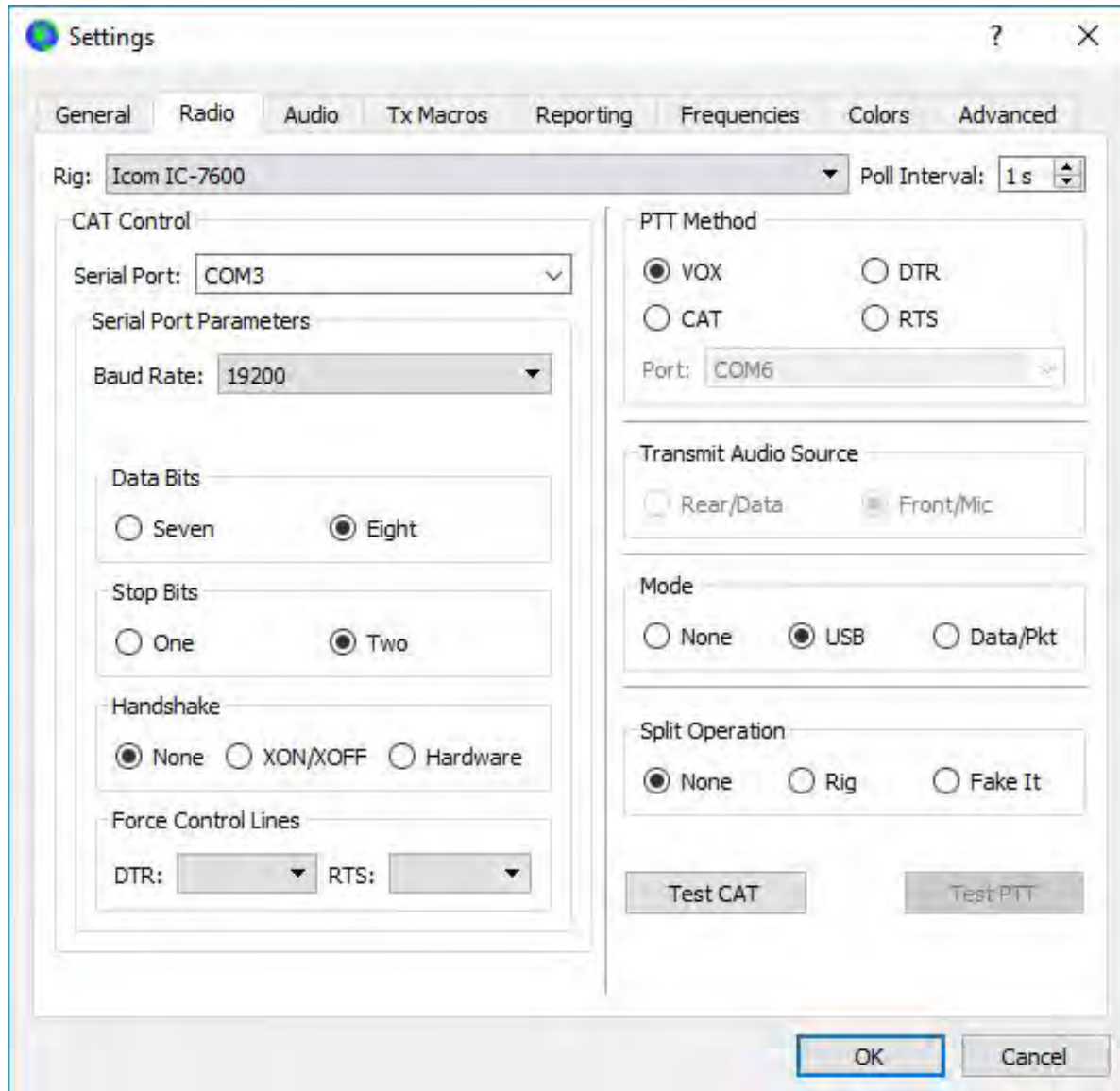
- Download from this website
- <https://physics.princeton.edu/pulsar/k1jt/wsjtx.html>
- Follow the instructions and install it.
- There is a lot of documentation to read



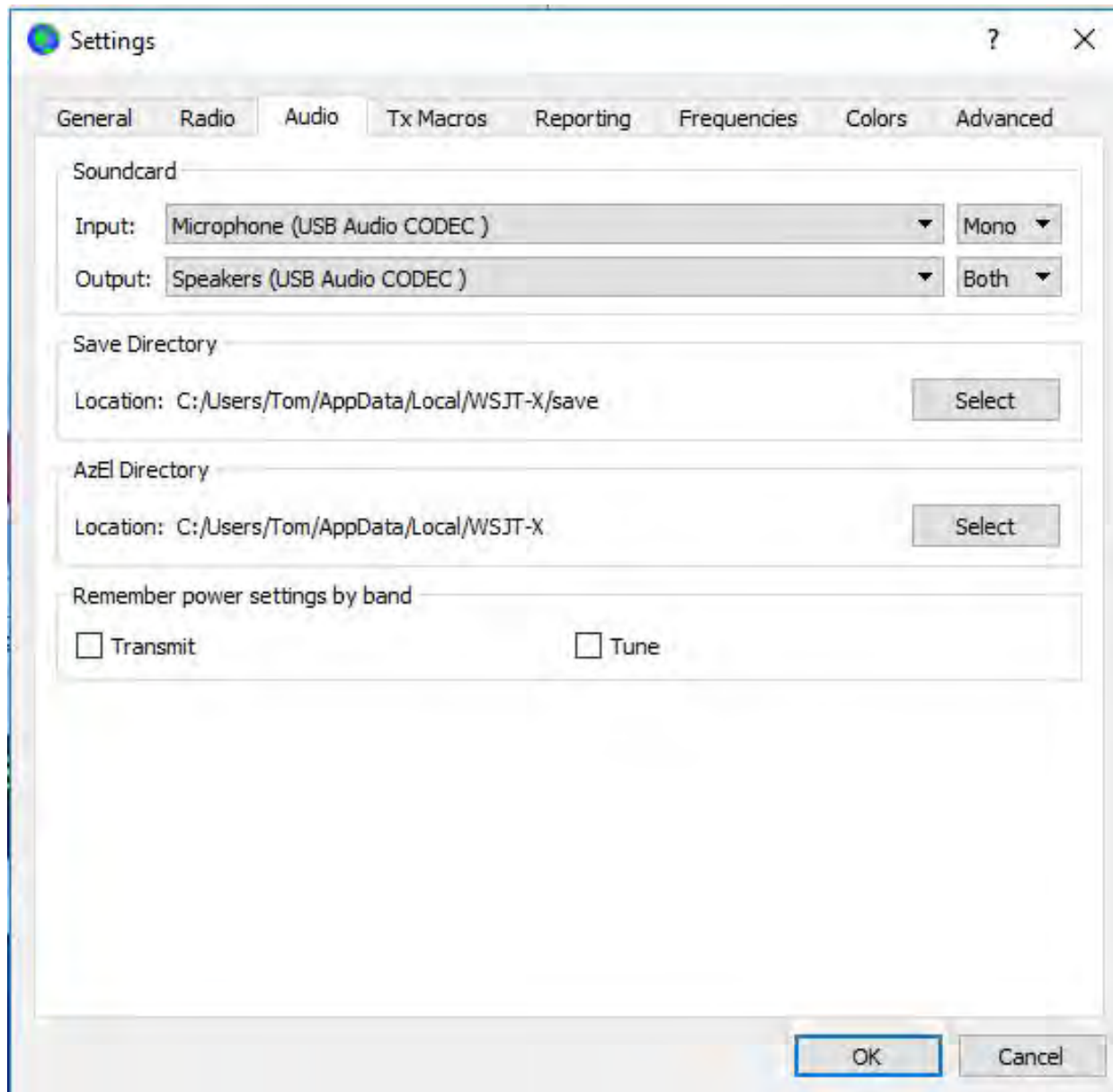
This is the main screen. Click on File and go to settings.



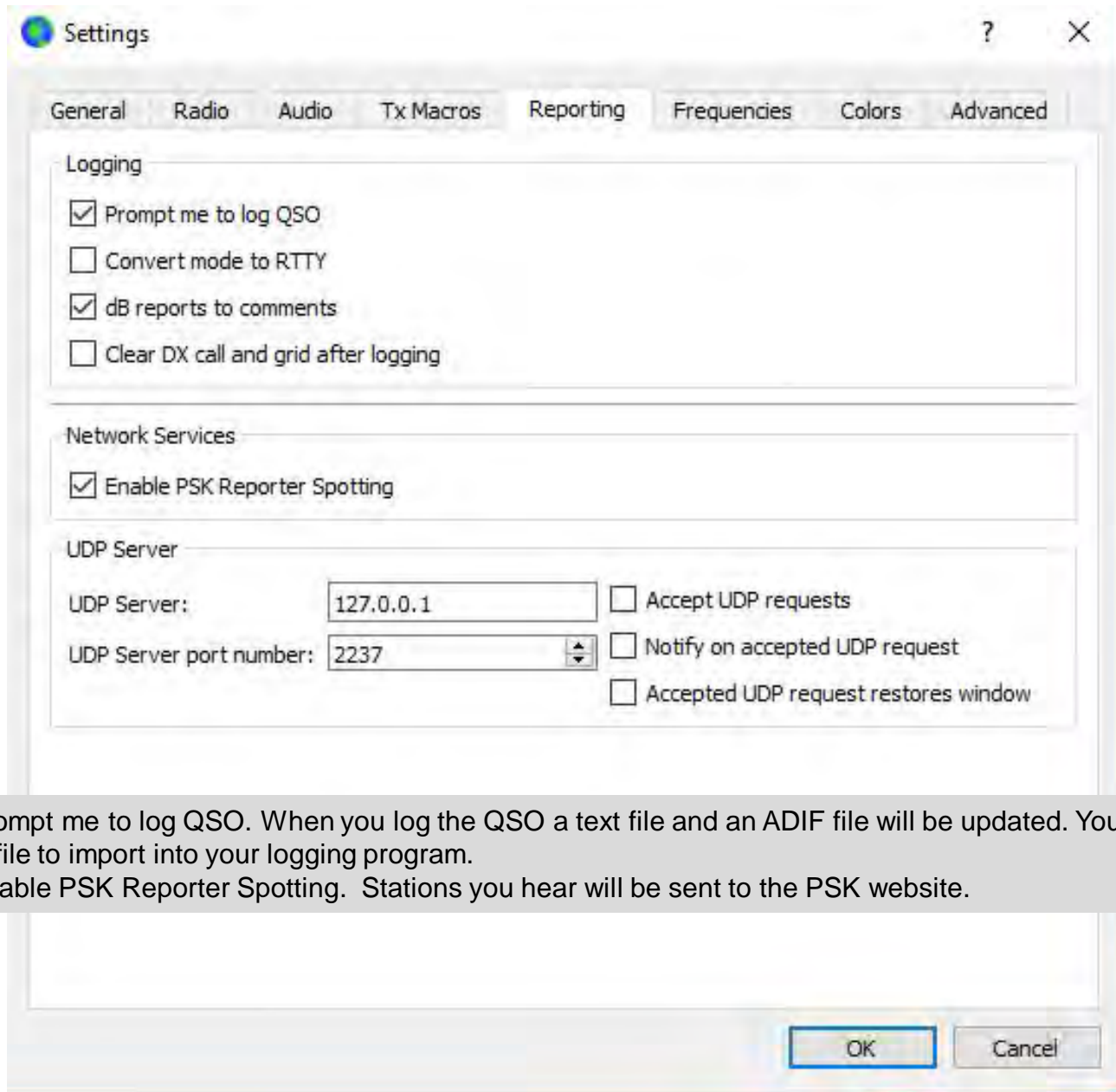
Put in your call and the grid



If you are using CAT control put in the Rig and port settings. The SignalLink uses VOX for PTT.



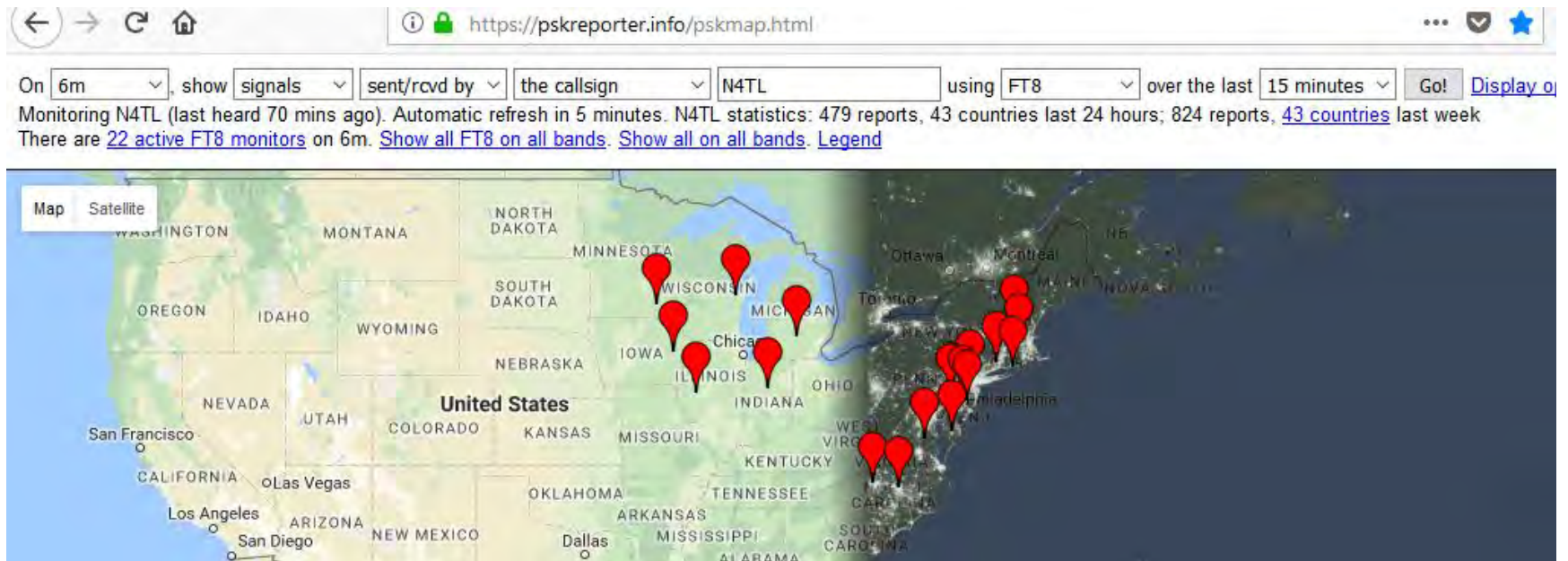
It is important to select the correct soundcard input and output.



Check Prompt me to log QSO. When you log the QSO a text file and an ADIF file will be updated. You can use the ADIF file to import into your logging program.
Check Enable PSK Reporter Spotting. Stations you hear will be sent to the PSK website.

PSK Reporter website

Set filters at the top



The screenshot shows the PSK Reporter website interface. At the top, there is a navigation bar with a back arrow, a forward arrow, a refresh icon, and a home icon. The address bar displays the URL <https://pskreporter.info/pskmap.html>. Below the address bar, there are several filter controls: "On 6m", "show signals", "sent/rcvd by", "the callsign", "N4TL", "using FT8", and "over the last 15 minutes". A "Go!" button and a "Display on" link are also present. Below the filters, there is a status message: "Monitoring N4TL (last heard 70 mins ago). Automatic refresh in 5 minutes. N4TL statistics: 479 reports, 43 countries last 24 hours; 824 reports, 43 countries last week. There are 22 active FT8 monitors on 6m. [Show all FT8 on all bands](#). [Show all on all bands](#). [Legend](#)".

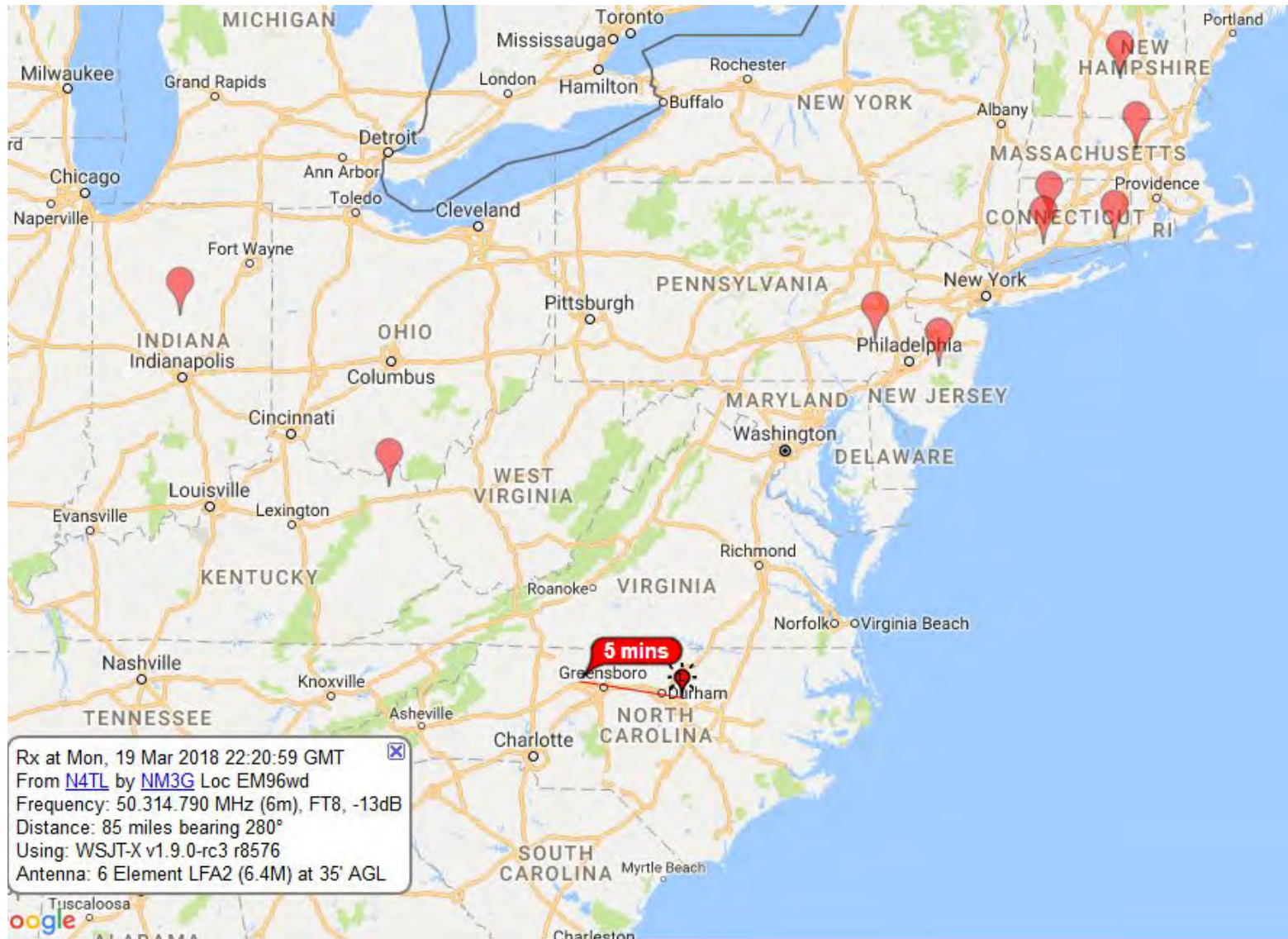
The main content area features a map of the United States with several red location pins. The pins are concentrated in the central and eastern parts of the country, specifically in the states of Wisconsin, Illinois, Michigan, Indiana, Ohio, Pennsylvania, and New York. The map also shows state names and major cities like San Francisco, Los Angeles, San Diego, Dallas, Chicago, Philadelphia, and New York City.

I called CQ on 6 meters to see who was hearing me.

The screenshot shows the WSJT-X v1.8.0 software interface. The main window displays a list of received messages in the 'Rx Frequency' pane, all of which are 'CQ N4TL FM05' received at 1795 Hz. The 'Band Activity' pane is currently empty. The interface includes a menu bar (File, Configurations, View, Mode, Decode, Save, Tools, Help), a toolbar with buttons like 'Log QSO', 'Stop', 'Monitor', 'Erase', 'Decode', 'Erase Tx', 'Halt Tx', 'Tune', and 'Menus'. The central display shows the frequency '50.313 000' and a signal strength of '71 dB'. Below this, there are fields for 'DX Call' (CT2GQN) and 'DX Grid' (IM67), along with 'Az: 65' and '3877 mi'. A date and time display shows '2018 Mar 19 22:25:29'. On the right, there is a 'Generate Std Msgs' panel with a list of message templates, including 'CQ N4TL FM05' which is selected. The status bar at the bottom indicates 'Receiving', 'IC-7600, SL', 'FT8', 'Last Tx: CQ N4TL FM05', and '14/15 WD:4m'.

Band Activity					Rx Frequency				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
					222045	Tx		1795 ~	CQ N4TL FM05
					222115	Tx		1795 ~	CQ N4TL FM05
					222145	Tx		1795 ~	CQ N4TL FM05
					222215	Tx		1795 ~	CQ N4TL FM05
					222245	Tx		1795 ~	CQ N4TL FM05
					222315	Tx		1795 ~	CQ N4TL FM05
					222345	Tx		1795 ~	CQ N4TL FM05
					222415	Tx		1795 ~	CQ N4TL FM05
					222445	Tx		1795 ~	CQ N4TL FM05
					222515	Tx		1795 ~	CQ N4TL FM05

One station, NM3G



After calling CQ for a while I checked the PSK reporter website. One station was reporting that it heard me. 85 miles to the west.

KF4DUE answered my CQ

I worked one station on 6 meters and then went back to the PSK reporter website.

The screenshot displays the WSJT-X v1.8.0 software interface. The main window shows a QSO log with two columns: 'Band Activity' and 'Rx Frequency'. The 'Band Activity' column lists received messages from N4TL KF4DUE on 6 meters. The 'Rx Frequency' column lists transmitted messages, including a CQ call and a response from N4TL FM05. A 'Log QSO' dialog box is open, prompting for confirmation of a QSO with call KF4DUE, starting at 19/03/2018 22:27:15 and ending at 19/03/2018 22:28:45. The dialog also shows transmission details: Mode FT8, Band 6m, Rpt Sent +06, Rpt Rcvd -01, Grid FM17, and Name. The main window also shows a frequency display at 1795 Hz and a 'Generate Std Msgs' panel with various message templates.

Band Activity					Rx Frequency				
UTC	dB	DI	Freq	Message	UTC	dB	DI	Freq	Message
222700	4	0.1	1798	~ N4TL KF4DUE FM17	222045			1795	~ CQ N4TL FM05
222730	6	0.1	1799	~ N4TL KF4DUE FM17	222115			1795	~ CQ N4TL FM05
222800	10	0.1	1794	~ N4TL KF4DUE R-01	222145			1795	~ CQ N4TL FM05
222830	10	0.1	1796	~ N4TL KF4DUE 73	222215			1795	~ CQ N4TL FM05
					222245			1795	~ CQ N4TL FM05
					222315			1795	~ CQ N4TL FM05
					222345			1795	~ CQ N4TL FM05
					222415			1795	~ CQ N4TL FM05
					222445			1795	~ CQ N4TL FM05
					222515			1795	~ CQ N4TL FM05
					222545			1795	~ CQ N4TL FM05
					222615			1795	~ CQ N4TL FM05
					222645			1795	~ CQ N4TL FM05
					222700	4	0.1	1798	~ N4TL KF4DUE FM17
					222717			1795	~ CQ N4TL FM05
					222722			1795	~ KF4DUE N4TL +04
					222730	6	0.1	1799	~ N4TL KF4DUE FM17
					222745			1795	~ KF4DUE N4TL +06
					222800	10	0.1	1794	~ N4TL KF4DUE R-01
					222815			1795	~ KF4DUE N4TL RRR
					222830	10	0.1	1796	~ N4TL KF4DUE 73
					222845			1795	~ KF4DUE N4TL 73

Log QSO Confirmation Dialog:

Click OK to confirm the following QSO:

Call	Start	End
KF4DUE	19/03/2018 22:27:15	19/03/2018 22:28:45

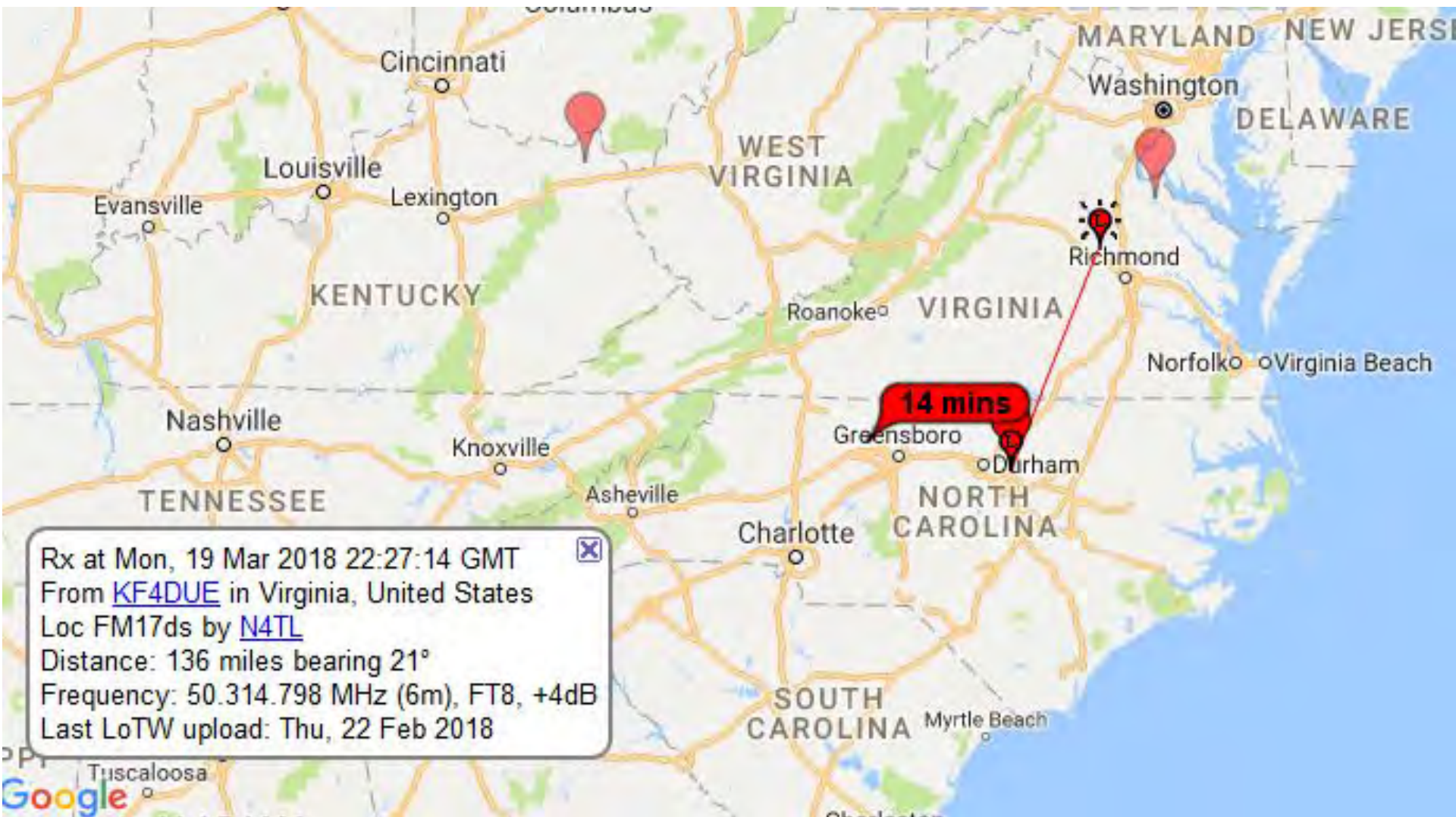
Mode: FT8, Band: 6m, Rpt Sent: +06, Rpt Rcvd: -01, Grid: FM17, Name: []

Tx power: [] Retain

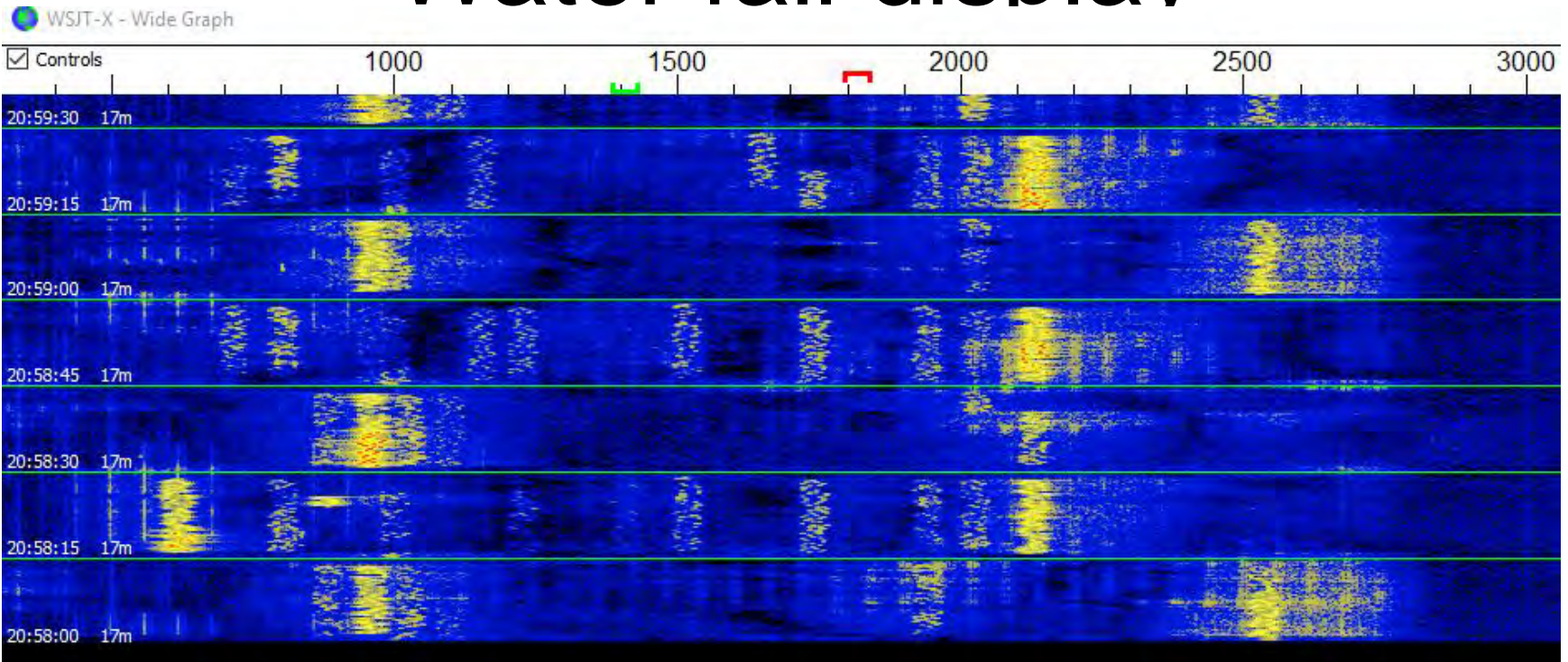
Comments: FT8 Sent: +06 Rcvd: -01 Retain

Buttons: OK, Cancel

The station I worked (KF4DUE) was near Richmond Virginia



Water fall display



Horizontal is audio frequency from low to high. If the right side is all dark, check the filters on your rig. Use wide filters. A narrow filter will cut off higher frequency signals.

The vertical is time. The newest is at the top. The yellow shows stations being received. Notice they transmit for a period of time then go to receive. Then back to transmit, every 15 seconds for FT8.

keyboard shortcuts

- Here are a few WSJT-X keyboard shortcuts
- F3 Display Keyboard Shortcuts
- F5 Display Special Mouse Commands

Set the radios' RF frequency (band) with the drop down box below Log QSO

Double click on a station calling CQ and the call will be put in the various boxes

Click on Enable Tx to answer the CQ

WSJT-X v1.8.0 by K1JT

File Configurations View Mode Decode Save Tools Help

Band Activity					Rx Frequency				
UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
205815	-20	0.0	1389	~ VP2EGO K4EM R+06	205815	-20	0.0	1389	~ VP2EGO K4EM R+06
205815	15	0.2	597	~ VP2EGO WORIC RR73					
205815	-7	0.1	780	~ DC7MO PY1TS -19					
205815	-7	-1.5	978	~ N4AU EA8KG 73					
205815	-19	0.1	1205	~ DC7MO WY1G -09					
205815	-5	0.5	1494	~ K1BZM NE8Z R-15					
205815	-6	0.1	1720	~ W4WNT EA9ABC -17					
205815	-8	0.1	2004	~ DC7MO N1NK FN41					
205815	15	0.1	2108	~ DC7MO KJ3L 73					
205815	-7	0.1	1918	~ DC7MO CX7CB GF15					
205830	18	0.0	938	~ WORIC VP2EGO 73					
205830	0	-0.2	1006	~ CQ AI0D DM33 !U.S.A.					
205830	4	0.4	2108	~ DE PJ4/DC7MO 73					
205830	0	0.1	862	~ EA8KG K1BZ FM19					
205830	-5	0.3	1076	~ CQ W1FIT DM26 !U.S.A.					

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune Menus

17m | 18.100 000 | Tx even/1st | Generate Std Msgs

DX Call: EA8ACW | DX Grid: IL28 | Tx 1795 Hz | Tx ← Rx | EA8ACW N4TL FM05 | Next: Tx 1

Az: 79 | 3699 mi | Rx 1385 Hz | Rx ← Tx | EA8ACW N4TL -15 | Now: Tx 2

Lookup | Add | Report -15 | Hold Tx Freq | EA8ACW N4TL R-15 | Tx 3

Auto Seq | Call 1st | EA8ACW N4TL RRR | Tx 4

NA VHF Contest | EA8ACW N4TL 73 | Tx 5

Receiving | IC-7600, SL | FT8 | CQ N4TL FM05 | Tx 6

9/15 WD:5m

Make sure any notch filter is off, Set the rig to USB and use the wide filter setting.

When transmitting watch the ALC on the rig and set the audio out level so there is a little ALC.

Now lets do the Demo

The screenshot displays the WSJT-X v1.8.0 software interface. The main window is titled "WSJT-X v1.8.0 by K1JT" and includes a menu bar with options: File, Configurations, View, Mode, Decode, Save, Tools, Help.

Two tables are visible at the top:

- Band Activity:** A table with columns UTC, dB, DT, Freq, and Message. It lists various stations and their call signs, such as VP2EGO K4EM R+06, VP2EGO W0RIC RR73, DC7MO PY1TS -19, N4AU EA8KG 73, DC7MO WY1G -09, K1BZM NE8Z R-15, W4WNT EA9ABC -17, DC7MO N1NK FN41, DC7MO KJ3L 73, DC7MO CX7CB GF15, WORIC VP2EGO 73, CQ AI0D DM33 (U.S.A.), DE PJ4/DC7MO 73, EA8KG K1BZ FM19, and CQ W1FIT DM26 (U.S.A.).
- Rx Frequency:** A table with columns UTC, dB, DT, Freq, and Message. It shows a single entry: 205815 -20 0.0 1389 ~ VP2EGO K4EM R+06.

Below the tables are several control buttons: Log QSO, Stop, Monitor (highlighted in green), Erase, Decode, Enable Tx, Halt Tx, Tune, and a checked Menus button.

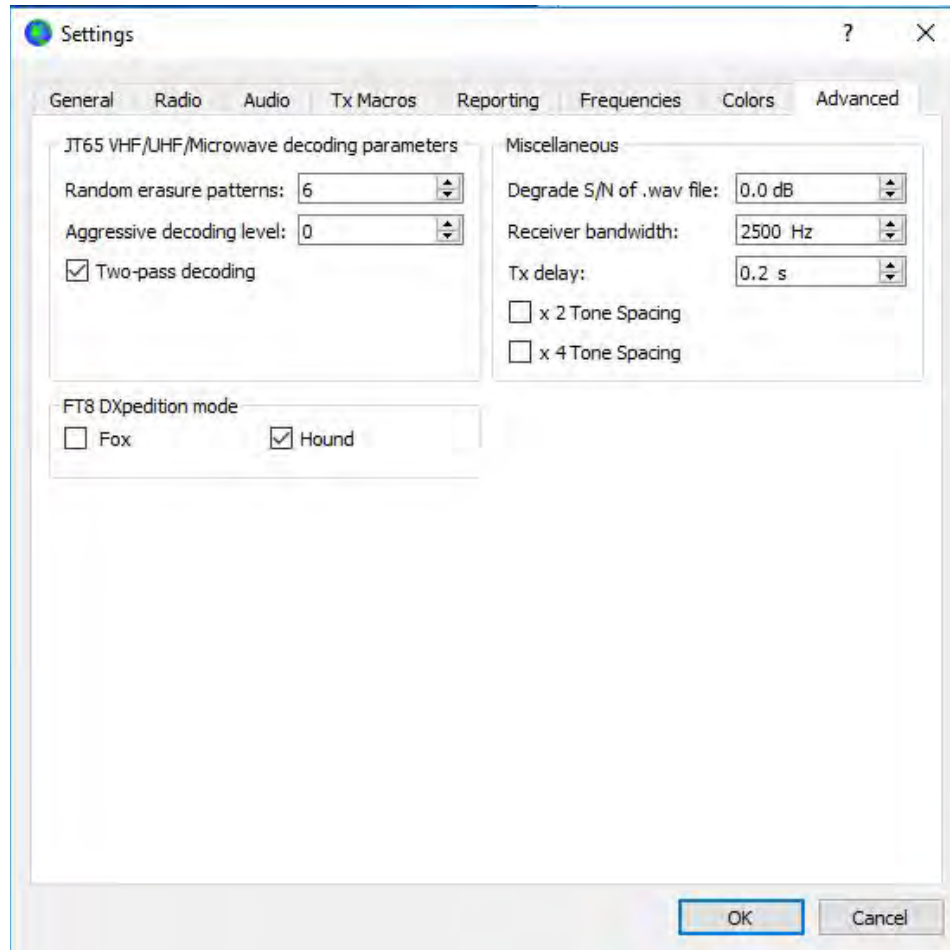
The central control area includes:

- A frequency display showing 17m and 18.100 000.
- A TX/RX status indicator showing 76 dB.
- Fields for DX Call (EA8ACW) and DX Grid (IL28).
- Azimuth (Az: 79) and distance (3699 mi) fields.
- Buttons for Lookup and Add.
- A Report -15 dropdown menu.
- Checkboxes for Tx even/1st, Hold Tx Freq, Auto Seq, and Call 1st.
- An unchecked checkbox for NA VHF Contest.

On the right side, there is a "Generate Std Msgs" section with a list of messages and buttons for Tx 1 through Tx 6. The messages include EA8ACW N4TL FM05, EA8ACW N4TL -15, EA8ACW N4TL R-15, EA8ACW N4TL RRR, EA8ACW N4TL 73, and CQ N4TL FM05.

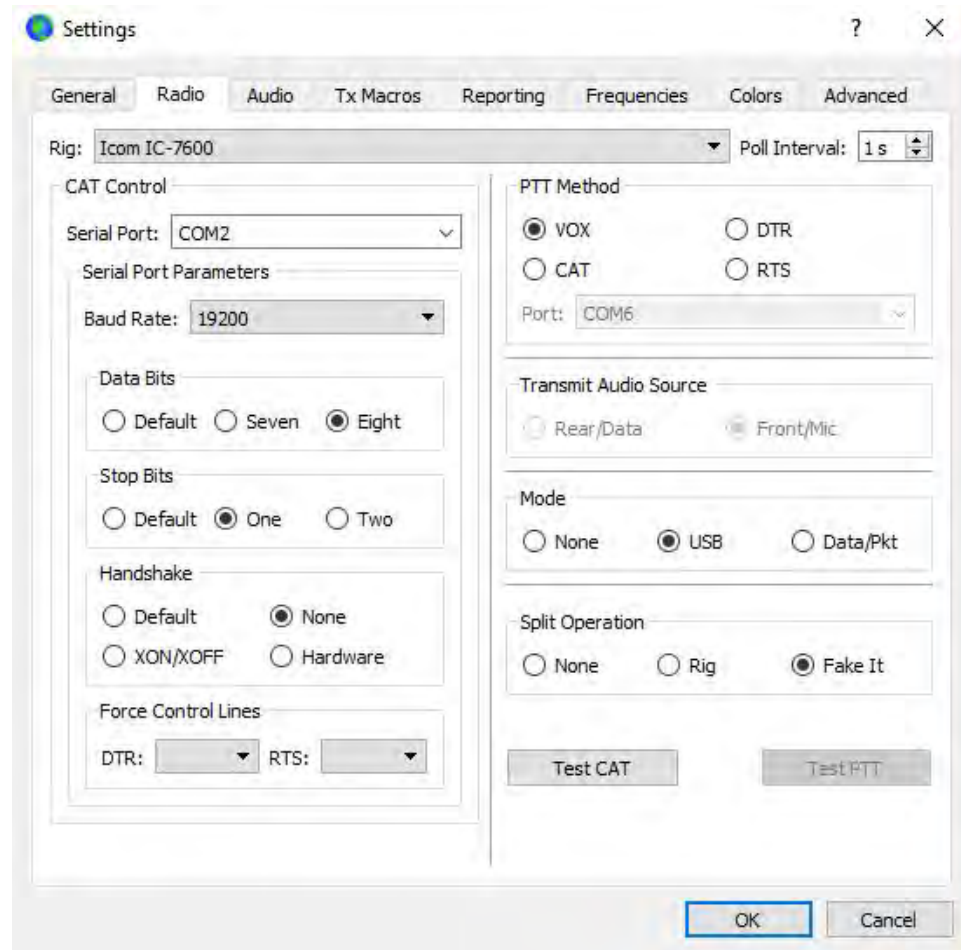
At the bottom, the status bar shows "Receiving" (highlighted in green), "IC-7600, SL", "FT8", and "9/15 WD:5m".

Fox Hound Mode



In setting, under advanced, click Hound

Fox Hound Mode



Split has to be enabled, I have been using Fake It

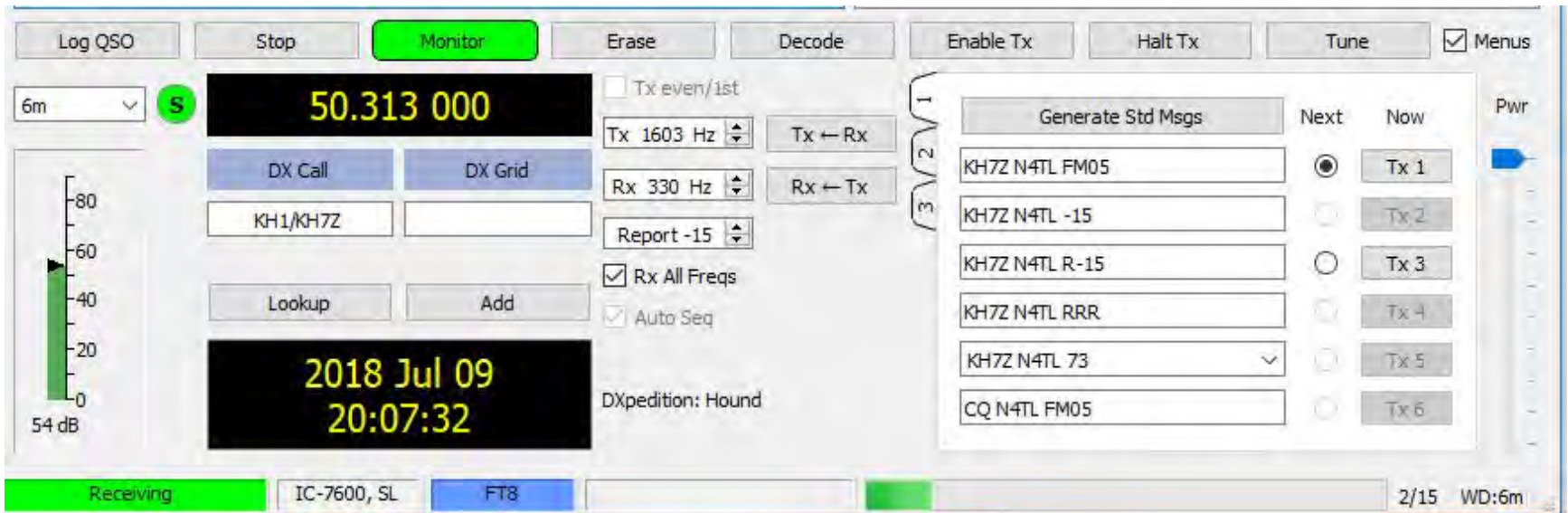
Fox Hound Mode

- Set the audio frequency above 1000hz
- Use the dial frequency for the DX station
- Baker island KH1/KH7Z used 14.090MHz
- Standard dial frequencies are not used
- Double click on the DX to set DX call and which 15 second period to transmit
- The DX will transmit with a low audio frequency, probably 330Hz or so.

Fox Hound Mode

- When the DX calls you. The WJST software will see your call and move your transmit frequency below 1000Hz.

Fox Hound Mode



Only two transmissions are needed

The same as working a regular pileup, your call and then TU 59 after the DX calls you.

Websites

Software used is “WSJT-X” You can download it from this website,

<https://physics.princeton.edu/pulsar/k1jt/wsjt-x.html>

This is the website for the PSK Reporter.

<https://pskreporter.info/pskmap.html>

Grid Square and Tips

http://www.levinecentral.com/ham/grid_square.php

https://www.physics.princeton.edu/pulsar/K1JT/FT8_Operating_Tips.pdf

https://physics.princeton.edu/pulsar/k1jt/FT8_DXpedition_Mode.pdf

CAT Control

Cables for rig control are sold at this company. You can use others or make your own. The ones used at the demo are, ICOM CT-17 USB FTDI Chipset CI-V Cat Control Programming Cable 3 Feet. You can also set the rigs frequency by hand. The program does not have to do it.

Valley-ent.com

Audio Interface

- This is the audio interface that was used, [Tigertronics SignalLink USB](#). It is sold by many [dealers](#). You can use others or make your own.
- If you only want to listen, just run an audio cable from the audio out on the radio to the audio in on the computer.

Dimension 4

The clock has to be correct on your computer. Dimension 4 software is used for this.

You can download it for free from this website,

<http://www.thinkman.com/dimension4/>

Don't run it once, let it run all the time to keep the clock correct.

COM Port Sharing

- Normally two programs can't use the same com port. This can be a problem if you have a logging program to run with WSJT-X
- Eterlogic publishes a program called VSPE
- It does com port splitting. I use it for com3 to com2. My radio is on com3 and the software is on com2
- <http://www.eterlogic.com/Products.VSPE.html>

Questions

- We were asked how we pick the frequency to use.
- We click on the drop down box just below the Log QSL box. The recommended frequencies are supplied with the software.

Questions

- We were asked how we monitor the software when we are not home. A control operator is needed for a repeater.
- The software is not setup to make automatic contacts. The Enable Tx is always turned off after a contact. The operator has to turn it back on. Also there is a watch dog timer that will stop CQs after a preset time.

Windows 10 Update breaks WSJT operation

I have been using WSJT and FT8 for a while now. The computer is a 64 bit windows 10 system. Microsoft did an update on May 21st. It took a long time to run and when it was done I could no longer operate FT8. When I started WSJT this error was shown “Error in Sound Input”.

The program was not receiving any audio from the radio. I did a lot of searching on the internet and finally found the solution. It was hard to find the solution because I was searching for audio input problem and not a microphone input problem. When windows 10 was new I turned off a lot of things to improve my privacy. One of them was the Microphone input. The computer does not have a microphone but I turned it off anyhow.

This search found the solution “windows 10 microphone access permissions”.

To fix it, go to Settings, Privacy, Microphone and enable the microphone access.

WSJT now works okay like it did before the update.

The End