

FT-8

What is it?

Required Stuff (by the wife)

- *KT7G Rick Smith (I have ID)*

- *First Licensed 1958*

- *Have been*

- *ZK1 TTG, ZK1 MA, Cook Islands*

- *VP5W, Turks & Caicos*

- *V31TB Belize*

- *K7GDN & Kn7GDN*

What is it

- ***Weak signal communication mode invented by K1JT and friends at Princeton.***
- **Joe Taylor, K1JT; Stan Franke, K9AN and Bill Somerville, G4WJS developed a new mode for WSJT-X, FT8 (Frankie-Taylor design, 8 FSK modulation) released on June 29, 2017**
- ***Who is K1JT?***
 - Joseph Hooton Taylor Jr. is an American astrophysicist and Nobel Prize in Physics laureate for his discovery with Russell Alan Hulse of a "new type of pulsar, a discovery that has opened up new possibilities for the study of gravitation." [Wikipedia](#)

Important characteristics of FT-8

Important characteristics of FT8:

- T/R sequence length: 15 s
- Message length: 75 bits + 12-bit CRC
- FEC code: LDPC(174,87)
- Modulation: 8-FSK, keying rate = tone spacing = 5.86 Hz
- Waveform: Continuous phase, constant envelope
- Occupied bandwidth: 47 Hz
- Synchronization: three 7×7 Costas arrays (start, middle, end of Tx)
- Transmission duration: $79 \times 2048 / 12000 = 13.48$ s
- Decoding threshold: -20 dB (perhaps -24 dB with AP decoding, TBD)
- Operational behavior: similar to HF usage of JT9, JT65
- Multi-decoder: finds and decodes all FT8 signals in passband
- Auto-sequencing after manual start of QSO

Error correcting mode

- The message includes 12 bits of CRC code.
 - Short story; a calculation is done on the message, if the receiving party's calculation does not match, it is rejected.

FEC ; Forward Error Correction; The Result is that if it is not correct, You will not see it.

RTTY is not; Sometimes called " Spray and Pray".

You may see some fiction with RTTY as various callers overlap and cancel each other.

The ones that we care about

- T/r Sequence length = 15 seconds

T/R sequence length = 15 seconds

- ***4 time periods in each minute.***
 - ***You are on 00 & 30***
 - ***Or 15 & 45***
 - ***The program takes care of that, when you call or answer somebody.***

The ones that we care about

- T/r Sequence length = 15 seconds
- **Transmission duration = 13.48 seconds**

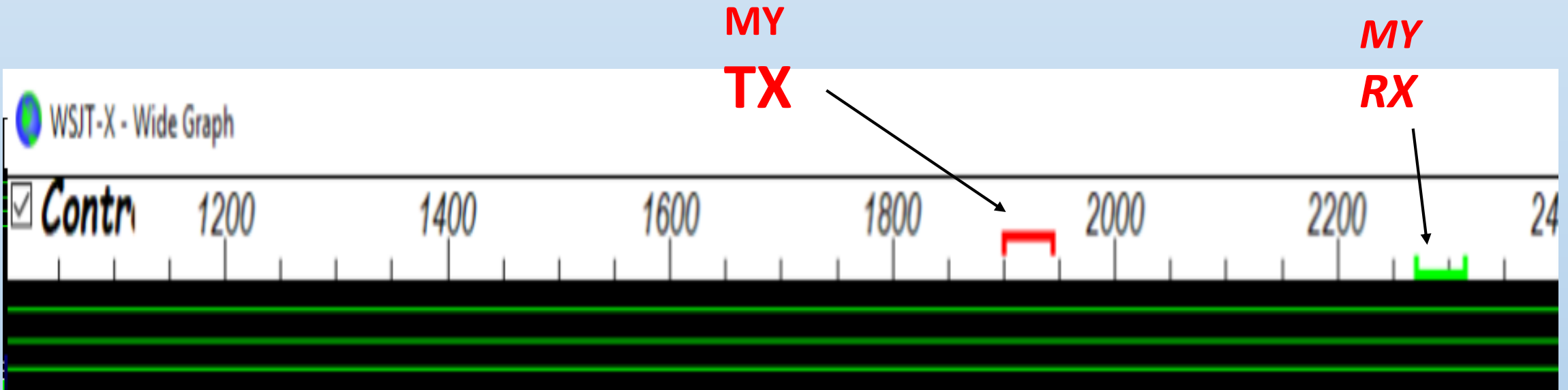
Transmission Duration:=13.48 seconds

- The decoding takes almost 14 of the 15 seconds allowed.
- **Auto sequencing** is important, you can't push the mouse button fast enough to get it the first time.
 - *If you start a time period late, you may not be decoded on anything less than 14 seconds!*

The ones that we care about

- T/r Sequence length = 15 seconds
- Transmission duration = 13.48 seconds
- Occupied bandwidth = 47HZ

BANDWIDTH



Occupied Bandwidth : 47hz

- IF You have picked 1850
 - **SAY YOU USE 1850 to 1897 for your transmission.**
 - *like the guy at 1804, Who is using 1804-1851 ...*
 - **Has the potential to prevent you from getting through.**

150645	-11	0.8	1807	~	CQ	J11RSF	PM96	AS
150704	Tx		1850	~	J11RSF	KT7G	CN85	
150730	Tx		1850	~	J11RSF	KT7G	CN85	
150800	Tx		1850	~	J11RSF	KT7G	CN85	
150830	Tx		1850	~	J11RSF	KT7G	CN85	
150845	-7	0.1	1803	~	CQ	K5DAK	EM34	CQ Zone 4
150900	Tx		1850	~	J11RSF	KT7G	CN85	
150915	-5	0.1	1803	~	CQ	K5DAK	EM34	CQ Zone 4
150930	Tx		1850	~	J11RSF	KT7G	CN85	
150945	-10	0.2	1804	~	CQ	K5DAK	EM34	CQ Zone 4
151000	Tx		1850	~	J11RSF	KT7G	CN85	
151015	-7	0.1	1804	~	CQ	K5DAK	EM34	CQ Zone 4
151030	Tx		1850	~	J11RSF	KT7G	CN85	
151045	-11	0.5	1808	~	KT7G	J11RSF	+06	
151104	Tx		1850	~	J11RSF	KT7G	R-11	

Calling cq on
1807

4 hz away CQ starts

He is 4-6 db louder
than the one I
want to work.....

Nobody Wins

The 4 digit number "Freq" is Hertz, not channels. If someone shows up within 50 of the one you are trying to work, things get difficult. The stronger signal wipes out the weaker one!

					<i>Rx Frequency</i>			
<i>UTC</i>	<i>dB</i>	<i>DT</i>	<i>Frea</i>		<i>Messgae</i>			
132415	-4	0.1	1858	~	CQ	YB4NY	OI16	OC
132445	-5	0.1	1858	~	CQ	YB4NY	OI16	OC
132500	Tx		2600	~	YB4NY	KT7G	CN85	
132530	Tx		2600	~	YB4NY	KT7G	CN85	
132545	8	0.1	1859	~	JA2QXY	AG7TX	DM09	
132600	Tx		2600	~	YB4NY	KT7G	CN85	
132630	Tx		2600	~	YB4NY	KT7G	CN85	
132645	5	0.1	1859	~	JA2QXY	AG7TX	R-02	

What is on the screens?

If your call is in the line, it will display

UTC TIME diff HZ ABOVE MAIN = 14076

160400	Tx		2000	~	CQ	KT7G	CN85
160430	Tx		2000	~	CQ	KT7G	CN85
160500	Tx		2000	~	CQ	KT7G	CN85
160515	-6	-0.1	2001	~	KT7G	YC6JRT	-12
160530	Tx		2000	~	YC6JRT	KT7G	R-06
160545	-6	-0.1	2001	~	KT7G	YC6JRT	RR73
160600	Tx		2000	~	YC6JRT	KT7G	73
160630	Tx		2000	~	CQ	KT7G	CN85
160700	Tx		2000	~	CQ	KT7G	CN85

Typical Contact

Signal strength in db

Time Sync is very important

Specific transmit and receive time intervals

Transmit and receive periods are specific so an accurate computer clock to within at least 1 second is necessary in order to decode FT8.

Most modern computers make use of a time servers. Apple, for example, lets the clock drift a few seconds here and there.

You at least need to set your computer to get NIST. Better yet is to use a time program Meinberg NTP on Windows machines or Dimension 4.

BIG PICTURE

WSJT-X v1.9.0-rc2 by K1JT

20m

211100	5	0.1	1319	~	IKOXB WA6WGS DM03	
211100	-1	0.6	1419	~	HK3J EA2DDE R+09	
211100	-10	0.1	1555	~	CQ DX IKOVSY JN63	~Italy
211100	-8	0.8	1602	~	F4HJN KBOPPO -19	
211100	-22	0.1	1671	~	KOLB K7RL RRR	
211100	-21	-0.3	1737	~	N2TSQ K4QD -03	
211100	-5	0.1	1942	~	KH6JF N3VQH FN10	
211100	-1	0.1	2082	~	IZ7NLM N8HMG -12	
211100	6	0.2	2232	~	CQ EA7JWF IM77	~Spain
211100	-4	0.3	2344	~	CQ IZ4YKT JN54	~Italy
211100	-16	0.1	2405	~	CQ KF2FK FN31	~U. S. A.
211100	-23	0.1	2482	~	NOKV K6BRN DM03	
211100	-3	0.1	1354	~	IKOXB VE2SCA 73	
211100	-11	0.1	2349	~	Z37M VE3QO 73	
211100	-23	0.2	2508	~	CQ NF3R FN20	U. S. A.

THE WHOLE BANDWIDTH WINDOW

CQ only
 Log QSO

 Menus

20m 14.074 000

DX Call	DX Grid	<input checked="" type="checkbox"/> Tx even/1st	
EA7ZY	IM67	Tx 1700 Hz	Tx ← Rx
Az: 47	5453 mi	Rx 1700 Hz	Rx ← Tx
Lookup	Add	<input type="checkbox"/> Hold Tx Freq	
		Report -8	
2018 Mar 30		<input checked="" type="checkbox"/> Auto Seq	<input checked="" type="checkbox"/> Call 1st
21:11:29			

Calling CQ	Answering CQ
CQ	Grid
dB	R+dB
RRR	73
EA7ZY KT7G CN85 <input checked="" type="radio"/> Gen msg	
VANCOUVER <input type="radio"/> Free msg	

Receiving
 FT8
14/15 WD:6m

Upper Left (full BW)

WSJT-X v1.9.0-rc2 by K1JT

202915	3	0.3	2187	~	CQ KI4KWR FM29	U. S. A.
202915	3	0.2	2196	~	CT7ANG WA2HIP RRR	
202915	-24	-0.0	2341	~	I8QJU K00Y -13	
202915	-24	-0.3	2397	~	HK5WML 9A6A R-10	
202915	-20	1.2	2461	~	D44CH KZ4P FM19	
202915	-24	0.1	2567	~	DJ9ZL VE3XN -05	
202915	-4	0.0	1969	~	KT7G N4CQR RRR	
202915	-18	1.1	1801	~	KC5WXA VE20K -14	
202915	-2	1.0	2148	~	9A4ZM WG4P -15	
202915	-21	0.1	2298	~	W6IA KG5RMJ EM12	
202915	-24	0.2	2678	~	YV5ARM VA3HP -07	
----- 20m						
202945	-7	0.0	1969	~	KT7G N4CQR 73	
202945	-14	1.0	1354	~	CQ DX IK0XBX JN63	~Italy
202945	-11	0.1	1501	~	W5KAL W8MSC +00	
202945	-5	0.2	1552	~	CQ N3ALN FM19	U. S. A.
202945	-16	0.1	1654	~	N7HHS N4LCH R-20	
202945	1	0.4	1910	~	WP4KJ K9DID -14	
202945	-10	0.1	2047	~	IZ2GRG KC3KFW FN00	
202945	3	0.1	2185	~	CQ KI4KWR FM29	U. S. A.
202945	2	-0.2	1925	~	YU7YG WF4W +05	
202945	0	0.2	2196	~	CT7ANG WA2HIP 73	
202945	-24	0.2	2533	~	Y03GA WD9HSY EN61	
202945	-18	1.1	1802	~	KC5WXA VE20K -14	
202945	-24	0.1	2569	~	DJ9ZL VE3XN RRR	

These 2
will
interfere
with
each
other!

Time
period
separator

NO!

LOWER LEFT

CQ only Log QSO Stop **Monitor** Erase

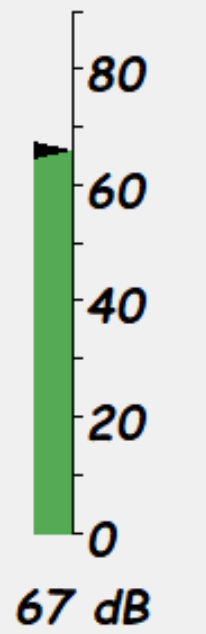
40m ● 7.074 000

DX Call	DX Grid
KK6BJU	EN47
Az: 73	1500 mi
Lookup	Add

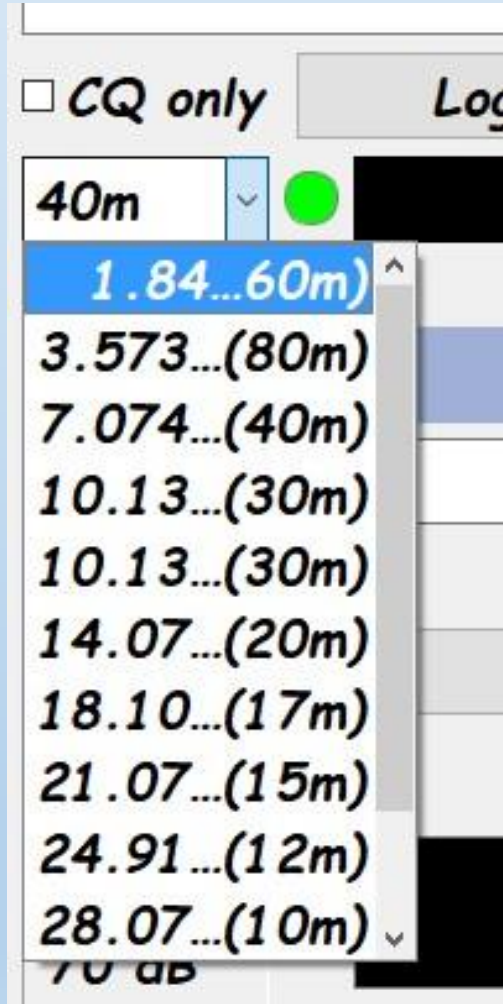
2019 Apr 02
19:45:40

Receiving FT8 Last Tx: KK6BJU KT7G CN85

ONCE = RIGHT SCREEN
TWICE = BOTH



PRESET START FREQUENCIES



Pulldown menu
also has 6 M,
not shown

Actual frequency in Log

2500 was tx freq

QSO: United States (00:45) (comment in Details panel)										
call	WE8R		name	Robert		QTH	Kettering			
mode	FT8		via	LOTW		tx freq	7.0765	begin	6/4/2019 05:46	
sent	-17	rcvd	-12	tx band	40M	rx freq	7.0765	end	6/4/2019 05:46	
power	350	code	291	DXCC	K	entity	United States			

7074 Plus 2500 hz is 7.0765

LOWER RIGHT

The screenshot displays a software interface for radio communication. At the top, there are four main buttons: **Decode**, **Enable Tx**, **Halt Tx**, and **Tune**, followed by a checked **Menus** checkbox. Below these are several control elements:

- Tx even/1st**
- Tx 1900 Hz** with a frequency spinner and **Hold Tx Freq**
- Up and down arrow buttons
- Rx 1932 Hz** with a frequency spinner
- Report -13** with a report level spinner
- Auto Seq** and **Call 1st**

A blue box with the text **Very important** has arrows pointing to the **Auto Seq** and **Report -13** controls. To the right of these controls is a vertical stack of three call log entries:

- 1 **Calling CQ** / **Answering CQ**
- 2 **CQ** / **Grid**
- 3 **dB** / **R+dB**


Below the call log are two rows of buttons: **RRR** / **73** and **KK6BJU KT7G CN85** / **Gen msg**. At the bottom, there is a dropdown menu with **Free msg** and a status bar showing **10/15 WD:6m**. A green bar is visible at the bottom of the interface.

Upper right

150645	-11	0.8	1807	~	CQ JI1RSF PM96	AS
150704	Tx		1850	~	J11RSF KT7G CN85	
150730	Tx		1850	~	J11RSF KT7G CN85	
150800	Tx		1850	~	J11RSF KT7G CN85	
150830	Tx		1850	~	J11RSF KT7G CN85	
150845	-7	0.1	1803	~	CQ K5DAK EM34	CQ Zone 4
150900	Tx		1850	~	J11RSF KT7G CN85	
150915	-5	0.1	1803	~	CQ K5DAK EM34	CQ Zone 4
150930	Tx		1850	~	J11RSF KT7G CN85	
150945	-10	0.2	1804	~	CQ K5DAK EM34	CQ Zone 4
151000	Tx		1850	~	J11RSF KT7G CN85	
151015	-7	0.1	1804	~	CQ K5DAK EM34	CQ Zone 4
151030	Tx		1850	~	J11RSF KT7G CN85	
151045	-11	0.5	1808	~	KT7G JI1RSF +06	
151104	Tx		1850	~	J11RSF KT7G R-11	
151115	-9	0.2	1804	~	NOPOD K5DAK -10	
151130	Tx		1850	~	J11RSF KT7G R-11	

Manual
answer
4 sec late

MENU BAR

 WSJT-X v2.0.0 by K1JT

File Configurations View Mode Decode Save Tools Help

Band Activity

UTC dB DT Freq Message

Menu bar,
Settings,
General

Settings

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

Station Details

My Call: My Grid: AutoGrid IARU Region:

Message generation for type 2 compound callsign holders:

Display

Blank line between decoding periods

Display distance in miles

Tx messages to Rx frequency window

Show DXCC entity 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

CW ID after 73 Tx watchdog:

Periodic CW ID Interval:

Rig: Yaesu FT-DX5000

Poll Interval: 2 s

CAT Control

Serial Port: COM7

Serial Port Parameters

Baud Rate: 38400

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: COM8

Transmit Audio Source

 Rear/Data Front/Mic

Mode

 None USB Data/Pkt

Split Operation

 None Rig Fake It

Test CAT

Test PTT

OK

Cancel

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

Soundcard

Input: *Microphone (4- USB Audio CODEC)* Mono ▾

Output: *Speakers (4- USB Audio CODEC)* Mono ▾

Save Directory

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

AzEl Directory

Location: *C:/Users/macrosmith/AppData/Local/WSJT-X* Select

Remember power settings by band

Transmit **Tune**

OK

Cancel

Troubleshooting tip

If.. Someone should forget to have the radio on, before starting the program..

Troubleshooting tip

You may get more audio in the room than you ever wanted... When you hit transmit.

(stop tx, it is easier to think!)

Troubleshooting tip

Check the settings in the AUDIO panel.

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

Soundcard

Input: Microphone (4- USB Audio CODEC) Mono ▾

Output: Speakers (4- USB Audio CODEC) Mono ▾

Save Directory

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

AzEl Directory

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

Remember power settings by band

Transmit Tune

OK

Cancel

Troubleshooting tip

The why of that is, that the usb port is not there with the radio off.

So the selection that you had, has disappeared when the radio is shut off.

Turn the Radio on, before
you start the program!

Sequence is Important

It's Pillage...

Then Burn!

*You can run this mode completely silent,
nothing to listen to.*

Keep the audio gain down and enjoy.

REPORTING

PSK REPORTER

Settings

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

Default frequencies and band specific st

Logging

Prompt me to log QSO

Convert mode to RTTY

dB reports to comments

Clear DX call and grid after logging

Op Call:

Network Services

Enable PSK Reporter Spotting

UDP Server

UDP Server: Accept UDP requests

UDP Server port number: Notify on accepted UDP request

Accepted UDP request restores window

N1MM Logger+ Broadcasts

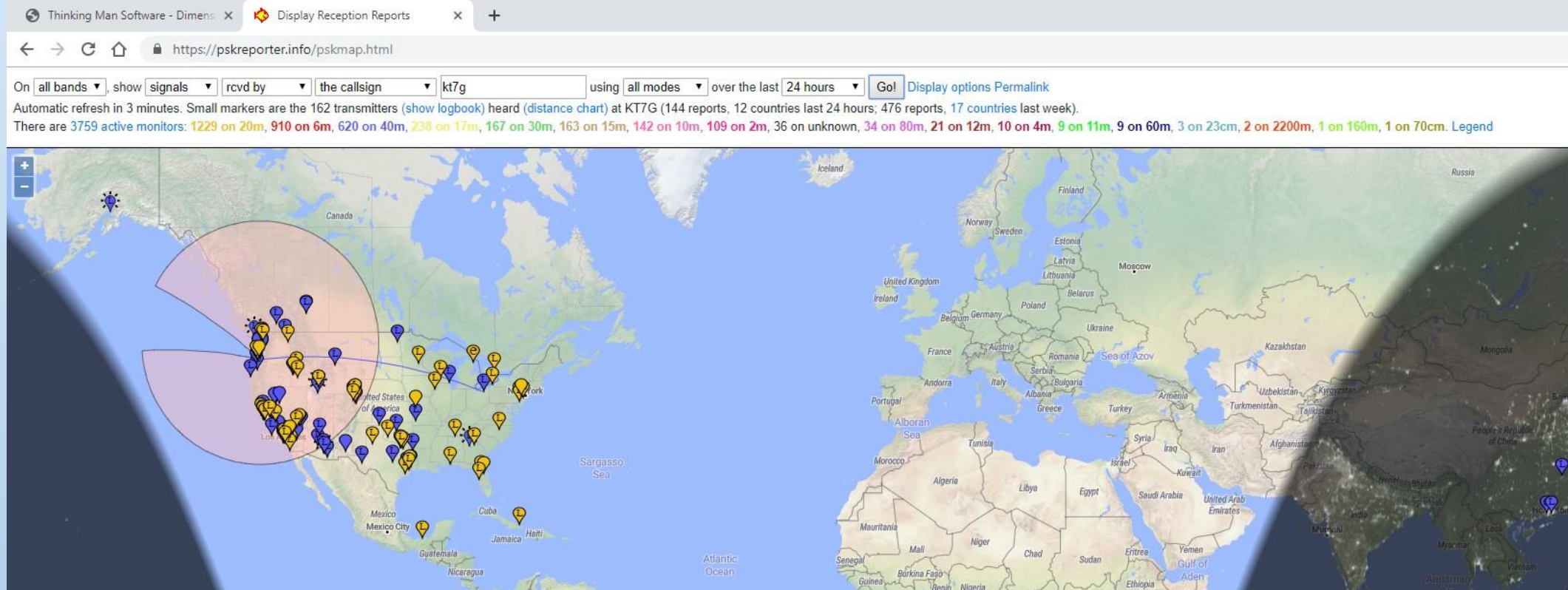
Enable logged contact ADIF broadcast

N1MM Server name or IP address:

N1MM Server port number:

OK Cancel

<https://pskreporter.info/pskmap.html>



Decode Highlighting

- My Call in message [f/g:unset, b/g:#ff6666]
- New Continent [f/g:unset, b/g:#ff0063]
- New Continent on Band [f/g:unset, b/g:#ff99c2]
- New CQ Zone [f/g:unset, b/g:#ffbf00]
- New CQ Zone on Band [f/g:unset, b/g:#ffe499]
- New ITU Zone [f/g:unset, b/g:#a6ff00]
- New ITU Zone on Band [f/g:unset, b/g:#ddff99]
- New DXCC [f/g:unset, b/g:#ff00ff]
- New DXCC on Band [f/g:unset, b/g:#ffaaff]
- New Grid [f/g:unset, b/g:#ff8000]
- New Grid on Band [f/g:unset, b/g:#ffcc99]
- New Call [f/g:unset, b/g:#00ffff]
- New Call on Band [f/g:unset, b/g:#99ffff]
- LotW User [f/a:#990000. b/a:unset]

Reset Highlighting

Highlight by Mode

Rescan ADIF Log

Logbook of the World User Validation

Users CSV file URL:


Fetch Now

Age of last upload less than:

OK

Cancel

MENU BAR

 WSJT-X v2.0.0 by K1JT

File Configurations View Mode Decode Save Tools Help

Band Activity

UTC dB DT Frea Messaae

MENU... OPEN LOG DIRECTORY..

Name	Date modified	Type	Size
save	4/7/2019 10:15 AM	File folder	
ALL.TXT	4/7/2019 10:06 AM	Text Document	46,686 KB
CALL3.OLD	8/6/2017 11:13 PM	OLD File	1 KB
CALL3.TXT	8/6/2017 11:13 PM	Text Document	1 KB
db.sqlite	12/11/2018 6:16 PM	SQLITE File	3 KB
false_decodes.txt	9/2/2017 11:11 AM	Text Document	0 KB
FoxQSO.txt	4/7/2019 10:06 AM	Text Document	13 KB
jt9_wisdom.dat	4/5/2019 4:19 AM	DAT File	23 KB
refspec.dat	9/10/2018 6:13 AM	DAT File	203 KB
timer.out	4/5/2019 4:19 AM	OUT File	1 KB
WSJT-X.ini	4/5/2019 4:19 AM	Configuration sett...	34 KB
wsjtx.log	4/5/2019 4:09 AM	Text Document	523 KB
wsjtx_log.adi	4/5/2019 4:09 AM	ADI File	1,467 KB
wsjtx_wisdom.dat	4/5/2019 4:19 AM	DAT File	4 KB

**TWO
VERSIONS OF
YOUR LOG ARE
STORED**

WSJT-X LOG (CSV FORMAT)

***2019-04-04,12:52:00,2019-04-04,
12:55:00,9W8DEN,OJ51,7.075700,
FT8,-06,-22,,FT8 Sent: -06 Rcvd: -22,***

IMPORTABLE INTO EXCEL

WSJT-X _LOG.ADI

(Amateur Doc Interchange)

- *<call:6>9W8DEN <gridsquare:4>OJ51 <mode:3>FT8
<rst_sent:3>-06 <rst_rcvd:3>-22 <qso_date:8>20190404
<time_on:6>125200 <qso_date_off:8>20190404
<time_off:6>125500 <band:3>40m <freq:8>7.075700
<station_callsign:4>KT7G <my_gridsquare:6>CN85ro
<comment:25>FT8 Sent: -06 Rcvd: -22 <eor>*

Transportable to logging programs

What needs to be green?

CQ only Log QSO Stop **Monitor** Erase

40m ● **7.074 000**

DX Call	DX Grid
KK6BJU	EN47
Az: 73 1500 mi	
Lookup	Add

2019 Apr 02
19:45:40

Receiving FT8 Last Tx: KK6BJU KT7G CN85

80
60
40
20
0
67 dB

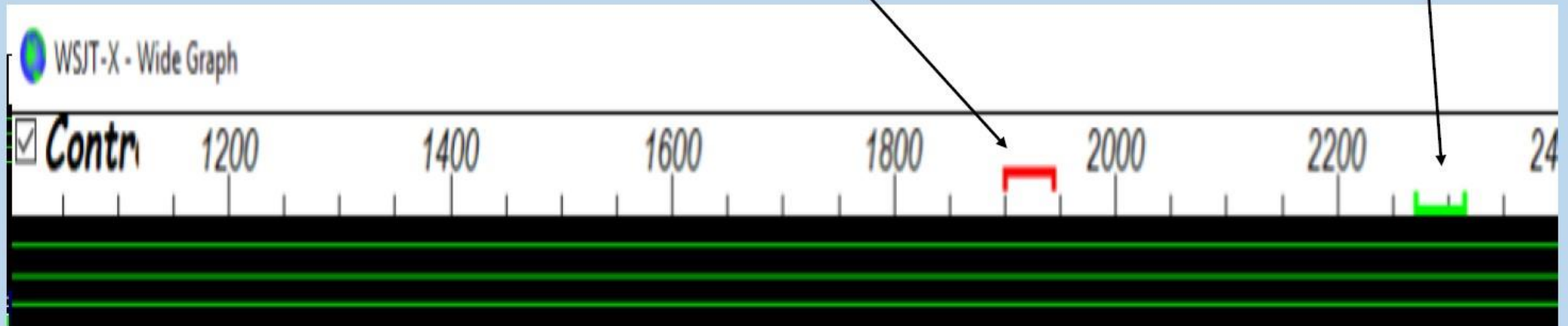
What needs to be green?

- *Receiving...*
- *Adjusted with RF Gain!*
 - *Kermit?*

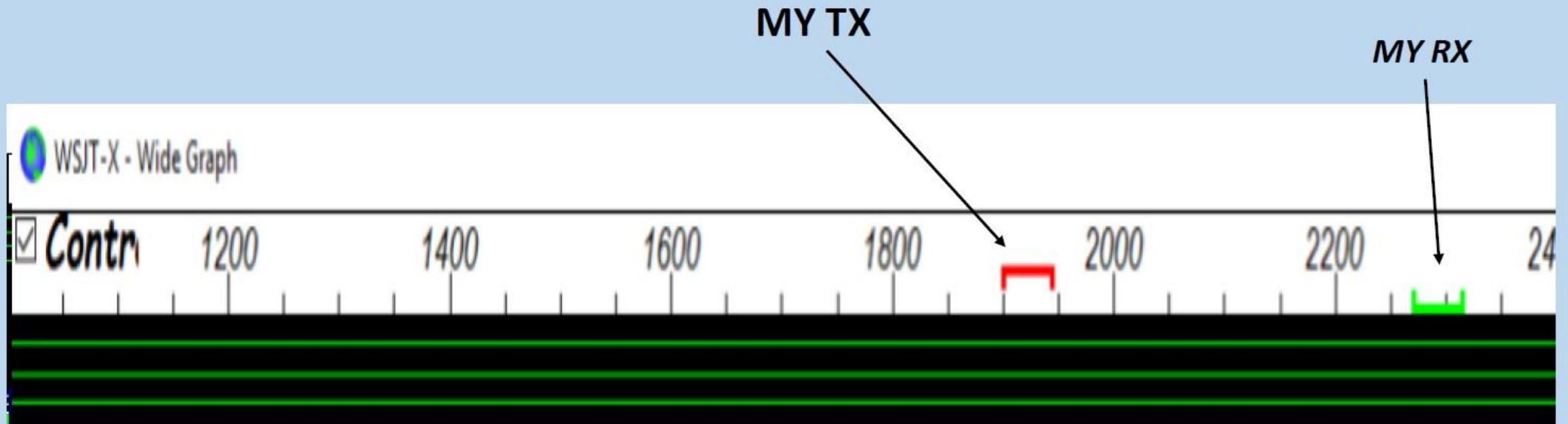
What is important about this

MY TX

MY RX

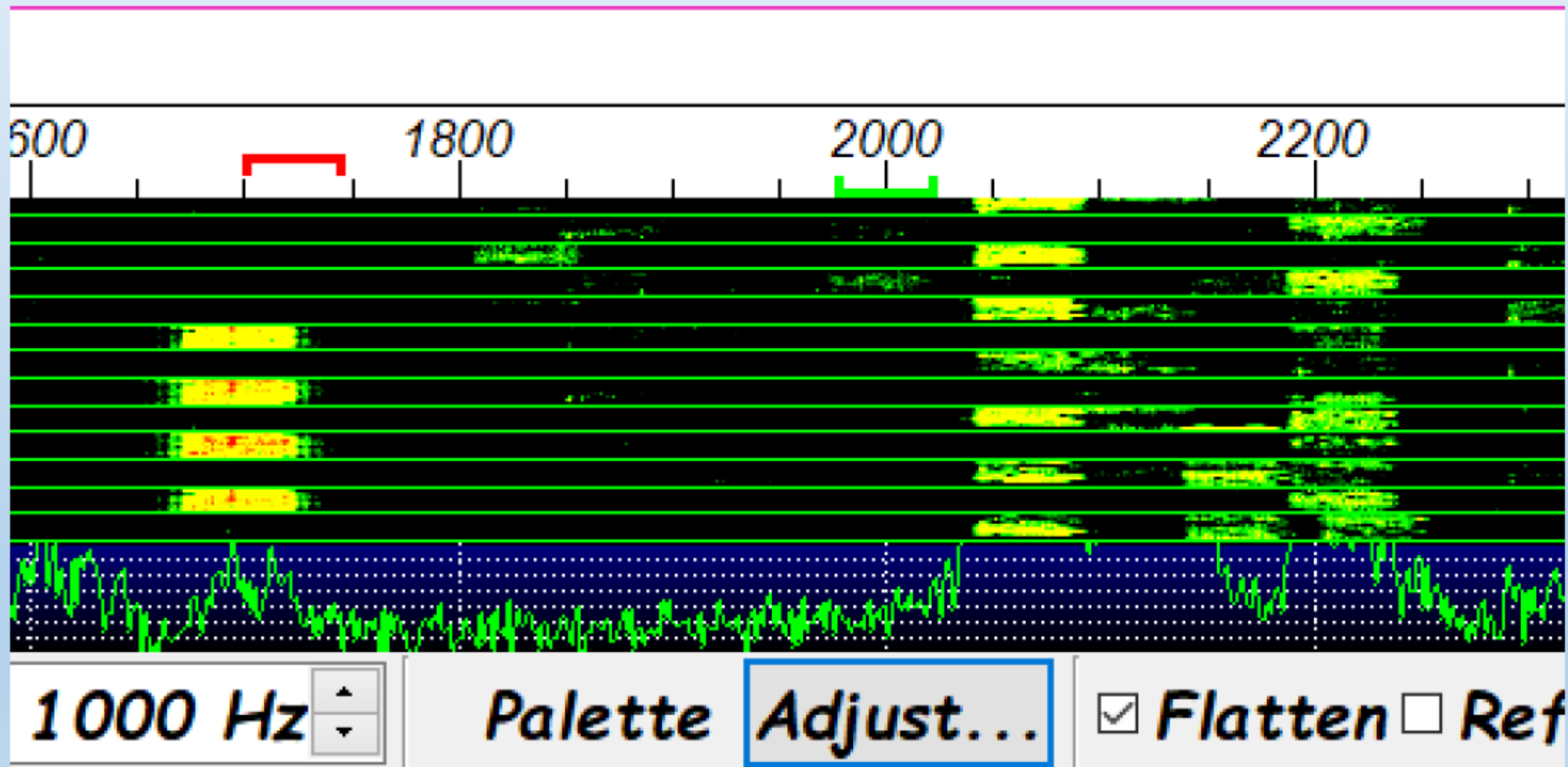


What is important about this



***Keep 50 hz away from others.
You can park on them if you are working them...***

Check every now and then...



*What do you do
if you hear a loud tone
when you transmit?..*

*What do you do
if you hear a loud tone on tx?..*

- ***Look for Your
cellphone?***

*What do you do
if you hear a loud tone on
tx?..*

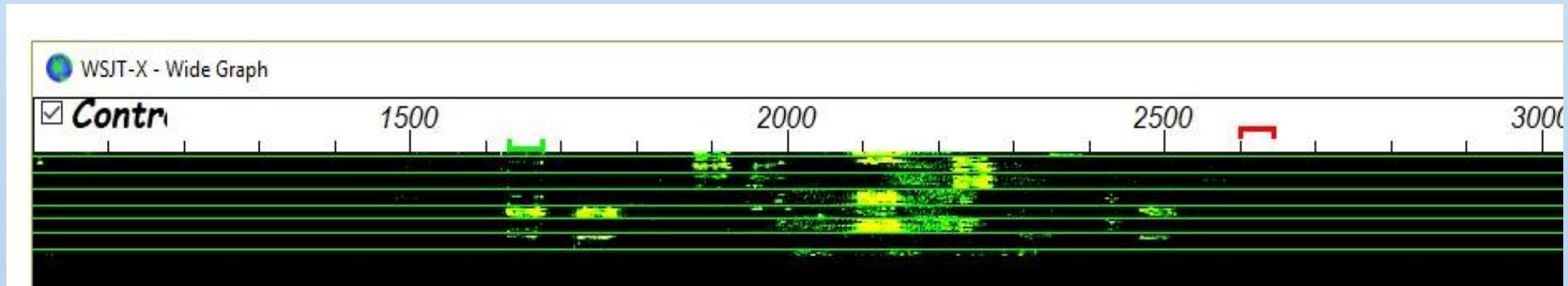
- Stop transmitting*
- Check audio panel for proper settings*

Three programs for FT8 session

- Wsjt-x version 2 or better, open after the radio is on....
- JTALERTX: Facilitates logging to some logging programs, alerts, preset by you.
- Logging program: takes care of LOTW, EQSL, QRZ, CLUBLOG
- Time sync will start when you boot the computer

VIP Very Important Points

1. Keep your tx out of the crowd, Watch the graph!



VIP Very Important Points

2. Watch Green Rcv graph, keep it green!

The screenshot shows a radio software interface with the following elements:

- Buttons:** CQ only, Log QSO, Stop, Monitor (highlighted in green), Erase.
- Band:** 40m (selected in a dropdown menu).
- Graph:** A vertical green bar graph on the left side, labeled "75 dB" at the bottom. The scale ranges from 0 to 80. An arrow points to the graph.
- Frequency:** 7.074 000 (displayed in yellow on a black background).
- DX Call:** WORBF
- DX Grid:** DM79
- Az:** 109
- Distance:** 988 mi
- Buttons:** Lookup, Add
- Date/Time:** 2019 Jan 05, 15:40:39 (displayed in yellow on a black background).
- Status:** Receiving (highlighted in green), FT8, Last Tx: WORBF KT7G CN85

VIP Very Important Points

- 3. Don't over power, this is not a pileup!
 - If you are getting (greater than +1) $>+1$ signal reports, it is too much.

VIP Very Important Points

- 4. Help your computer to keep time!
 - The DT column should be 0.something.
 -
 - I use Dimension 4
 - <http://www.thinkman.com/dimension4/download.htm>

Links

- <https://pskreporter.info/pskmap.html>
- <http://www.thinkman.com/dimension4/download.htm>
- <https://hamapps.com/> **JTALERT-X**
- <https://www.youtube.com/watch?v=P5pcUNII68o> Jtalertx

MORE LINKS

- **Very good everything you might want to know document.**
 - https://www.physics.princeton.edu/pulsar/K1JT/FT8_Operating_Tips.pdf

W1JT's Quick start guide.

https://physics.princeton.edu/pulsar/k1jt/Quick_Start_WSJT-X_2.0.pdf

Any Questions?

THE END

