WSJT-X AND 6 METERS

The band has sure changed this summer

MSK144 AND JT65 USED FOR SPORADIC-E JANUARY 2017

MSK144 was used by some operators on 6 during the winter Es season January, 2017. Operators found JT65 more effective. JT65 has been in use since 2003, mostly for EME on 6.

MAY 2017

Summer Es season starts in North America

Initially SSB/CW are popular

Big Caribbean opening May 28 to North America
Most stations still on CW/SSB – FM5AN, FG4NN, PZ5RA, etc.
Some were on JT65, such as PZ5RA

MEMORIAL WEEKEND A TRANSITION

- JT65 activity picks up on 6 meters, used by many to work DX
- Still considerable domestic SSB/CW
- Europeans and JA's take to JT65
- JT65 popular on HF bands, some HF digital ops migrating to 6.

FIRST TWO WEEKS OF JUNE

- Several major openings from NA to Europe and Japan
- JT65 now used by a majority of operators to work DX
- A few DX stations still on CW
- Many Japanese 6 meter stations are on JT65, they are skilled at completing contacts in the least number of exchanges.
- Some very low power NA stations work Japan and Africa – Iowa with attic dipole & 10 W to EA8DBM, Texas, Kansas to Japan 100W and loops with JT65.
- Big NA stations work Australia, E51WL, Hawaii, Kuwait, SV9, TY2AC, etc.

FT8 RELEASED JULY 2, 2017

- Steve Franke, K9AN and Joe Taylor, K1JT develop a new mode for WSJT-X. “We’re calling the mode “FT8” (Franke-Taylor design, 8-FSK modulation).”
- FT8 is “designed for situations like multi-hop Es where signals may be weak and fading, openings may be short, and you want fast completion of reliable, confirmable QSOs.”
- A disadvantage of JT65 are the long sequences. It was not designed for Es. FT8 has shorter 15 second sequences.

THE RISE OF FT8

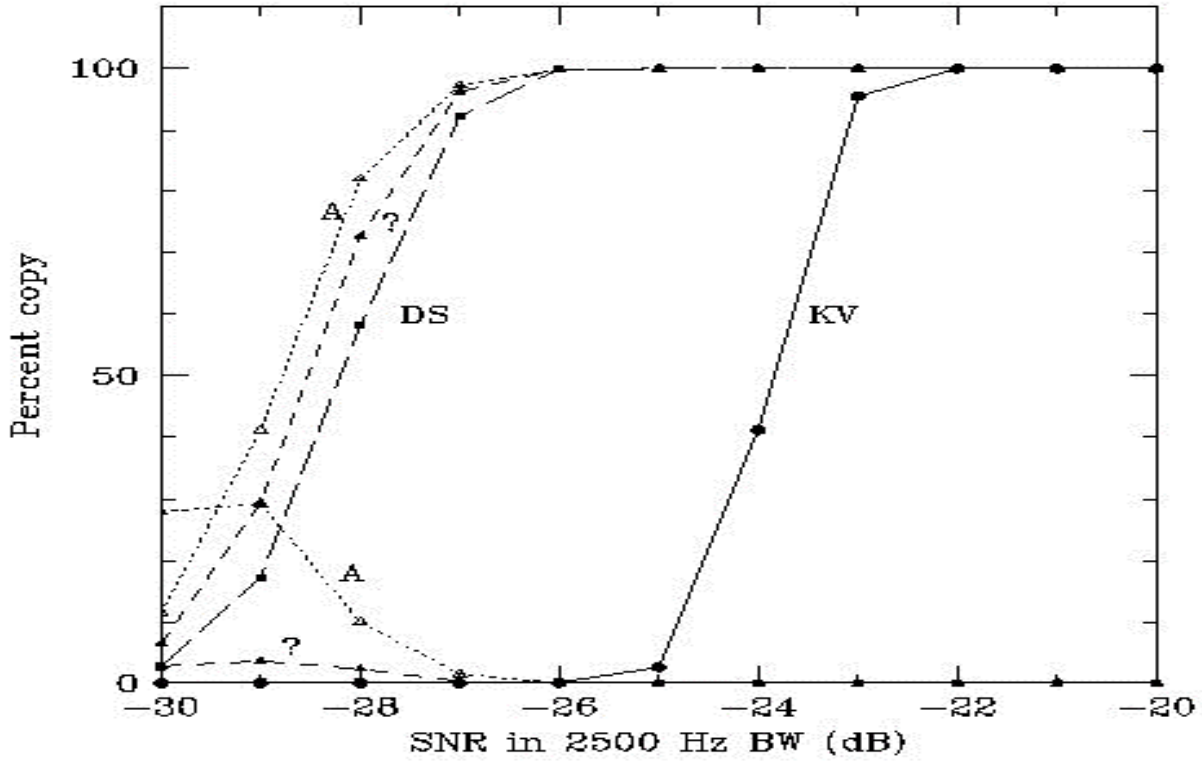
- By mid July, 2017 a growing majority of 6 meter Es spots were for stations using the new FT8 mode.
- All most all foreign (DX) spots were FT8.
- FT8 popular in the CQ VHF Contest.
- Many “new call signs” spotted on 6 meters. HF digital ops migrating to 50 MHz ?

COMPARISON JT65 & FT8

- **JT65** was developed and released in late 2003, was originally intended for extremely weak but slowly varying steady signals, such as those found on iono-scatter or Earth-Moon-Earth (EME) or "moonbounce") paths. It can decode signals many dB below the noise floor in a 2,500 Hz band (note that SNR in a 2500 Hz band is approximately 28 dB lower than SNR in a 4 Hz band, which is closer to the channel bandwidth of an individual JT65 tone), and can often allow amateurs to successfully exchange contact information without signals being audible to the human ear. Like the other modes, multiple-frequency shift keying is employed; unlike the other modes, messages are transmitted as atomic units after being compressed and then encoded with a process known as forward error correction (or "FEC"). The FEC adds redundancy to the data, such that all of a message may be successfully recovered even if some bits are not received by the receiver. (The particular code used for JT65 is Reed-Soloman.) Because of this FEC process, messages are either decoded correctly or not decoded at all, with very high probability. After messages are encoded, they are transmitted using MFSK with 65 tones.

SENSITIVITY OF JT65

Measured sensitivity of JT65



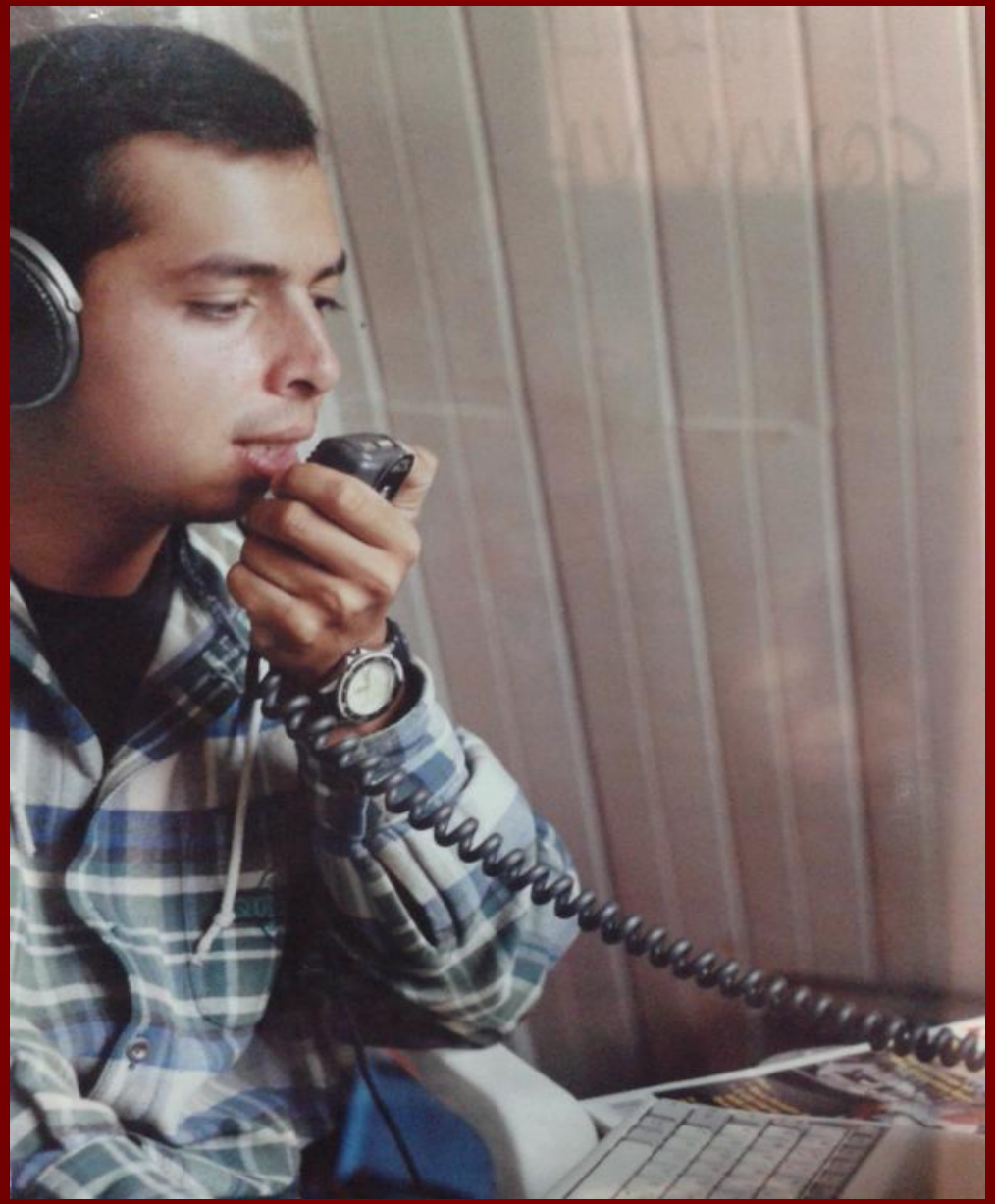
FT8 CHARACTERISTICS

- According to J. Taylor, the important characteristics of FT8 are:
- T/R sequence length: 15 seconds
- 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 7x7 Costas arrays (start, middle, end of transmission)
- Transmission duration: 79*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
- Compared to the so called *slow modes* (JT9, JT65, QRA64), FT8 is a few dB less sensitive but allows completion of QSOs four times faster. Bandwidth is greater than JT9, but about 1/4 of JT65A and less than 1/2 QRA64.

BY EARLY AUGUST FT8 PREDOMINANT MODE ON 6 METERS

- 75 – 90% Cluster Spots on 50 MHz were FT8
- Almost all foreign or “DX” spots were FT8
- Still a few holdouts on SSB, CW during big Es openings
- I logged TI2ALF August 4 on 50.110 MHz SSB.
- Gustavo’s TI friends on ‘KST said “we are trying to get him on FT8!”

TI2ALF



FT8 SPOTS AUGUST 4

WWW.DXMAPS.COM 17:04z			WWW info: SFI=75 A=12 K=4-Minor storm SWX=Quiet		
2017-08-04 17:04	N4OYT (EM92ID)	50.313.0 FT8	AC8WS (EN81OK)	LoTW 1041 km Sp-E (66MHz)	FT8 -15 dB 584 Hz CQ
2017-08-04 17:04	N4OYT (EM92ID)	50.313.0 FT8	K3JT (EM99XO)	LoTW 836 km Sp-E (77MHz)	FT8 -12 dB 1121 Hz CQ
2017-08-04 17:04	N4OYT (EM92ID)	50.313.0 FT8	K5JC (EM00XU)	LoTW 1592 km Sp-E (53MHz)	FT8 +3 dB 487 Hz CQ
2017-08-04 17:01	N4OYT (EM92ID)	50.313.0 FT8	N5JEH (DM65RD)	LoTW 2353 km Sp-E (50MHz)	FT8 -14 dB 1383 Hz CQ
2017-08-04 17:01	N4OYT (EM92ID)	50.313.0 FT8	CG3HP (FN03)	LoTW 1280 km Sp-E (59MHz)	FT8 -12 dB 587 Hz CQ
2017-08-04 17:01	KF4PGW (EM60VQ)	50.313.0 FT8	KF3BH (FN11TA)	LoTW 1448 km Sp-E (55MHz)	FT8 -13 dB 776 Hz CQ
2017-08-04 17:01	KB7IJ (EM12MR)	50.099.8 CW	WA2ZQX (EL87)	LoTW 1463 km Sp-E (55MHz)	CW 4 dB 18 WPM DX
2017-08-04 17:01	W3CP (EM74UG)	50.095.0 CW	K4JJW (FM15MB)	LoTW 676 km Sp-E (90MHz)	CW 25 dB 24 WPM DX
2017-08-04 17:00	W3OA (EM95MN)	50.094.9 CW	K5AND (EM00LF)	1785 km Sp-E (51MHz)	CW 15 dB 23 WPM DX
2017-08-04 17:00	KM4SII (EM86)	50.313.0 FT8	N2QT (FM07)	LoTW 371 km Tropo	FT8
2017-08-04 17:00	KM4SII (EM86)	50.313.0 FT8	KA5JTM (EL29LM)	LoTW 1367 km Sp-E (57MHz)	FT8
2017-08-04 17:00	KM4SII (EM86)	50.313.0 FT8	NA5Q (EM30UF)	LoTW 1112 km Sp-E (64MHz)	FT8
2017-08-04 17:00	W3UA (FN42GV)	50.099.7 CW	WA2ZQX (EL87)	LoTW 1998 km Sp-E (50MHz)	CW 8 dB 17 WPM CQ
2017-08-04 17:00	N4OYT (EM92ID)	50.313.0 FT8	VE3BV (FN05MM)	1500 km Sp-E (55MHz)	FT8 -16 dB 1571 Hz CQ
2017-08-04 16:59	KM4SII (EM86)	50.313.0 FT8	K5VWW (EL29FQ)	LoTW 1394 km Sp-E (56MHz)	FT8
2017-08-04 16:58	W6LFB (EM13KF)	50.075.0 CW	WA5SLO/B (EM50RW)	847 km Sp-E (76MHz)	EM50rw > EM13kf Strong 4 a wh
2017-08-04 16:58	N4OYT (EM92ID)	50.313.0 FT8	WB5XX (EM33OO)	LoTW 1085 km Sp-E (65MHz)	FT8 +1 dB 1594 Hz CQ
2017-08-04 16:58	KF4PGW (EM60VQ)	50.313.0 FT8	N2QT (FM07)	LoTW 1010 km Sp-E (68MHz)	FT8 +2 dB 552 Hz CQ
2017-08-04 16:58	K5EK (FM03WW)	50.313.0 FT8	WB5XX (EM33OO)	LoTW 1354 km Sp-E (57MHz)	FT8 +2 dB 1584 Hz CQ
2017-08-04 16:58	K5EK (FM03WW)	50.313.0 FT8	W3ACO (EN41FP)	LoTW 1454 km Sp-E (55MHz)	FT8 -9 dB 1035 Hz CQ
2017-08-04 16:57	KF4PGW (EM60VQ)	50.313.0 FT8	K5VWW (EL29FQ)	LoTW 903 km Sp-E (73MHz)	FT8 -13 dB 790 Hz CQ
2017-08-04 16:57	KF4PGW (EM60VQ)	50.313.0 FT8	N3CR (FN20DV)	1475 km Sp-E (55MHz)	FT8 -10 dB 480 Hz CQ
2017-08-04 16:56	N4OYT (EM92ID)	50.313.0 FT8	VE3RCN (FN02MV)	LoTW 1212 km Sp-E (61MHz)	FT8 -12 dB 1967 Hz CQ
2017-08-04 16:56	K5EK (FM03WW)	50.313.0 FT8	K5VWW (EL29FQ)	LoTW 1709 km Sp-E (52MHz)	FT8 +6 dB 773 Hz CQ
2017-08-04 16:56	N4OYT (EM92ID)	50.313.0 FT8	K5VWW (EL29FQ)	LoTW 1385 km Sp-E (57MHz)	FT8 +4 dB 783 Hz CQ
2017-08-04 16:55	KF4PGW (EM60VQ)	50.313.0 FT8	XE2YWB (DL82MM)	LoTW 1892 km Sp-E (51MHz)	FT8 -8 dB 852 Hz CQ
2017-08-04 16:54	KA0EGE (EM27PJ)	50.313.0 FT8	K5VWW (EL29)	LoTW 875 km Sp-E (75MHz)	EM27PJ<>EL29 FT8
2017-08-04 16:54	K5EK (FM03WW)	50.313.0 FT8	AJ4F (EL29LM)	LoTW 1670 km Sp-E (53MHz)	FT8 -13 dB 2219 Hz CQ
2017-08-04 16:54	N4OYT (EM92ID)	50.313.0 FT8	AJ4F (EL29LM)	LoTW 1343 km Sp-E (57MHz)	FT8 +0 dB 2230 Hz CQ
2017-08-04 16:53	NW0W (EM47QU)	50.313.0 FT8	NK1K (FN42JP)	LoTW 1726 km Sp-E (52MHz)	FT8 -16 +2004hz FN42
2017-08-04 16:52	NW0W (EM47QU)	50.313.0 FT8	N2GHR (FN30KU)	1537 km Sp-E (54MHz)	FT8 -12 +1312hz FN30
2017-08-04 16:52	W4CLJ (EM90)	50.155.0 SSB	K1IED (EM60)	LoTW 574 km Sp-E (102MHz)	Calling CQ Vy strong into EM60
2017-08-04 16:52	KO1U (FN42)	50.060.7 CW	W3HH/B (EL89VB)	1803 km Sp-E (51MHz)	EL89>FN42 S5-S7
2017-08-04 16:52	KF4PGW (EM60VQ)	50.313.0 FT8	WB5UDI (DM79PK)	LoTW 1938 km Sp-E (51MHz)	FT8 -17 dB 1701 Hz CQ
2017-08-04 16:52	KF4PGW (EM60VQ)	50.313.0 FT8	K1JT (FN20)	LoTW 1490 km Sp-E (55MHz)	FT8 +6 dB 895 Hz CQ
2017-08-04 16:52	N4OYT (EM92ID)	50.313.0 FT8	K1JT (FN20)	LoTW 1089 km Sp-E (65MHz)	FT8 +0 dB 890 Hz CQ
2017-08-04 16:51	N2QT (FM07II)	50.312.8 FT8	K5VWW (EL29FQ)	LoTW 1726 km Sp-E (52MHz)	FT8 +4 dB 1029 Hz CQ
2017-08-04 16:50	NW0W (EM47QU)	50.060.6 CW	W3HH/B (EL89VB)	1249 km Sp-E (59MHz)	CW 29 dB 14 WPM BEACON

FT8 OR CW --- *WHICH HEARS BETTER* ??

FT8 DECODES TO – 20 DB, IN REAL WORLD MOST CONTACTS ARE -15 DB OR STRONGER.

FT8 2500 HZ BANDWIDTH - FOR CW IN 500 HZ + 6DB

250 HZ BANDWIDTH CW, ANOTHER 3 DB. MODERN DSP RADIOS A FEW MORE DB. COPY CW TO -11 DB ?

FINALLY THE “X” FACTOR OF A SHARP CW OP ?? DB

A NUMBER OF SEASONED 6 METER DXERS FEEL CW HEARS AS WELL OR BETTER THAN FT8.

HOW HAS FT8 CHANGED 6 METERS ?

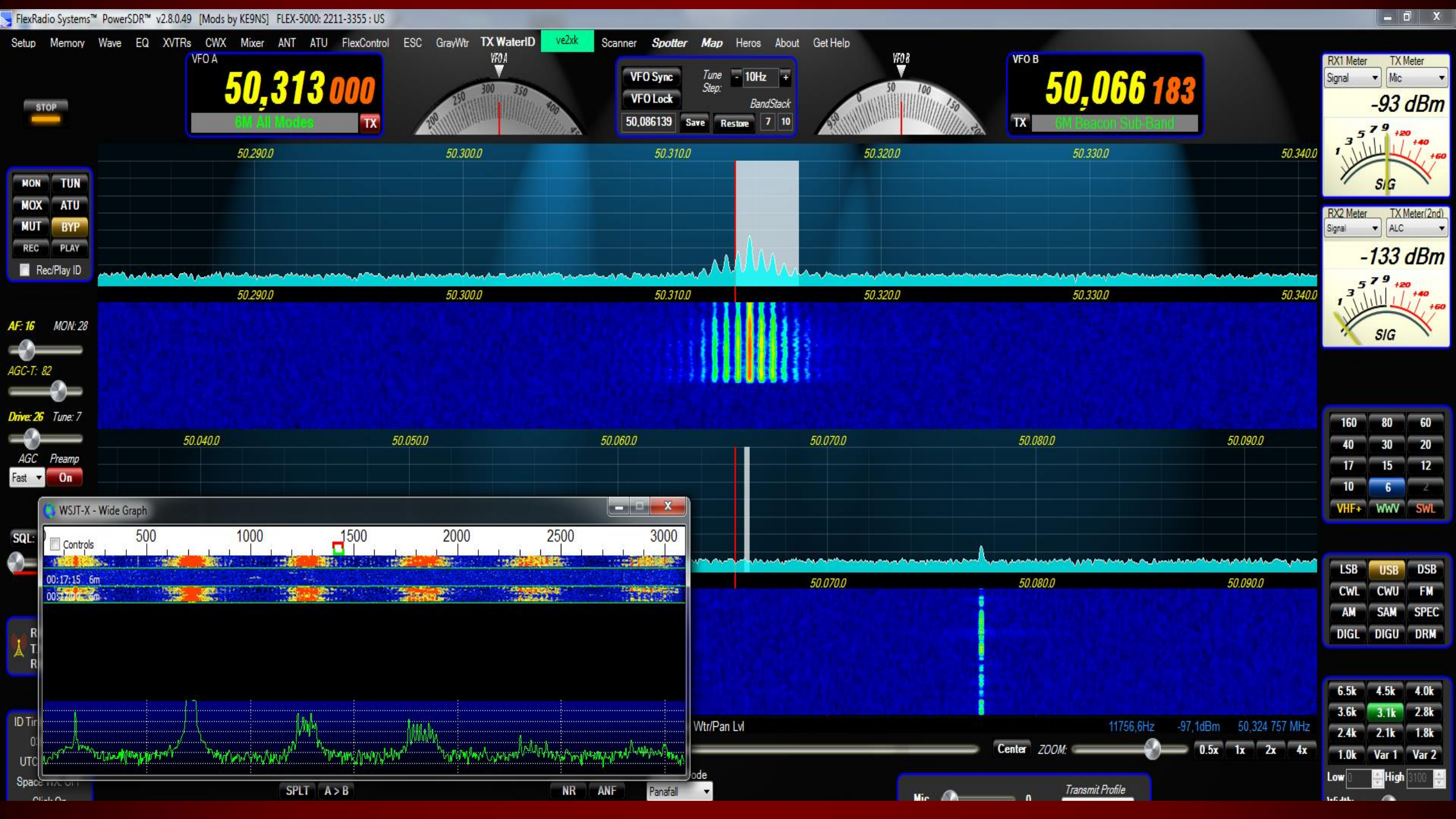
- Many operators now using FT8, a number exclusively
- Far fewer stations on CW and SSB during Es openings
- Aurora September 8 an exception, FT8 not well propagated by AU. Most aurora activity was traditional SSB and CW.
- Local ground wave activity now often FT8.
- FT8 allows “OVER the MUF” Es contacts, extending opening possibilities. (K9LA “Understanding Prop. With JT65, JT9 and FT8 QST October, 2017).
- Does FT8 offer non-CW ops the advantages of CW for sporadic E?

FT8 DISAPPOINTS IN SEPTEMBER VHF ?

- During the September VHF Contest, many stations struggled to make contacts via FT8. There were essentially no Es.
- Some stations did not change the settings to contest mode, or use manual advance. Thus difficult for others to work.
- Despite the “black magic” of the computer algorithms, FT8 needs Es to achieve a contact outside of ground wave range.
- Stations found MSK144 more effective for completing distant contest contacts by meteor scatter.

THE FUTURE OF 50 MHZ

- An exclusively digital band? While digital modes popular on HF, still considerable SSB/CW activity.
- 50.080 – 50.200 MHz becoming a “ghost land?”
- Can digital and SSB/CW co-exist on 6 meters ?
- What should the future of 50 MHz be ?


FlexRadio Systems™ PowerSDR™ v2.8.0.49 [Mods by KE9NS] FLEX-5000: 2211-3355 : US
Setup Memory Wave EQ XVTRs CWX Mixer ANT ATU FlexControl ESC GrayWtr TX WaterID ve2xk Scanner Spotter Map Heros About Get Help
VFO A
50,313 000
6M All Modes
TX
VFO Sync
VFO Lock
Tune Step:
10Hz
BandStack
50,086139
Save
Restore
7
10
VFO B
50,066 183
TX
6M Beacon Sub-Band
RX1 Meter
Signal
TX Meter
Mic
-93 dBm
S/G
RX2 Meter
Signal
TX Meter(2nd)
ALC
-133 dBm
S/G
STOP
MON
TUN
MOX
ATU
MUT
BYP
REC
PLAY
Rec/Play ID
AF: 16
MON: 28
AGC-T: 82
Drive: 26
Tune: 7
AGC
Preamp
Fast
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SQL:
50.290.0
50.300.0
50.310.0
50.320.0
50.330.0
50.340.0
50.040.0
50.050.0
50.060.0
50.070.0
50.080.0
50.090.0
160 80 60
40 30 20
17 15 12
10 6
VHF+ WWV SWL
LSB USB DSB
CWL CWU FM
AM SAM SPEC
DIGL DIGU DRM
6.5k 4.5k 4.0k
3.6k 3.1k 2.8k
2.4k 2.1k 1.8k
1.0k Var 1 Var 2
Low
High
WSJT-X - Wide Graph
Controls
500
1000
1500
2000
2500
3000
00:17:15 6m
Wtr/Pan Lvl
11756,6Hz
-97,1dBm
50,324 757 MHz
Center
ZOOM:
0.5x
1x
2x
4x
SPLT
A > B
NR
ANF
Panafall
Transmit Profile