The newest fun weak signal digital mode. Shaun Harteloo, N7TNP Amateur Extra



### What is FT8?

- The latest weak signal mode from K1JT
- Joseph Taylor, K1JT
  - Nobel Prize winning Astrophysicist
  - Created WSPR, JT65, JT9 and many other Weak signal modes
- WSJT (Weak Signal/Joseph Taylor)
  - WSJT, <u>WSJT-X</u>, WSPR, SimJT
  - https://physics.princeton.edu/pulsar/k1jt/
- I've made 1000+ contacts since Jan 2018
  - Completed my WAS on 20m

### What is FT8?

• First showed up in August 2017

- As of Dec 31<sup>st</sup> ClubLog reported that 60% of all contacts logged on their service were done with FT8
- Can only be found in WSJT-X and some other free software packages.
- Time Dependency
  - Synchronized time is critical to this mode working properly
- 15 Second Transmission Intervals
  - Even (0 Second/30 Second)
  - Odd (15 Second/45 Second)
- 13 Character Limit
- Can decode down to audio levels of -24 dB

### What is FT8?

• "[FT8 is] designed for making reliable, error-free contacts using very weak signals — in particular, signals that may be too weak for the more traditional modes to be usable, or even too weak to hear." -Joseph Taylor, K1JT

### What is needed?

- Omputer
- Audio Interface to Radio
  - SignaLink
  - West Mountain Radio RigBlaster
  - Timewave Navigator
  - Homebrew
    - WSJT-X requires an audio card that does 48000hz sample rate
- Time Synchronization Software
  - Dimension 4 http://www.thinkman.com/dimension4/
  - Meinberg NTP http://www.satsignal.eu/ntp/setup.html
- WSJT-X
  - https://physics.princeton.edu/pulsar/k1jt/wsjtx.html

### **Time Synchronization**

- Why?
  - Computer clocks don't keep time very well
  - They lose 10ths of a second very quickly
- FT8 is highly time sensitive
  - Decodes will fail starting at a DT difference of just 0.5 seconds.
  - Ideally you are within 0.1 seconds.

UTC dB	DT	Freq	Message	
234315 -15 234315 -20			KI6DY NP4G -13 WA4MIT JH3VWN 73	^
234315 -8 234315 -14	0.2	2141 ~	K6SEX JP7DKQ -13 VE6DDD K3UA EN90	

### How to make an FT8 QS0

- 15 second cycles
  - 4 Per Minute
  - 2 Listen
  - 2 Transmit
  - 13 seconds on the air
  - 2 seconds for decoding and preparing for the next cycle
- Similar to JT65 and JT9FASTER!

## How an FT8 QS0 Operates

	CQ	CQ N7TN	P CN85
	<ul> <li>CQ [CALL] [Grid Sq]</li> </ul>		
	Response to CQ	W7Q N7T	NP CN85
	• [Call] [Your Call] [Grid Sq]		
	Response to Caller		W7Q N7TNP -12
	• [Caller] [Your Call] [RSSI]		
	Response to Signal Repo	ort	W7Q N7TNP R-12
	<ul> <li>[Caller] [Your Call] R[RSSI]</li> <li>R is to acknowledge that you received the second sec</li></ul>	signal report.	
	Roger Roger Roger		W7Q N7TNP RRR
	• [Caller] [Your Call] RRR		
	73		W7Q N7TNP 73
_	<ul> <li>[Caller] [Your Call] 73</li> </ul>		
	RR73		W7Q N7TNP RR73
	• [Caller] [Your Call] RR73		

### WSJT-X

SJT-X v1.9.1 by K1JT File Configurations View Mode	Decode Save Tools Help						-		x נ	:
	Band Activity					Rx Frequency				٦
UTC dB DT Freq	Message		UTC	dB	DT Freq	Message				
235315 -6 -0.0 893 ~ 235315 -19 1.9 1022 ~ 235315 -14 0.0 1277 ~ 235315 -13 0.2 1365 ~ 235315 -15 0.9 1431 ~ 235315 -16 0.1 1680 ~ 235315 -19 -0.1 1860 ~ 235345 -19 -0.0 503 ~ 235345 -1 0.4 606 ~ 235345 -1 0.4 606 ~ 235345 -6 -0.0 893 ~ 235345 -6 0.0 893 ~ 235345 -10 0.1168 ~ 235345 -10 1.0 1447 ~ 235345 -19 1.0 1447 ~ 235345 -13 -0.0 2056 ~ 235345 -14 0.0 904 ~	WIGKT KB7AK -15 WAOKDS N5GJ EM50 K5OA KD9LOK 73 K920 JE1FQV RR73 TU LID W6JPG K9RU -20 W6G JR1BAS PM95 KN4JRP LU1KCQ R-11 20m KH6HZ AB5GC EM30 JH2AMN WA4MIT R-09 WJ7WJ KN4COE EM79 W1GKT KB7AK -15 NTTNP KD9LOK EM69 CQ JE1FQV PM95 AD8J PY2RTB RR73 KO6K K4AKY R-08 KN4JRP LU1KCQ 73	-Japan	233545 233615 233645 233715 233745 233845 233845 234902 235000 235000 235100 235100 235130 235230 235230 235230 235300 235345 235400	Tx Tx Tx Tx Tx Tx Tx Tx Tx Tx Tx Tx Tx T	1168 ~ 1168 ~	CQ N7TNP CN85 CQ N7TNP CN85				
CQ only Log QSO	Stop Monitor	Erase	Decod	e	Enable Tx	Halt Tx	Tun	e	Menus	s
20m ~ S	4.073 500	☑ Tx even/1st		5	Gene	rate Std Msgs	Next	Now	Pwr	r
DX Call	DX Grid	Tx 1168 Hz 🜲	$Tx \gets Rx$	2	KD9LOK N7TNP C	N85	0	Tx <u>1</u>		-
-80 KD9LOK	EM69		D	(m	KD9LOK N7TNP -	08	۲	Tx <u>2</u>		-
-60	z: 90 1839 mi	Rx 1168 Hz 🖨	Rx ← Tx		KD9LOK N7TNP R	-08	0	Tx <u>3</u>		-
►-40 Lookup	Add	]	Hold Tx Free	1	KD9LOK N7TNP R	RR	10	Tx <u>4</u>		
-20		Report -8 🜲			KD9LOK N7TNP 7	73 ~	0	Tx <u>5</u>	1	-
L L <sub>o</sub>	018 Sep 16		Call 1st		CO N7TNP CN85			Tx 6		-
0 dB	23:54:04	M Auto Seq M			CQ IV THE CHOU			14.0		_
Tx: KD9LOK N7TNP -08         TS-2000         FT8         Last Tx: CQ N7TNP CN85         MD:90         4/15         WD:90										

#### FT8 for Field Day and other Events

- We worked FT-8 for Field Day
- The challenge: Figuring out the most efficient way to send the FD exchange.
  - '3A OR'
  - We used the 'TX Macro Configuration'
  - 3A OR 73 W7Q
  - {CAUTION} Limit of 13 characters

### FT8 DXpedition Mode

- Allows a 'Fox (DX)' to work multiple stations at once
  - Really good for working DX stations
- 'Hounds (Hunters)'

 You generally don't see people running DXpedition mode on the known FT8 frequencies.

### WSJT-X Settings

Settings ? 🗙	Settings ? X
General       Badio       Audio       Tx Macros       Reporting       Frequencies       Colors       Advarice         Station Details       My Call:       NTNP       My Grid:       CN85tl       AutoGrid       IARU Region:       All           Message generation for type 2 compound callsign holders:       Full call in Tx3           Image: State in the set of type 2 compound callsign holders:       Full call in Tx3           Display       Blank line between decoding periods       Font               Display distance in miles       Decoded Text Font                 Tx messages to Rx frequency window                   Show DXCC entity and worked before status                   Show principal prefix instead of country name                     Behavior                       Monitor returns to last used frequency	General       Radio       Audio       Tx Macros       Reporting       Frequencies       Colors       Advarible         Rig:       Icom IC-7000       Poll Interval:       1s       Is         CAT Control       Serial Port:       COM3       DTR       DTR       DTR       O CAT       O RIS         Serial Port Parameters       Baud Rate:       19200       Image: Como Composition       PTT Method       O CAT       O RIS         Data Bits       O Default       Seyen       Eight       Transmit Audio Source       Image: Como Composition       Image: Com
OK Cancel	OK Cancel

### WSJT-X Settings

Settings	? ×	Settings	? ×
General Radio Audio Tx Macros Reporting Frequencies	Colors Advance	General Radio Audio Tx Macros Reporting Frequencies Colors	Advarilee
Soundcard Input: Microphone (USB Audio CODEC ) Output: Speakers (USB Audio CODEC ) Save Directory Location: C:/Users/slharte/AppData/Local/WSJT-X/save AzEl Directory Location: C:/Users/slharte/AppData/Local/WSJT-X	<ul> <li>Mono ▼</li> <li>Mono ▼</li> <li>Select</li> </ul>	▲dd         TNX 73 GL         TNX 73 PSE QSL         73 QSL DIR BUR         73 FROM OR USA         N7TNP 73 LOTW	Delete
Remember power settings by band			
	OK Cancel	ОК	Cancel

### WSJT-X Settings

Settings	? ×	< 🤇	Settings				?	×
General     Radio     Audio     Tx Macros     Reporting     Frequence       Logging       ✓     Prompt me to log QSO     Op Call:       ☐     Convert mode to RTTY			al <u>R</u> adio JT65 VHF/L Random er Aggressive	Audio Tx Mac UHF/Microwave deco rasure patterns: 6 e decoding level: 0 ass decoding	ding parameters	Frequencies     Color       Miscellaneous     Degrade S/N of .wav fil       Receiver bandwidth:     Tx delay:       x 2 Tone Spacing     x 4 Tone Spacing	s Advanced	
UDP Server: 127.0.0.1 Accept UDP red UDP Server port number: 2237								
Enable logged contact ADIF broadcast     N1MM Server name or IP address: 127.0.0.1     N1MM Server port number: 2333								
	OK Cancel					(	ж с	ancel

### FT8 On The Go

- I use remote desktop applications to work FT8 away from the shack.
  - Chrome Remote Desktop
- Things to think about before remote hamming
  - Good Antenna System
  - Good Internet Connection
  - Security

# Things I need buy to enhance my remote station

- Computer readable SWR meter
- Remote capable antenna switch