



A quick guide to get started Alex KD2FTA

The Radio Frequency World of PASS BAND Modulation

Analog modulation

AM FM PM QAM SM SSB

Digital modulation

ASK APSK CPM **FSK** MFSK MSK OOK PPM
PSK QAM SC-FDE TCM WDM

Hierarchical modulation

QAM WDM

Spread spectrum

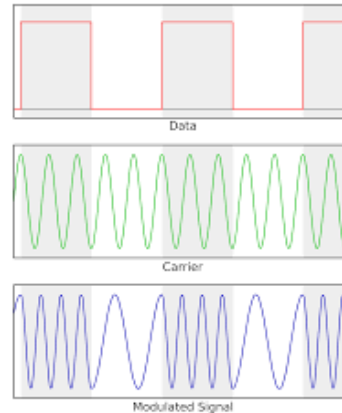
CSS DSSS FHSS THSS

A Very Very Quick History of Digital Modes

- The first digital mode was..... CW –Morse code
 - A form of ASK or amplitude shift keying!
- From the ARRL web site - “Amateur digital communication began in earnest in the late 1940's”
- Hams worked out techniques of connecting mechanical Teletype keyboard/printers to amateur gear using FSK and AFSK modulation.
- FSK= Frequency Shift Keying
- AFSK = Audio Frequency Shift Keying

Definitions of FSK & AFSK

- FSK is a frequency modulation scheme in which digital information is transmitted through discrete frequency changes of a carrier signal



- AFSK is a modulation technique by which digital data is represented by changes in *the* frequency (pitch) of an audio tone, yielding an encoded signal suitable for transmission via radio or telephone.

SO What is FT8?

- **FT8** stands for “Franke-Taylor design, 8-FSK modulation” and was created by Joe Taylor, K1JT and Steve Franke, K9AN. It is described as being designed for “multi-hop Es where signals may be weak and fading, openings may be short, and you want fast completion of reliable, confirmable QSO's” There many other FSK modes, like BFSK (binary FSK) utilizing other modulation techniques to pass information digitally”
- The rest of this presentation is going to focus on just FT8

What do you need to get started?

- Hardware

- A Transceiver that will accept computer aided interfaces
- A radio to computer interface (Many of the newer high end rigs already have these built in)



- A computer or laptop with a couple of USB ports (one for a mouse, and one for the radio interface)
- Audio cables, USB cable, and a remote speaker or headphones to hear the melodic “tones” of FT8



What do you need to get started cont.?

- Software - you have two excellent software programs that are made for FT8, which you can download for free
- *WSJT-X* implements communication protocols or "modes" called **FT4**, **FT8**, **JT4**, **JT9**, **JT65**, **QRA64**, **ISCAT**, **MSK144**, and **WSPR**, as well as one called **Echo** for detecting and measuring your own radio signals reflected from the Moon. These modes were all designed for making reliable, confirmed QSOs under extreme weak-signal conditions.
- WSJT-X <https://physics.princeton.edu/pulsar/k1jt/wsjtx.html>
- JTDX- Derivative software based on WSJT-X <https://www.jtdx.tech/en/>

Configuration

- Once you have connected your laptop, radio interface, and radio and done all the manual checks to ensure everything is working, you'll need to configure the software to your setup
- Both software packages walk you through a configuration process, and JTDX being a derivative of WSJT-X will have a very similar configuration process

Configuration con't.

The 'Settings' dialog box, General tab, is shown. It has a title bar with a question mark and a close button. The tabs are General, Radio, Audio, Tx Macros, Reporting, Frequencies, Colors, and Advanced. The General tab is active.

Station Details

My Call: My Grid: ☐ AutoGrid IARU Region:

Message generation for type 2 compound callsign holders:

Display

☐ Start new period decodes at top

☐ Blank line between decoding periods

☒ Display distance in miles

☒ Tx messages to Rx frequency window

☐ Show DXCC, grid, and worked-before status ☐ Show principal prefix instead of country name

Behavior

☐ Monitor off at startup ☐ Enable VHF/UHF/Microwave features

☐ Monitor returns to last used frequency ☒ Allow Tx frequency changes while transmitting

☐ Double-click on call sets Tx enable ☒ Single decode

☒ Disable Tx after sending 73 ☒ Decode after EME delay

☒ Calling CQ forces Call 1st

☒ Alternate F1-F6 bindings

☐ CW ID after 73

Tx watchdog:

Periodic CW ID Interval:

The 'Settings' dialog box, Radio tab, is shown. It has a title bar with a question mark and a close button. The tabs are General, Radio, Audio, Tx Macros, Reporting, Frequencies, Colors, and Advanced. The Radio tab is active.

Rig: Poll Interval:

ADAT www.adat.ch ADT-200A
AE9RB Si570 Peaberry V1
AE9RB Si570 Peaberry V2
Alinco DX-77
AmQRP DDS-60
AMSAT-UK FUNcube Dongle
AMSAT-UK FUNcube Dongle Pro+
AOR AR2700
AOR AR3000A

Data Bits

☒ Default ☐ Seven ☐ Eight

Stop Bits

☒ Default ☐ One ☐ Two

Handshake

☒ Default ☐ None
☐ XON/XOFF ☐ Hardware

Force Control Lines

DTR: RTS:

☐ Rear/Data ☒ Front/Mic

Mode

☒ None ☐ USB ☐ Data/Pkt

Split Operation

☒ None ☐ Rig ☐ Fake It

Configuration con't.

Settings

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

Rig: None Poll Interval: 1 s

CAT Control

Serial Port: USB

Serial Port Parameters

Baud Rate: 4800

Data Bits

☒ Default ☐ Seven ☐ Eight

Stop Bits

☒ Default ☐ One ☐ Two

Handshake

☒ Default ☐ 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

Soundcard

Input: Microphone (RIGblaster Advantage Audio) Mono

Output: Speakers (RIGblaster Advantage Audio) Mono

Save Directory

Location: C:/Users/Andrew/AppData/Local/WSJT-X/save Select

AzEl Directory

Location: C:/Users/Andrew/AppData/Local/WSJT-X Select

Remember power settings by band

☐ Transmit ☐ Tune

OK Cancel

Configuration con't.

The 'Settings' dialog box is shown with the 'Reporting' tab selected. The 'Logging' section has the following options:

- ☒ Prompt me to log QSO (Op Call:)
- ☐ Log automatically (contesting only)
- ☐ Convert mode to RTTY
- ☐ dB reports to comments
- ☐ Clear DX call and grid after logging

The 'Network Services' section has:

- ☒ Enable PSK Reporter Spotting

The 'UDP Server' section has:

- UDP Server: ☐ Accept UDP requests
- UDP Server port number: ☐ Notify on accepted UDP request
- ☐ Accepted UDP request restores window

The 'Secondary UDP Server (deprecated)' section has:

- ☐ Enable logged contact ADIF broadcast
- Server name or IP address:
- Server port number:

Buttons: OK, Cancel

The 'Settings' dialog box is shown with the 'Colors' tab selected. The 'Decode Highlighting' section has a list of items with checkboxes and color-coded backgrounds:

- ☒ My Call in message [f/g unset]
- ☒ New Continent [f/g unset]
- ☒ New Continent on Band [f/g unset]
- ☒ New CQ Zone [f/g unset]
- ☒ New CQ Zone on Band [f/g unset]
- ☐ New ITU 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]
- ☐ New Call [f/g unset]
- ☐ New Call on Band [f/g unset]
- ☐ LotW User [b/g unset]

Buttons: Reset Highlighting, Rescan ADIF Log

The 'Logbook of the World User Validation' section has:

- Users CSV file URL:
- Age of last upload less than:

Buttons: OK, Cancel

Band Activity

UTC	dB	DT	Freq	Message
125730	-15	-0.1	879 ~	CQ DA KF5BA EM30
125730	-7	0.1	968 ~	YD3FPI W5GDL EM15
125730	-15	0.2	1373 ~	KOHUR WA3LXD R-11
125730	-7	0.1	1457 ~	W2OSR N9ITB -17
125730	15	0.2	2104 ~	CQ N2BJ EN61
125730	-7	1.5	2449 ~	WA1ZDA KU4VG RR73
125730	-13	0.3	967 ~	YD3FPI N5BSA EM12
125730	-14	0.5	2423 ~	JH5FTY N5DG R-24

Rx Frequency

UTC	dB	DT	Freq	Message
125515	1x		1900 ~	CQ KD2FTA FN21
125530	5	-0.4	1900 ~	CQ K8SIA EN84
125600	3	-0.4	1900 ~	CQ K8SIA EN84
125615	Tx		1900 ~	K8SIA KD2FTA FN21
125630	3	-0.4	1900 ~	KD2FTA K8SIA -06
125645	Tx		1900 ~	K8SIA KD2FTA R+03
125700	2	-0.4	1900 ~	KD2FTA K8SIA RR73
125715	Tx		1900 ~	K8SIA KD2FTA 73

☐ CQ only

Log QSO

Stop

Monitor

Erase

Decode

Enable Tx

Halt Tx

Tune

☒ Menus

40m

7.074 000

DX Call

DX Grid

K8SIA

EN84

Az: 300

455 mi

Lookup

Add

2019 Aug 26
12:57:56☐ Tx even/1st

Tx 1900 Hz

☒ Hold Tx Freq

▲ ▼

Rx 1900 Hz

Report 2

☒ Auto Seq☒ Call 1st

Calling CQ

Answering CQ

CQ

Grid

dB

R+dB

RRR

73

CQ KD2FTA FN21

☒ Gen msg

WRKING?

☐ Free msg

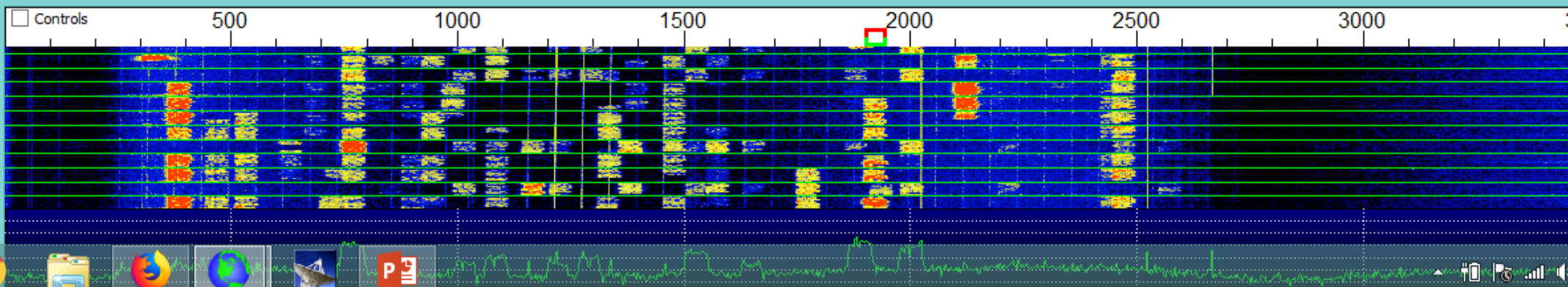
Receiving

FT8

Last Tx: K8SIA KD2FTA 73

11/15 WD:6m

WSJT-X - Wide Graph



JTDX by HF community

v2.0.2-rc139, derivative work based on WSJT-X by K1JT

FileViewModeDecodeSaveAutoSeqDXpeditioMiscHelp

UTC	dB	DT	Freq	Message	Band Activity
124845	-17	0.2	696	~ K1S KG2NV FN20	•U.S.A.
124845	-18	0.2	831	~ YD3TSJ K7ER RR73	•U.S.A.
----- 26.08.19 12:49:14 UTC ----- 20m -----					
124900	-2	0.1	365	~ KOHUR KK4CQN R-24	•U.S.A.
124900	5	-0.4	1900	~ W5MEU K8SIA EN84	•U.S.A.
124900	1	0.3	1694	~ KE0N W4PPC R-07	•U.S.A.
124900	-9	0.1	1137	~ YC8MII KD9LTQ EN52	•U.S.A.
124900	-3	0.1	1426	~ W2OSR KF9KV RR73	•U.S.A.
124900	1	0.1	924	~ CQ N8AWW EN82	•U.S.A.
124900	-12	0.1	2486	~ JH4PBQ W5DXQ EM13	•U.S.A.
124900	-10	0.6	2424	~ JA0BGS N5DG RR73	•U.S.A.
124900	-7	0.1	879	~ CQ DX KF5BA EM50	•U.S.A.
----- 26.08.19 12:49:29 UTC ----- 20m -----					
124915	-5	0.1	2732	~ CQ WQ5L EM50	•U.S.A.
124915	6	0.1	1241	~ KN3B N1RPH -06	•U.S.A.
124915	3	0.1	2078	~ VE3FGU WA1ZDA 73	•U.S.A.
124915	-2	0.5	1506	~ CQ KW4SP EM64	•U.S.A.
124915	-13	0.3	2552	~ CQ KC3OL EM28	•U.S.A.
124915	-6	0.1	993	~ K8SIA W5MEU -06	•U.S.A.
124915	2	-0.1	1552	~ W1LEM WF4W -24	•U.S.A.
124915	-11	0.1	312	~ 4G7RAZ K6BV CM87	•U.S.A.
124915	1	0.1	1958	~ YF0TUR N5WRX RR73	•U.S.A.
124915	-18	0.2	831	~ CQ K7ER DM09	•U.S.A.
124915	-17	0.2	2010	~ W4PPC KE0N RR73	•U.S.A.
124915	-18	0.2	696	~ K1S KG2NV FN20	•U.S.A.

14.074 000

12:49:32

TX 00/30

20m

☐ Spt ☒ Menu

DX Call

DX Grid

Lookup

Add

Tx FT8 ~

Report -15

S meter

Tx 2000 Hz

Tx=Rx

Hound

Rx 2000 Hz

Rx=Tx

AutoTX

☐ Wanted

Tx/Rx Split

AutoSeq2

UTC	dB	DT	Freq	Message	Rx Frequency
124915	-17	0.2	2010	~ W4PPC KE0N RR73	•U.S.A.

Enable Tx

Halt Tx

Log QSO

Erase

Hint

SWL mode

AGCc

Filter

Decode

Clear DX

CQ

☐ RRR

AnsCQ

SkipGrid ☐

CQ

Grid

dB

R+dB

RR73

73

☒ Gen msg

☐ Free msg

TNX 73

Receiving

FT8

WD 6m

2/15

Logd

26 Aug 2019

FT8 11

90+

80

70

60

50

40

30

20

10

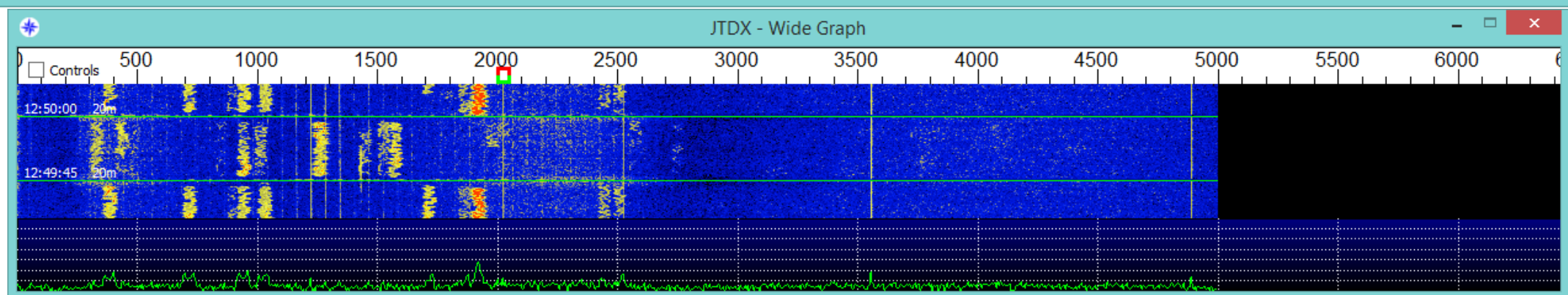
0

63dB

Monitor

Bypass

1 QSO



Next Get on the Air!!!

- You can tune your radio to operate generally 1 to 2 KHz above the standard frequencies used for FT8

	FT8
160m	1.840 MHz
80m	3.573 MHz
60m	5.357 MHz
40m	7.074 MHz
30m	10.136 MHz
20m	14.074 MHz
17m	18.100 MHz
15m	21.074 MHz
12m	24.915 MHz
10m	28.074 MHz
6m	50.313 MHz

Use PSK Reporter

- Use PSK Reporter to check out:
 - Band Conditions
 - Who you're hearing – which countries and regions
 - How well you're being heard in dB's
 - How far your signal is propagating
 - Where the propagation black holes exist!
 - <https://www.pskreporter.info/>

On , show sent/rcvd by using over the last [Display options](#) [Permalink](#)

Monitoring KD2FTA (last heard 2 mins ago). Automatic refresh in 5 minutes. Small markers are the 171 transmitters ([show logbook](#)) heard ([distance chart](#)) at KD2FTA (256 reports, 44 countries last 24 hours; 758 reports, 44 countries last week).

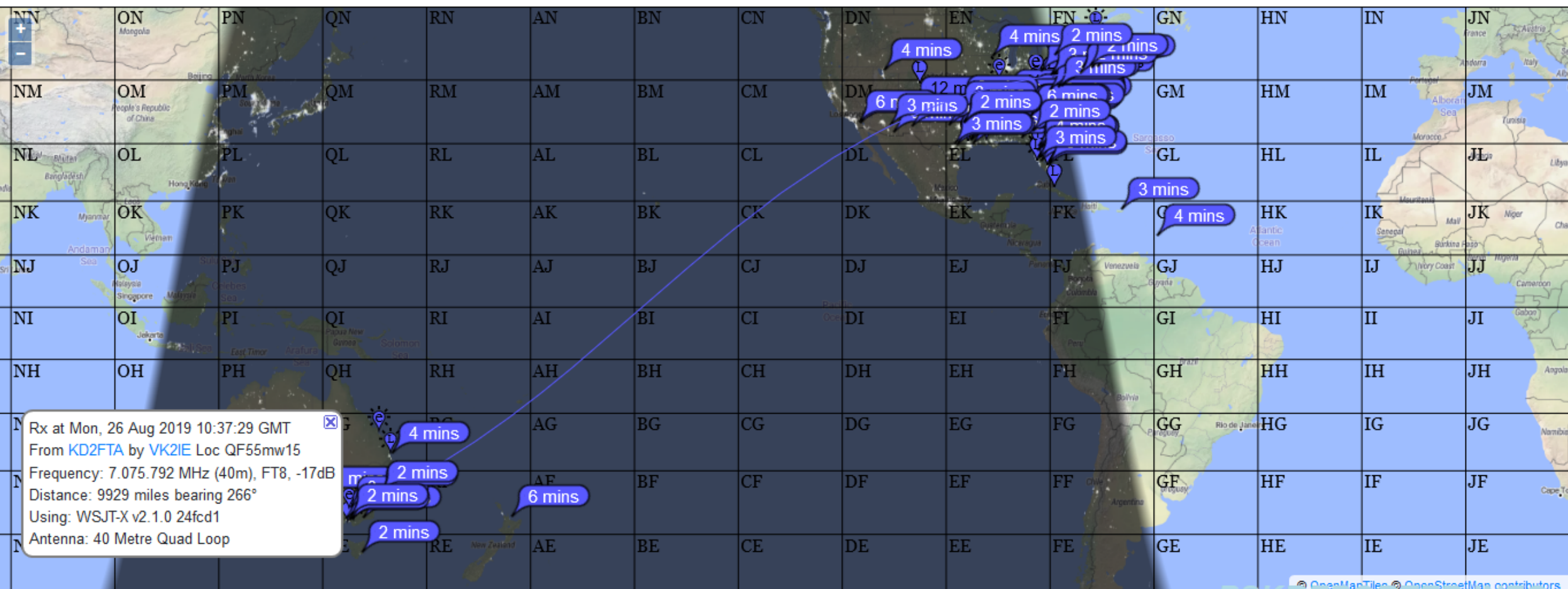
There are 561 active FT8 monitors on 40m. [Show all FT8 on all bands.](#) [Show all on all bands.](#) [Legend](#)



On , show sent/rcvd by using over the last [Display options](#) [Permalink](#)

Monitoring KD2FTA (last heard 2 mins ago). Automatic refresh in 5 minutes. Small markers are the 34 transmitters ([show logbook](#)) heard ([distance chart](#)) at KD2FTA (471 reports, 57 countries last 24 hours; 973 reports, 57 countries last week).

There are [612 active FT8 monitors](#) on 40m. [Show all FT8 on all bands.](#) [Show all on all bands.](#) [Legend](#)



Finally – Have fun make contacts!



For Multiple Web sites with references go here <https://physics.princeton.edu/pulsar/k1jt/refs.html>