OPERATING FT8

WHAT IS THIS FT8 THING?

FT8 is a digital protocol for Amateur Radio communication for weak and fading signals

Derivative work of the JT65 and JT9 modes by Joe Taylor K1JT and Steven Franke K9AN

- JT65 was designed originally for EME or "moonbounce" communications on VHF and UHF

- JT65 became very popular for world-wide weak signal QSOs

- Standard exchange took seven minutes!

WHAT IS THIS FT8 THING?

FT8 was designed to accomplish much of the same things as JT65 but within a shorter exchange time

- 8-FSK modulation

- 15 seconds per transmission cycle with very little gap between cycles

- Wider bandwidth than JT65 while still narrower than JT9
  - 50Hz wide with tones spaced at 6.25Hz

- Somewhat less sensitive than JT65 at decoding under the noise

- Designed to operate more or less automatically

FT8 TRANSMISSIONS

Designed specifically for QRP and the associated QRM and QRN experienced while operating QRP

FT8 can be successfully decoded at -20dB

Transmissions are divided into "even" and "odd":

- Each transmission is 13.48 seconds

- Even transmissions are :00 and :30 seconds, odd :15 and :45

Transmissions are based on clock time

- Must ensure your computer time is synchronized with the worldwide NTP network

FT8 QSO

A complete, fully-compliant FT8 QSO takes 6 transmissions (excluding calling CQ)

15s per transmission = 1m 30s for all QSOs to be completed

Each FT8 transmission can contain 13 characters

FT8 COMPLETE CONTACT

Rx Frequency

UTC	dB	DT	Freq		Message
130630	Tx		539	~	CQ N8JDM EN91
130645	-12	0.3	539	~	N8JDM AE4WG EL99
130700	Tx		539	~	AE4WG N8JDM -12
130715	-8	0.3	540	~	N8JDM AE4WG R-08
130730	Tx		539	~	AE4WG N8JDM RRR
130745	-4	0.3	540	~	N8JDM AE4WG 73
130800	Tx		539	~	AE4WG N8JDM 73

FT8 FREQUENCIES

Band	Freq
160m	1.841 Mhz
80m	3.579 Mhz
40m	7.079 Mhz
30m	10.141 Mhz
20m	14.079 Mhz
17m	18.105 Mhz
15m	21.079 Mhz
12m	24.920 Mhz
10m	28.079 Mhz
6m	50.313 Mhz

Frequencies are VFO

Any cluster spot will be VFO

Radio mode is always USB

Don't use a narrow filter such as you would for RTTY; the software itself does in-band tuning and shifting as necessary

WHY ON EARTH WOULD I DO THIS?

A great question… Some possible answers:

- Different (the "Because it was there" answer)

- Make contacts you can't on Phone, CW, RTTY, etc.

- AWARDS!!
  - DXCC
  - Worked All States
  - Worked All Continents

- Do radio stuff while multitasking.

RADIO OPERATING NOTES

Must setup different than SSB even though signals are USB

Receiving:

- Disable any noise reduction features

- Experiment with any pre-amp features to see if they help or hurt

Transmitting:

- Disable any voice processing

- Set xmit power to lower level

- Raise audio out level just enough to xmit at the set power

EQUIPMENT NEEDS

Radio with a good duty cycle

A method to interface radio with a computer:

- USB interface w/ computer for modern radios
- DIN/ACC interface
- Custom wiring on the Mic input + radio line out

A method to cause transmit (PTT or Vox)

CAT/Rig control (recommended, not required)

COMPUTER DETAILS

WSJT-X - Windows, MacOS, or Linux

Disable all other system sounds! I was listening to JT65 signals one night and heard someone transmitting the continuous ring of a Skype call over and over again!

Again, a CAT/Rig control is recommended such as Omnirig or Hamlib

Must have time well-synchronized with NTP

- Windows default time system drifts too much! Use NTP for Windows: https://www.meinbergglobal.com/english/sw/ntp.htm

N8JDM QTH

Kenwood TS-570

WJST-X

Omni-Rig

BASIC OPERATION STEPS

1. Find FT8 signals on the bands! FT8 won't magically overcome the bad propagation right now.

2. Responding to CQs
   1. Select the call in the *Band Activity* window
   2. Watch WJST-X run the contact
   3. Adjust power and audio levels as needed
   4. Goto 1

3. Calling CQ
   1. Set the "Call 1st" option or call CQ and click on a responder
   2. Watch WJST-X run the contact
   3. Adjust power and audio levels as needed
   4. Goto 1

TX/RX Mechanics

CQ on even/odd

TX/RX subfrequency
for CQ find open segment in the waterfall for best results.

Band (important for decoding)

Receive Signal (should be green)

Auto-QSO when calling CQ

Cycle through QSO seq automatically

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File   Configurations   View   Mode   Decode

Band Activity

UTC	dB	DT	Freq		Message
135415	-11	0.1	965	~	WB5FSK KD0V0U -19
135415	-15	0.6	1080	~	CQ W5KDJ EM20
135415	-4	0.5	1362	~	CQ DX WE7K DM43
135415	0	0.1	1934	~	CQ KC9UQR EN52
135415	6	0.3	2067	~	W4WXA K4MT FM05
135415	-15	1.8	2420	~	VE3ASL WB9TLH 73
135415	-3	0.0	2692	~	KE8BWA AB4WL 73
135415	-23	0.1	1428	~	KC9LFD KE6SCS RRR
135415	-9	0.1	2067	~	W4WXA WB5CXJ EM50
135415	-20	0.1	2147	~	BD7MYM K7MAC -13
135445	0	0.1	1934	~	N8JDM KC9UQR -16
135445	8	0.1	363	~	CQ NZ4DX FM15

Rx Frequency

UTC	
135415	
135415	
135433	
135445	
135500	

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

Generate Std Msgs   Next   Now   Pwr

40m   ●   **7.074 000**   ☑ Tx even/1st

DX Call   DX Grid   Tx 1934 Hz ⬍   Tx ← Rx

KC9UQR   EN52   Rx 1934 Hz ⬍   Rx ← Tx

Az: 287   624 km   ☐ Hold Tx Freq

Lookup   Add   Report 0 ⬍

2018 Mar 24 13:55:24   ☑ Auto Seq   ☑ Call 1st

☐ NA VHF Contest

KC9UQR N8JDM R +00   ○   Tx 3
KC9UQR N8JDM RRR   ○   Tx 4
KC9UQR N8JDM 73   ○   Tx 5
CQ N8JDM EN91   ○   Tx 6

80
60
40
20
0

53 dB

Receiving   FT8   Last Tx: KC9UQR N8JDM R +00

All signals decoded on the band segment

Messages for the selected call(s)

Settings

General | Radio | Audio | Tx Macros | Reporting | Frequencies | Colors | Advanced

Station Details

My Call: N8JDM   My Grid: EN91db   IARU Region: Region 2

Message generation for type 2 compound callsign holders: Full call in Tx3

Display

☐ Blank line between decoding periods

☐ Display distance in miles

☑ Tx messages to Rx frequency window

☐ Show DXCC entity and worked before status

[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

☑ 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: OmniRig Rig 1 ▾   Poll Interval: 1 s ▲▼

CAT Control

Serial Port: ▾

Serial Port Parameters

Baud Rate: 4800 ▾

Data Bits
○ Seven   ◉ Eight

Stop Bits
○ One   ◉ Two

Handshake
◉ None   ○ XON/XOFF   ○ Hardware

Force Control Lines
DTR: ▾   RTS: ▾

PTT Method

○ VOX   ◉ DTR
○ CAT   ○ RTS

Port: COM3 ▾

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

Logging

- ☑ Prompt me to log QSO
- ☐ Convert mode to RTTY
- ☐ dB reports to comments
- ☑ Clear DX call and grid after logging

Network Services

- ☑ Enable PSK Reporter Spotting

UDP Server

UDP Server: `127.0.0.1`   ☐ Accept UDP requests

UDP Server port number: `2237`   ☐ Notify on accepted UDP request

☐ Accepted UDP request restores window

OK   Cancel
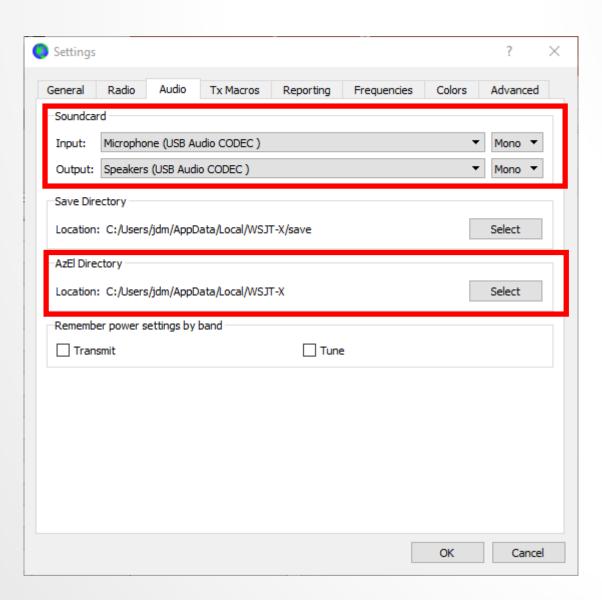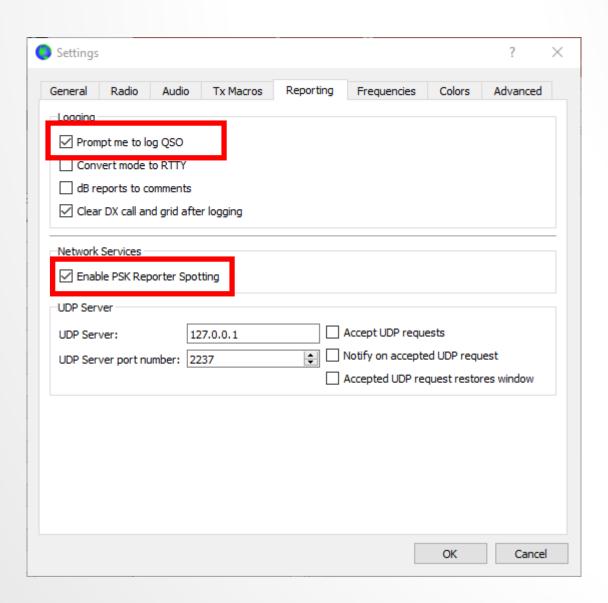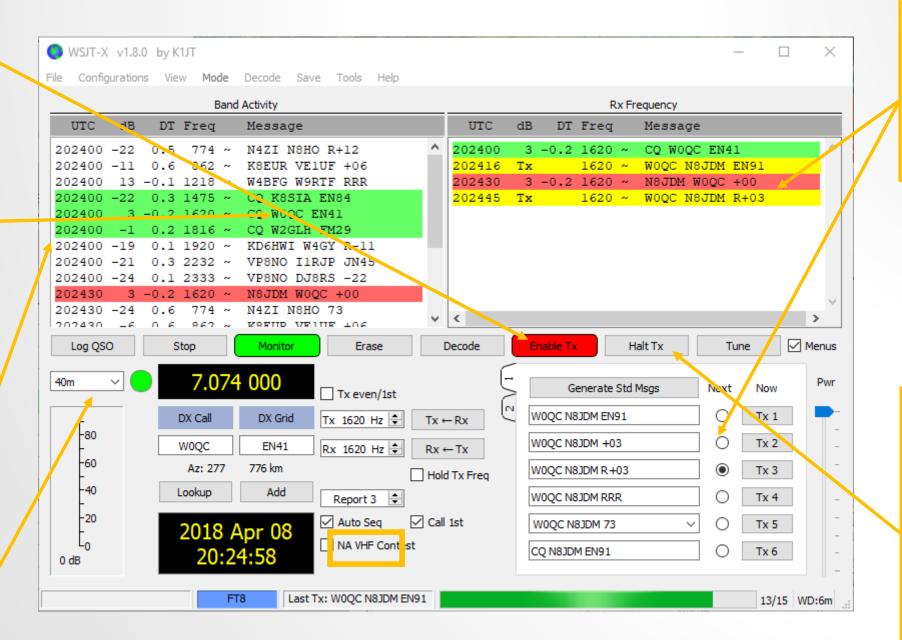
4. Click *Enable TX* to enable xmit (if not auto-enabled)

3. Double-click on the callsign calling CQ.

2. Watch for a station calling CQ

1. Select operating band

5. Watch the QSO complete as each contact step passes

6. Click Halt Tx if you xmit a number of steps with no response. Shuts off after you send 73.

WSJT-X   v1.8.0   by K1JT

File   Configurations   View   Mode   Decode   Save   Tools   Help

Band Activity

UTC	dB	DT	Freq	Message
202400	-22	0.5	774 ~	N4ZI N8HO R+12
202400	-11	0.6	862 ~	K8EUR VE1UF +06
202400	13	-0.1	1218 ~	W4BFG W9RTF RRR
202400	-22	0.3	1475 ~	CQ K8SIA EN84
202400	3	-0.2	1620 ~	CQ W0QC EN41
202400	-1	0.2	1816 ~	CQ W2GLH FM29
202400	-19	0.1	1920 ~	KD6HWI W4GY R-11
202400	-21	0.3	2232 ~	VP8NO I1RJP JN45
202400	-24	0.1	2333 ~	VP8NO DJ8RS -22
202430	3	-0.2	1620 ~	N8JDM W0QC +00
202430	-24	0.6	774 ~	N4ZI N8HO 73
202430	-6	0.6	862 ~	K8EUR VE1UF +06

Rx Frequency

UTC	dB	DT	Freq	Message
202400	3	-0.2	1620 ~	CQ W0QC EN41
202416	Tx		1620 ~	W0QC N8JDM EN91
202430	3	-0.2	1620 ~	N8JDM W0QC +00
202445	Tx		1620 ~	W0QC N8JDM R+03

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

40m   ●   7.074 000   ☐ Tx even/1st

-80
-60
-40
-20
-0
0 dB

DX Call   DX Grid   Tx 1620 Hz   Tx ← Rx
W0QC   EN41   Rx 1620 Hz   Rx ← Tx
Az: 277   776 km   ☐ Hold Tx Freq
Lookup   Add   Report 3
2018 Apr 08   20:24:58   ☑ Auto Seq   ☑ Call 1st
☐ NA VHF Contest

Generate Std Msgs   Next   Now   Pwr

W0QC N8JDM EN91	○	Tx 1
W0QC N8JDM +03	○	Tx 2
W0QC N8JDM R +03	◉	Tx 3
W0QC N8JDM RRR	○	Tx 4
W0QC N8JDM 73	○	Tx 5
CQ N8JDM EN91	○	Tx 6

FT8   Last Tx: W0QC N8JDM EN91   13/15   WD:6m

OPERATING TIPS

- You need to be fast on the clicks. FT8 moves fast. But don't be worried about messing up; it's also very forgiving.

- Watch your power meter
  - Cap radio output at your max desired power (try starting w/ 30W)
  - Use the TX knob or equivalent of your audio to micro-adjust ALC and power
  - It's harder to generate lower offset sounds than ones in the middle of the band – watch when you need to up your audio out.

- If you hear FT8 tones but never decode:
  - Check your clock synchronization
  - Check your audio in the waterfall display

PSKREPORTER.INFO