Getting Started with FT8

Written by *Timothy Adams, N6DLC* – eMail: tim@wnbnet.net on Jan 1, 2021

FT8 is an Amateur Radio digital mode that has become very popular in the last few years. It is primarily used on the HF bands although it can be used on any band were data transmission is allowed.

To use FT8 you need four things:

- 1. HF transceiver with SSB capability
- 2. Some kind of sound card audio interface. Modern radios such as the IC-7300 or FT991a have this built in via a USB connection, along with a radio control interface. For older radios there are devices like the Tigertronics SignaLink USB. (link here)
- 3. A computer capable of running the **FT8** software along with "Time Synchronization" (<u>link here</u>) software
- 4. The popular (and free) WSJT-X **FT8** software (<u>link here</u>)

Step number one:

Download and install the time synchronization software. (link here)

This is important due to the way that FT8 processes messages. With **FT8**, you are restricted to very small messages, with a limit of 13 characters per message. Each message of up to 13 characters takes 13 seconds to send. There are 4 slots per minute, and you transmit for one 15 second block, then listen for replies for 15 seconds, and transmit again for 15 seconds. Due to this, timing is very important. Errors of one second or more begin to degrade signal to noise ratio and your results will suffer. This software constantly adjusts your PC clock.

Step number two:

Download and install the digital mode application "WSJT-X" (link here).

This program does all the work needed to operate your radio in several different digital modes, but we will be focusing primarily on FT8 for now.

Step number three:

Start up the WSJT-X program.

Now we need to setup a few configuration parameters. These will vary on each computer depending on your setup. You will need to know:

- 1. What serial port is used to send commands to your radio (such as "COM2").
- 2. What that port baud rate is set to on your radio.
- 3. The name of the audio device to send and receive audio from your radio. This will look something like "Microphone (2-USB Audio Codec)" used for audio from the radio to the computer or "Speakers (2-USB Audio Codec)" used to send audio to the radio.

Setting up the WSJT-X settings:

On the program menu, go to "File->Settings". The settings window will open.

It will look like:

Settings	?	×							
General Radio Audio Tx Macros Reporting Frequencies Colors	Advanced								
Station Details									
My Call: N6DLC My Grid: DM14BC AutoGrid IARU Region:	Region 2 🗸								
Message generation for type 2 compound callsign holders: Full call in Tx3	~								
Display									
Start new period decodes at top	ont								
Blank line between decoding periods	Text Font								
Display distance in miles									
Tx messages to Rx frequency window									
Show DXCC, grid, and worked-before status Show principal prefix instead of c	country name								
Behavior		5							
Monitor off at startup Enable VHF/UHF/Microwave features									
Monitor returns to last used frequency 🛛 Allow Tx frequency changes while tran	smitting								
Double-click on call sets Tx enable									
Disable Tx after sending 73 Decode after EME delay									
☑ Calling CQ forces Call 1st									
Alternate F1-F6 bindings Tx watchdog: 6	i minutes 😫								
CW ID after 73 Periodic CW ID Inte	erval: 0 韋								
OK	Cancel								

In the "Station Details" box fill in "My Call" with your call sign. Fill in "My Grid" with your grid square (you can find this in your QRZ.com profile if you do not know it). In the USA we are all in IARU Region 2 so use the pulldown menu to set that. Other than that, be sure all the check boxes that are checked above are set.

Next, click on the tab at the top that is labeled "Radio".

It will now look like:

Settings	? ×					
General Radio Audio Tx Macros Rej	porting Frequencies Colors Advanced					
Rig: Icom IC-7300	✓ Poll Interval: 2 s ♀					
CAT Control	PTT Method					
Serial Port: COM4 ~						
Serial Port Parameters	● CAT ○ RTS					
Baud Rate: 115200 \checkmark	Port: COM1 ~					
Data Bits Default	Transmit Audio Source					
Stop Bits Default One O Two	Mode None USB Data/Pkt					
Handshake Default None XON/XOFF Hardware	Split Operation None Rig Fake It					
Force Control Lines DTR: V RTS: V	Test CAT Test PTT					
	OK Cancel					

Set "Rig" to the model of your radio. Here is where you need to know your "Serial Port". If for some reason you do not know which one it is, pick one. Set the "Baud Rate" to the rate you setup on your radio for CAT commands. For the most part the rest of the options can be set as shown. You can now click on the "Test CAT" button. If it turns green, all is set correctly. If it turns red, you may have the "Serial Port" or the "Baud Rate" options set incorrectly. Check your radio for the baud rate it is set for and if that is correct, try another "Serial Port" until you find the one that works.

Next, click on the tab at the top labeled "Audio".

It will look like:

Settings					?	×			
General Radio Audio	Tx Macros	Reporting	Frequencies	Colors	Advanced				
Soundcard									
Input: Microphone (2- USB Audio CODEC) $\scriptstyle\checkmark$ Mono $\scriptstyle\checkmark$									
Output: Speakers (2-USB A	Output: Speakers (2- USB Audio CODEC) $\scriptstyle \checkmark$ Mono $\scriptstyle \checkmark$								
Save Directory									
Location: C:/Users/tim/AppDa	ata/Local/WSJT	-X/save			Select				
AzEl Directory									
Location: C:/Users/tim/AppDa	ata/Local/WSJT	-X			Select				
Remember power settings by	band								
Transmit		🗹 Tune	:						
				ОК	Cancel				

Set the "Input" and "Output" sound devices similar as shown above. You may change the directories but really do not need to do so. Leave the "Remember power settings by band" checkboxes checked as shown above. By "power settings" it is referring to the "Pwr" slider on the lower right side of the main screen which controls your audio output level.

Ignore the Tx Macros tab for now. Click on the Reporting tab as below:

Settings					?	2		
General Radio Audio	Tx Macros	Reporting	Frequencies	Colors	Advanced			
Logging								
Prompt me to log QSO			Op Call:]		
Log automatically (contesting only)								
Convert mode to RTTY								
dB reports to comments								
Clear DX call and grid at	fter logging							
Network Services								
Enable PSK Reporter Sp	ootting							
UDP Server								
UDP Server:	127.0.0.1		Accept UDP requ	ests				
UDP Server port number:	2237	÷	Notify on accepte	ed UDP requ	iest			
			Accepted UDP re	quest restor	res window			
Secondary UDP Server (dep	precated)							
Enable logged contact	ADIF broadcast							
Server name or IP address	127.0.0.1]		
Server port number: 2333								
				OK	Cance	4		

Check the Logging box "Prompt me to log QSO" as shown above. Also check the "Enable PSK Reporter Spotting" box. This is not absolutely required but allows the program to send all callsigns it hears to the "pskreporter.info" web site which helps all hams see where their own radio signal is being heard around the world. Leave the rest of the settings as they are for now.

The "Frequencies" tab controls where on the bands to go for FT8 and other digital modes.

General F	Seneral Radio Audio Tx Macros Reporting Frequencies Colors Advan							
Frequency (Calibration							
Slope:	0.0000 ppm 🚔 1	intercept:	0.00 Hz 🖨					
Working Fre	quencies							
IARU Reg	ion Mode		F	requency			^	
All	WSPR			0.13	6 000 MHz (2190m)		
All	JT65			0.13	6 130 MHz (2190m)		
All	ЭТ9			0.13	6 130 MHz (2190m)		
Region	1 FreqCal		0.198 000 MHz (OOB)					
All	JT65		0.474 200 MHz (630m)					
All	9ТС		0.474 200 MHz (630m)					
All	WSPR		0.474 200 MHz (630m)					
Station Info	rmation							
Band	Offset		Ante	nna Description				
20m	0.000 000 MHz	Cushcraft R5	vertical					

The defaults are fine, we do not need to change anything there for now. Because FT8 is a very narrow-band mode, there are well established center frequencies on each band where you will find other operators. So, the defaults are the ideal starting point.

Settings		?	×					
General Radio Audio Tx Macros Reporting Frequencies	Colors	Advanced						
Decode Highlightling								
✓ My Call in message [f/g unset]		^						
New Continent [f/g unset]								
New Continent on Band [1/g unset]								
New CO Zone on Band [f/g unset]								
New ITH Zone [f/g unset]								
New ITU Zone on Band [f/g unset]								
New DXCC [f/g unset]								
☑ New DXCC on Band [f/g unset]								
New Grid [f/g unset]								
New Grid on Band [f/g unset]								
Now Coll [f/g uncot]		×						
Reset Highlighting								
Highlight by Mode	Reso	an ADIE Log						
Only grid Helds sought								
Include extra WAE entities								
Logbook of the World User Validation								
-								
intps://idw.antorg/iotw-user-activity.csv	Users CSV Tile URL: nttps://iotw.arri.org/iotw-user-activity.csv Fetch Now							
Age of last upload less than: 365 days		-						
	OK	Cance	I					

Use this list to choose which type of calls you are interesting in highlighting on the main screen as you receive them. It is not necessary to change things here right away but you may want to after you use the program for a while.

No changes need to be made to the "Advanced" tab, just leave the defaults.

Click the "OK" button and we're done with the "Settings" screen.

This shows the main program screen, where all the action happens. To receive FT8 use the "Mode" selection from the menu. The window on the left side will show all the calls you can hear. The window on the right side shows all the calls for the slice of receive bandwidth you have "selected".

The white area at the top of the left window shows all the call messages. The blue lines are people calling CQ. The green lines are people calling CQ who have already been worked. The red lines are people calling CQ who are on a new Continent. These colors are configured in the "Colors" panel in the "Settings" menu.

۰	WSJT-X	/2.2.2 b	oy K1JT, G	4WJS, and	K9AN													_		×
File	Configur	ations	View M	lode Dec	ode S	ave Tools	Help													
					Band A	tivity										Rx Frequency				
	UTC	dB	DT	Freq	Ν	lessage					UTC	dB	DT	Freq		Message				
1	91000	-17	0 1	1917	a. 16	6T N2OF	D 73		0.0.22	^	184730	_5	-0.1	2039	<i>a</i> :	VE8CK W6VI7 P	-11			^
	91000	-20	0.1	585	~ 14	K5L0 K4	YT BB7	3			184745	-6	0 1	2035	~	KISDYC KEODC	DM79			
1	91000	-20	0.1	2337	~ 8	V9BMG W	D5K -1	.6			184800	-1	-0.1	2039	~	VE8CK W6YLZ R	-11			
1	91000	-6	0.0	918	~ 8	VOLS KE	7ZTI C	N88			184830	-5	-0.1	2038	~	VE8CK W6YLZ R	-11			
1	91000	-15	0.1	972	~ 9	A3ST W4	XCO EN	180			184845	-4	0.1	2044	~	KI5DYC KE0DC	DM79			
1	91000	-22	0.1	2302	~ E	GCMU W9	KIM EN	159			184900	-6	-0.1	2041	~	VE8CK W6YLZ R	-11			
1	91000	-14	0.7	1602	~ 14	B5BHS W	6PNG -	03			184915	-3	0.1	2044	~	KI5DYC KE0DC	DM79			
	91000	-18	0.2	1065	~ 2	SIXA KO	40 K-J	.8	TL C D	_	184930	-3	-0.1	2039	ĩ	VESCK WOYLZ /	3			
	91015	-4	0.1	917	~ 0	O K7VIC	112 Dr 0128	104	U.S.A.		185030	-4	0.1	2044	~	WIFBV KISDIC	RBR			
1	91015	-9	0.1	1900	~ c	O K47BF	EM65		U.S.A.		185100	-6	0.0	2044	~	W1FBV KI5DYC	RRR			
1	91030	-13	0.1	2337	~ 0	Q DX WI	5K EM1	.2	U.S.A.		190145	-4	-0.1	2039	~	<> W6YLZ D	M04			
1	91030	-13	0.1	1817	~ 0	Q N2OHF	EM60		U.S.A.		190215	-4	-0.1	2040	~	<> W6YLZ D	M04			
1	91030	-24	0.1	585	~ 0	Q K4YT	FM19		U.S.A.		190245	-4	-0.1	2039	~	<> W6YLZ D	M04			
1	91030	-24	0.1	2257	~ 0	Q I4JEI) JN54		EU		190315	-5	-0.1	2040	~	<> W6YLZ D	M04			
1	91045	-4	-0.1	2039	~ 9	Q DX W6	YLZ DM	104	U.S.A.		190330	2	-0.1	2044	~	SX1AFM WF0GM	DM79			
1	91045	-17	-1.2	1142	~ 0	Q WE9I	EN/1		U.S.A.		190345	0	0.2	2047	~	OX3LX WB5TZN	EM53			
	91045	-24	0.1	1420	~ 0	Q K42BE	CM79		Conodo		190345	-3	-0.1	2039	2	<> WOILZ D	M04			
1	91100	-14	0.7	1602	~ 0	O W6PNG	DM13		U.S.A.		190430	-4	0.1	2035	~	SX1AFM WF0GM	DM79			
1	91100	-3	0.1	2121	~ c	O K3ZK	FN21		U.S.A.		190445	-4	-0.1	2039	~	<> W6YLZ D	M04			
1	91100	-10	0.1	1817	~ 0	Q N2OHE	EM60		U.S.A.		190500	-2	0.1	2044	~	SX1AFM WF0GM	DM79			
1	91100	-16	0.1	2337	~ 0	Q DX WI	5K EM1	.2	U.S.A.		190515	-2	-0.1	2039	~	<> W6YLZ D	M04			
1	91100	-23	0.2	2256	~ 0	Q I4JEI	JN54		EU		190530	-3	0.1	2044	~	SX1AFM WF0GM	DM79			
1	91100	-21	0.1	584	~ 0	Q K4YT	FM19		U.S.A.		190545	-2	-0.1	2039	~	<> W6YLZ D	M04			
	91115	-16	-1.2	1142	~ 0	Q W6B L	M04 EN71		U.S.A.		190600	_4	-0.1	2044	~	SXIAFM WFUGM	DM/9			
1	91115	-10	-0.1	2039	~ 0	O DX WE	YLZ DM	t0.4	U.S.A.		190645	-9	-0.1	2030	~	< > W6YLZ D	M04			
1	91115	-14	0.5	1936	~ 0	O KC3OI	EM28		U.S.A.		191015	-4	-0.1	2040	~	CO DX W6YLZ D	M04 τ	J.S.	Α.	
1	91130	0	0.1	2122	~ 0	Q K3ZK	FN21		U.S.A.		191045	-4	-0.1	2039	~	CQ DX W6YLZ D	M04 τ	J.S.	Α.	
1	91130	-13	0.8	1602	~ 0	Q W6PNG	DM13		U.S.A.		191100	-9	0.1	2039	~	W6YLZ KI5DYC	EM10			
1	91130	-15	0.1	1817	~ 0	Q N2OHE	EM60		U.S.A.		191115	-6	-0.1	2039	~	CQ DX W6YLZ D	M04 t	J.S.	Α.	
1	91130	-21	0.1	584	~ 0	Q K4YT	FM19		U.S.A.	~	191130	-5	0.1	2039	~	W6YLZ KI5DYC	EM10			~
\checkmark	CQ only	L	.og QSO		S	юр	Moi	hitor		Erase	Decod	e		Enable Ty	¢	Halt Tx	Т	une	2] Menus
20	Ìm	~	<u>s</u>			14	074 0	n			Tx even/1st			-						Pwr
20	an		<u> </u>			14	074 00	00			Tx 1000 Hz	€ ⊻	Hold Tx	Freq >		Generate Std Msgs		Next	Now	
	Г				DX Ca	I			DX Grid		A	,		2	W	A2TOP N6DLC DM14		0 [Tx 1	
	-80				WA2TC	P			EL29		Rx 2043 Hz	\$		3	W	A2TOP N6DLC -15		0	Tx 2] -
	-60					Az:	97 1382	mi			Report -15	-			W	A2TOP N6DLC R-15		0 [Tx 3	
	-40				Looku	0			Add		🗹 Auto Seq		Call 1st		W	A2TOP N6DLC RR73		0 [Tx 4	
	-20					202	0 Sep	15							W	A2TOP N6DLC 73	\sim	0	Tx 5	1
6	4 dB					1	9:11:4	3							C	N6DLC DM14		•	Tx 6	-
	-																			- 1
	Recei	ving		FT8				13											13/15	WD:6m

On the bottom left is a vertical green bar. This bar shows your receive audio level. This should be around the 50db mark, or about centered. The easiest way to adjust this is the audio control panel on your computer.



The example above is set a little too high. Below is an example of the Windows Audio control panel. You can find it by going to your Windows control panel and selecting the one labeled "Sound". Find your radio audio device in the "Recording" tab and adjust the level while watching the green bar on WSJT-X.



Your transmit audio level should be set around the 50 percent point using the "Sound" control panel as shown below. Click on the "Properties" button, then the "Levels" tab and set the slider to 50 percent.

🎯 Sound						×		
Playback	Recording	Sounds	Communic	ations				
Select a	playback de	evice belo	w to modi	fy its settings:				
	Speake 2- USB Ready	ers Audio C(DDEC			^		
Q	Speakers 2- USB Audio Device Default Communications Device							
	Heads BH-M2 Discon	Headset BH-M20 Hands-Free AG Audio Disconnected						
	Headp BH-M2 Discon	Headphones BH-M20 Stereo Disconnected						
	DELL U NVIDIA Defaul	3011 High De t Device	finition Au	dio		~		
Confi	gure		S	et Default 🛛 🔻	Properties	5		
			ОК	Cancel	Appl	y.		

Once that is set correctly then you will be controlling your transmit audio with the "Pwr" slider on the lower right side of the main WSJT-X windows.

P۱	wr
	-
	-
	-
	-
	-
	-
	-
	-
	-
	-

Set your radio output power via your radio controls to whatever power level you wish to use. 25 watts is a good starting point. Be sure that you have your antenna tuner set for the band you are on and it is tuned for the band you are using. I recommend 20 or 40 meters to start as they are busy bands. Set the meter on your radio to read ALC. Click the "Tune" button on the WSJT-X program and using the "Pwr" slider adjust your radio for minimum to zero ALC. It helps to have a RF power meter while adjusting this, you may need to bump it up just a little to get to the correct power level depending on your radio.

Once this is done you are ready to operate. You should be seeing messages scrolling past on the left window of the WSJT-X program.

That is all for now! Operating FT8 will be a topic for a future document.

73 and have fun!

Tim N6DLC



Be sure to visit <u>Gotahams.com</u> for more fun educational topics!