

FT8 DIGITAL MODE – INFORMATION & OPERATING TIPS

1. FT8 was created by Steve Franke (K9AN) and Joe Taylor (K1JT) – released June, 2017
2. Uses **8** audio tones that are Frequency Shifted Keyed (FSK) within 50 Hz of audio bandwidth
3. FT8 is the latest addition to the **WSJT-X** suite of 9 weak signal modes for HF use
4. FT8 was derived from JT-65 - originally developed for moon-bounce (EME) VHF/UHF QSO's
5. JT-65 later became a very popular HF weak-signal mode
6. FT8 decodes every signal within the receiver's audio passband (200 Hz up to 3500 Hz)
7. It's possible in theory to have 60+ simultaneous QSO's occurring within the audio passband
8. Uses Forward Error Correction (FEC) to assure accurate decoding, no gibberish in decoding
9. Each FT8 transmission is contained within a 15 second window of time
10. FT8 is 4x faster than the older JT-65 HF program
11. FT8 QSO's can be successful with very weak signals – even when no audio is being heard
12. FT8 is an excellent mode for DX'ing – even when bands are in poor shape
13. FT8 uses a dedicated frequency in each of the HF bands 160-6 meters (except for 60 meters)
14. FT8 works great with low power – 10-25 watts is usually sufficient
15. FT8 software (part of WSJT-X software suite) is free – and it's a lot of fun!
16. FT8 software is available for Windows, Linux (including Raspbian) and Mac (OS/X)
17. The FT8 main screen has two sections: Waterfall & Operation
18. **JT Alert** is a very useful add-on free program that works in conjunction with FT8
19. While you can log within FT8, JT Alert enables the use of external logging programs such as:
 - a. Ham Radio Deluxe
 - b. DXKeeper (DX Labs)
 - c. ACLog
 - d. Log4OM
 - e. MixW
20. JT Alert will show the other station's State, Country, QSL method (LOTW, eQSL), and if calling CQ (Green shading). It also tells you if the other station has been worked B4.
21. Your computer clock needs to be very accurate – within +/- 2 seconds of UTC time
22. Sync your computer clock over the internet with a free program such as:
 - a. Dimension-4
 - b. NetTime
 - c. Atomic Clock Sync
23. If operating without an internet connection (such as a portable operation), you can connect a small USB GPS receiver to your laptop for UTC time sync.

INTERFACING:

- 1) If you're already interfaced for another digital mode such as PSK31, JT-65, RTTY, etc., then you should in theory be all set to use FT8, just install and configure the FT8 and JT Alert software.
- 2) The quality of the sound card used in interfacing is important for accurate decoding.

- 3) Its most helpful to use rig control software such as:
 - a. Ham Radio Deluxe (HRD) – free & paid (\$99) versions
 - b. DX Labs (free suite of programs)
 - c. Fldigi
 - d. TRX-Manager
- 4) Several choices exist for a commercial interface hardware such as these examples:
 - a. Signalink
 - b. Rigblaster
 - c. microHAM
 - d. Timewave
 - e. Yaesu digital interface
- 5) Direct connect from computer to rig is possible (USB or Serial cable) for some rigs:
 - a. Yaesu FT-991 (USB cable)
 - b. Yaesu FTdx5000 (serial cable)
 - c. Icom 7300 (allegedly reported to be possible?)
 - d. Research Your SPECIFIC HF Transceiver for potential direct connect possibility
- 6) Primary Interface signals:
 - a. Audio coming out of Receiver
 - b. Audio going to Transmitter
 - c. PTT – Push-Io-Talk (transmitter keying)
 - d. CAT (Computerized Radio Control) – controls your rig:
 - i. Selects the rig's band, frequency, mode
 - ii. Sets split operation (if you have 2 VFO's – many HF rigs do)

OPERATION TIPS

- 1) Check that your computer clock is accurately sync'ed to UTC time before starting up FT8
- 2) Set transmit power appropriately (10-25 watts) - usually works well with a decent antenna
- 3) FT8 is full key-down, consider your transmitter limits (usually 50% of max power output)
- 4) Do not overdrive transmitter or audio, check that your ALC level is within limits
- 5) Set HF rig to **USB** – or **Digital mode** (dependent on your specific transceiver model)
- 6) Open receiver audio passband (USB filter) as wide as possible – 3500 Hz possible for some rigs
- 7) The FT8 software will put your rig into SPLIT mode (no operator setting needed) – if you have two VFO's – if not, then FT8 software can be configured to “fake it” for a using a single VFO.
- 8) FT8 will automatically set the rig's frequency depending on the band chosen in the FT8 software
- 9) Turn off the transceiver **AGC**
- 10) Turn off the transceiver **Noise Blanker** and/or **Noise Reduction**
- 11) Turn off transceiver **Compression**
- 12) Turn down the receiver **RF gain** so that gain signal display in the FT8 software is Green, not Red. (too high receiver gain swamps the decoding process). You read signal strength in the software.
- 13) Click on **Monitor** mode in FT8 screen to start decoding FT8 signals

- 14) Once you double click on a CQ'ing station's callsign, the software will move the decoding audio frequency to that of the sending station and you will see specific decoding only for that audio frequency in the right-hand **RX FREQUENCY** window. This also moves your transmit frequency to the same Receive frequency. See the next item below for operation in SPLIT mode.
- 15) Consider moving your transmit audio frequency (RED Icon at top of waterfall) to an open slot in the waterfall to reduce the chances of QRM (use Shift F11 or Shift F12). Yes, you can keep your Xmit frequency the same as the Receive frequency but if more than one station answers a calling station at the same time on the Receive frequency, QRM results in no decoding at the calling station. Operating split is especially smart for successful DX station contacts.
- 16) Click on **ENABLE Tx** and the software will automatically start responding to the calling station in the correct time sequence. If the CQ station answers, then all subsequent messaging happens automatically, just sit back and watch the action. The QSO automatically ends upon sending 73.
- 17) The program will prompt you to log the QSO once you send your 73 macro text. The **Enable Tx** Red icon will also turn off indicating that the QSO has been completed.
- 18) If you transmit more than approximately 25 times (i.e. CQ'ing) without another station answering, the program will automatically trigger a "watchdog" and inhibit further transmissions until you re-set the **ENABLE Tx**
- 19) Click in the box "**Tx Even/1st**" before starting to send CQ – this puts you at top of the minute and at :30 seconds for your transmissions, the other station will then transmit at :15 and :45
- 20) Your antenna is more important than trying to run a lot of power with FT8. However, magnetic loops, TAK-Tenna, and other low-profile antennas will work FT8 successfully in HOA locations.
- 21) Stations running high power will bleed over adjacent stations in the decoding at the receiving station and high-power stations run the risk of not hearing responding low power stations.

MACROS AND TEXTING

- 1) The default macros in FT8 for sending messages will be sufficient for almost all QSO's.
- 2) However, you can add custom macros within the settings of the FT8 program and/or with the JT Alert program – just to be a bit more "conversational" if you wish after the standard exchange.
- 3) You can also send 128-character Text messages from the JT Alert program to an individual station (if they are also using JT Alert) – use the F5 key and then click on their callsign (see the Help info within the JT Alert program for more details). This goes over the internet.

HELPFUL ADDITIONAL PROGRAMS and TIPS

- 1) **PSK REPORTER** – an Internet based program will show you where your signal is being received
- 2) An internet based **Grid Locator Map** is helpful to show you where the other station is located (see link in *Resources*)
- 3) Having two computer monitors running on your FT8 computer to use the above programs along with the FT8 program will make operating much more user friendly and fun. The option would be to have a second computer running nearby.

MISCELLANIOUS

- 1) The ARRL sponsored 2018 year-long “**International Grid Chase**” will be perfect for the FT8 mode since grid square numbers are a normal part of the FT8 exchange.
- 2) The Bouvet Island January 2018 DXpedition will be using FT8 as one of their modes of operation – this is the most isolated island in the world and the 2nd most wanted world DX entity.
- 3) Consider trying **WSPR**, another weak-signal mode of the WSJT-X suite of programs. It’s a beacon mode transmitting 20% of the time, listening 80% of the time – it’s fun to see where your signal is being seen around the world and helps others to know about current propagation

RESOURCES:

- **QST MAGAZINE**, October and November 2017 Issues – a two-part article on the WSJT-X digital suite of weak-signal software programs
- **WSJT-X**: <https://physics.princeton.edu/pulsar/k1jt/wsjitx.html>
- **JT-ALERT**: <http://hamapps.com>
- **Facebook** Users Group: – a very active group with plenty of operational tips and suggestions: <https://www.facebook.com/groups/FT8.Digital.Mode/permalink/216036652255969/>
- **Yahoo** Users Group: A new FT8 users group recently started on Yahoo Groups
- **Google** Users Group: <https://groups.io/g/FT8-Digital-Mode>
- **QRZ Forums** – occasional postings about FT8
- **PSK Reporter**: <https://pskreporter.info/pskmap.html>
- **Grid Locator Map**: http://www.levinecentral.com/ham/grid_square.php
- **WSPR Net**: <http://wspnet.org/drupal/wspnet/map>
- **Bouvet Island DXpedition**: <http://www.bouvetdx.org/>
- **2018 ARRL International Grid Chase**: <http://www.arrl.org/international-grid-chase-2018>

NOTE: While the details provided here may seem to make FT8 seem overly complex, it is not and once you get FT8 successfully running, you will likely find it to be a fun mode and easy to work DX even in poor propagation conditions. It is not conversational like PSK31 or RTTY but does afford the opportunity to make a lot of NA and DX HF contacts in the current solar cycle of minimal sunspots without needing high power or elaborate HF antennas.

This document is meant to assist one to getting started in FT8 however studying the online manuals for WSJT-X, JT Alert, your interface hardware/software, and various User Groups is important for successful implementation and full operational use of the FT8 mode. The author takes no responsibility for any errors or omissions.