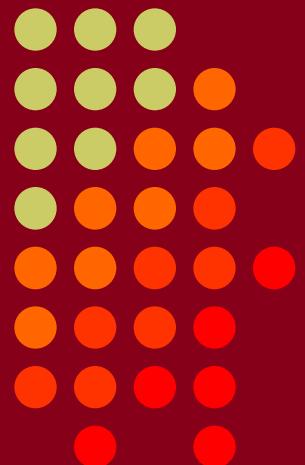


CTU Presents

**Utilizing Digital Modes FT8 and
MSK144 for Competitive Advantage in
VHF Contests**

Joel Harrison, W5ZN



• CTU •
CONTEST
UNIVERSITY

ICOM®

Before We Talk “Digital” Let’s Review VHF Contests



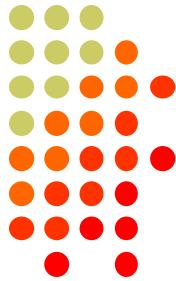
- Available Contests
- Available Modes
- Propagation Techniques



Available Contests

- **ARRL VHF**
 - **January**
 - **June**
 - **September**
- **CQ VHF**
 - **July**
- **Sprints**

Differences from HF Contests



- Any Mode is Allowed
 - Exception
 - ARRL Contest FM Only category
- You can self spot & make skeds
 - Absolutely NO QSO information



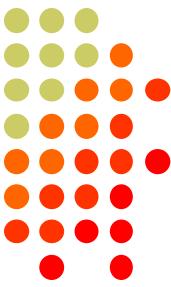
Propagation Techniques

- Sporadic “E”
- Meteor Scatter – “MS”
- Tropo
- Moonbounce - EME



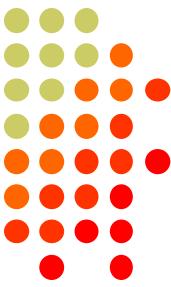
Meteor Scatter

- Meteor scatter is the reflection of radio waves from the ionized trails from meteors burning up in the upper atmosphere.
- Meteors (space debris) burn up in the upper atmosphere at a height of around 65 miles.
- This may be used to make QSOs up to about 1400 miles



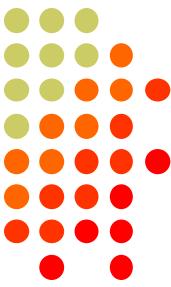
Meteor Scatter

- The earth is bombarded by a constant stream of small particles, remnants of comets that when entering the earth's atmosphere can ionize a column of atoms in the E region at approximately 100km (~60 miles) above the surface of the earth which can reflect radio waves in the VHF region of the spectrum



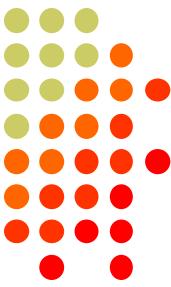
Meteor Scatter

- There are seasonal variations in the number of sporadic meteors
 - Relative rate increases noticeably in May, peaking in July and August then tailing off into October and November.
- There is also an hourly variation in the relative rate of meteors peaking
 - around dawn local time with the minimum late afternoon before the ramp up begins again late evening.
 - The hourly relative rate is due to the fact that the earth's rotation is head on so to speak in the morning into the path of the particles and therefore there is an increase in the relative velocity of a particle entering the earth's atmosphere.



Meteor Scatter

- The length of time of the ionization, or burst duration, is related to meteor velocity and increase in relative velocity results in longer ionization times.



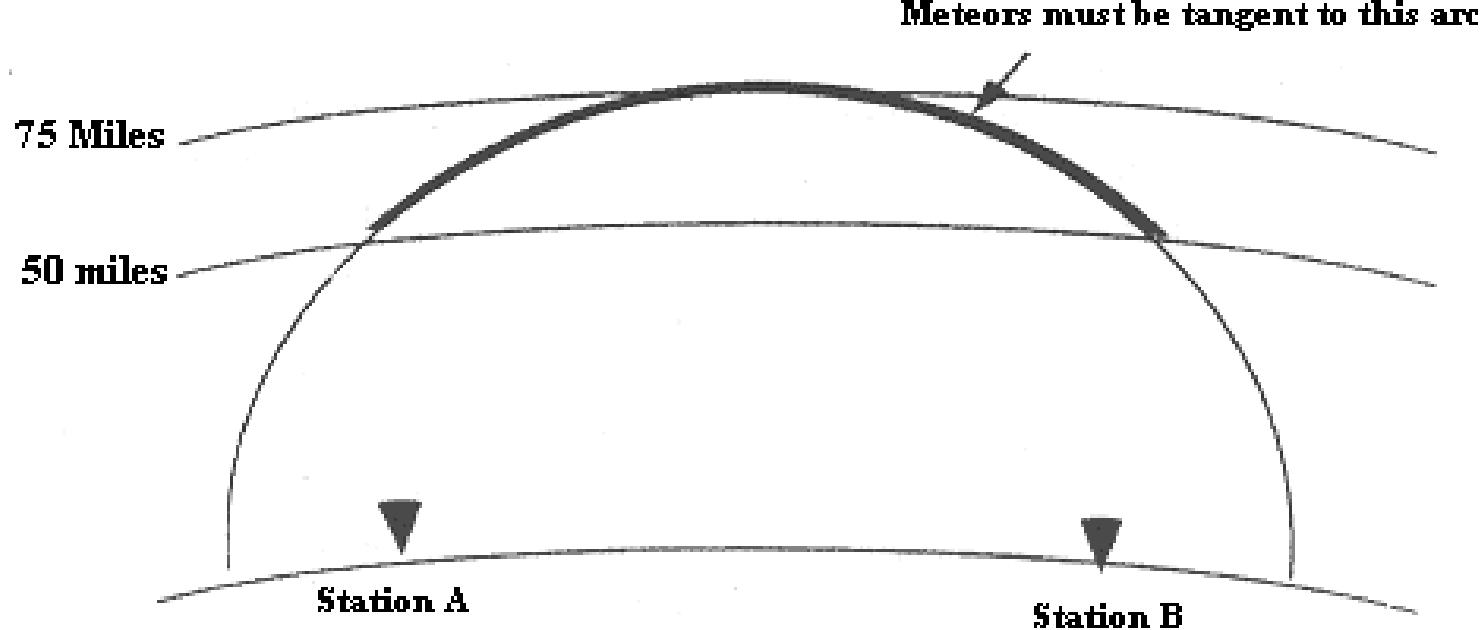
Meteor Scatter

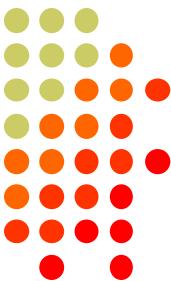
- Most particles entering the earth's atmosphere are the size of a grain of sand resulting in ionization lasting only a fraction of a second
 - much too short to convey any meaningful information using SSB or even high speed CW.
- The digital modes of FSK441 and MSK144 were designed to compress a limited amount of information in a packet and transmit that packet in a very short period of time.
 - In the case of MSK144 the information packet, with a transmission length 0.072 seconds, is repeated over and over again during the duration of the selected transmit interval of 5, 10, 15 or 30 seconds.



Meteor Scatter

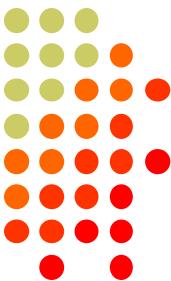
Reflection will occur when the trail is oriented as shown





Meteor Scatter

- **Excellent for 50 MHz**
- **Very Predictable Paths**
 - Best times between midnight & approx 9 AM
 - Peak during “showers” – Anytime with high speed procedures like WSJT



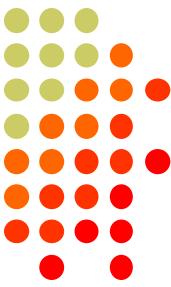
Meteor Scatter

- **Very Good for 144 MHz**
- **Very Predictable Paths**
 - Best times between midnight & approx 9 AM
 - Peak during “showers” – Anytime with high speed procedures like WSJT

MSK144 & FT8 Digital Modes

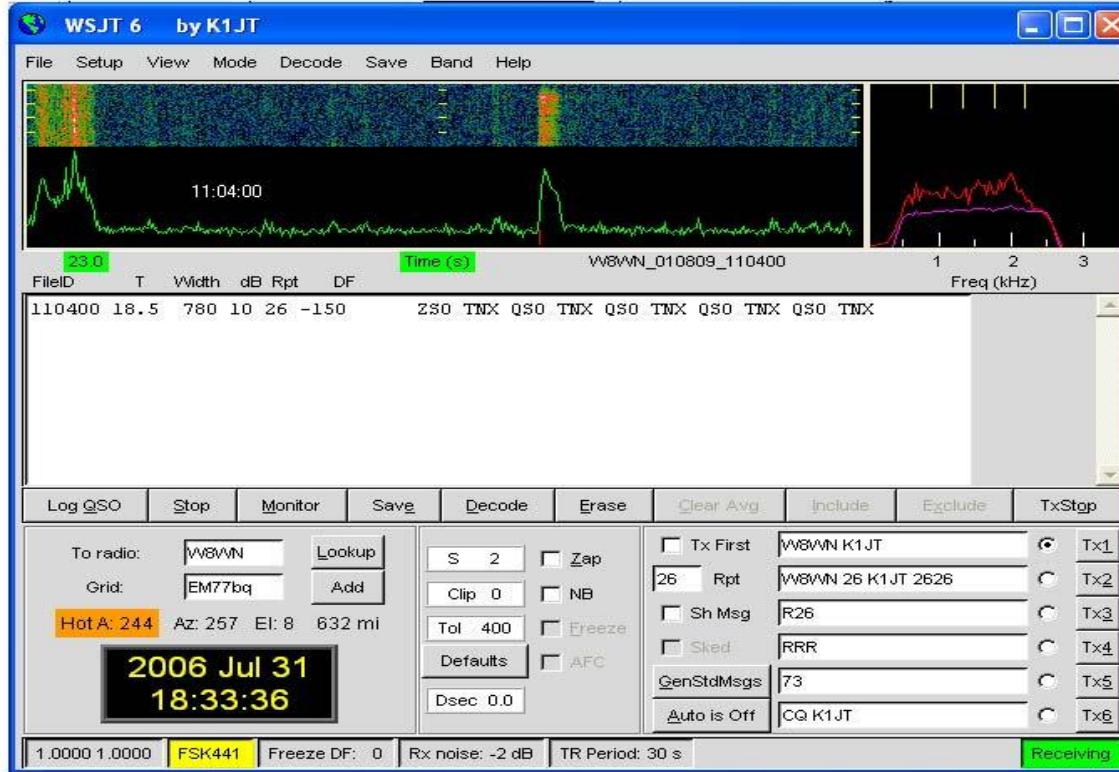


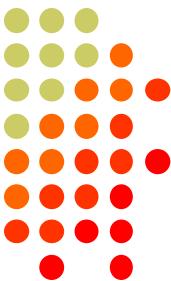
- **Weak Signal Communication by K1JT (WSJT)** offers specific digital protocols optimized for EME and meteor scatter at VHF/UHF
- Free open-source programs in the WSJT-x Suite. Normal usage requires only a standard SSB transceiver and a personal computer with soundcard.



Meteor Scatter

Original JT “FSK441” MS Mode

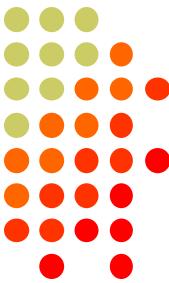




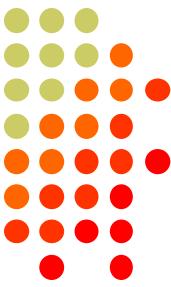
Meteor Scatter – MSK144

- **New Mode introduced in WSJT-X**
 - Officially released in January 2017
 - Contains 8 new modes
 - **MFSK441 Mode**
 - **Calling frequencies 50.280**
 - **Many new features**

Meteor Scatter – MSK144

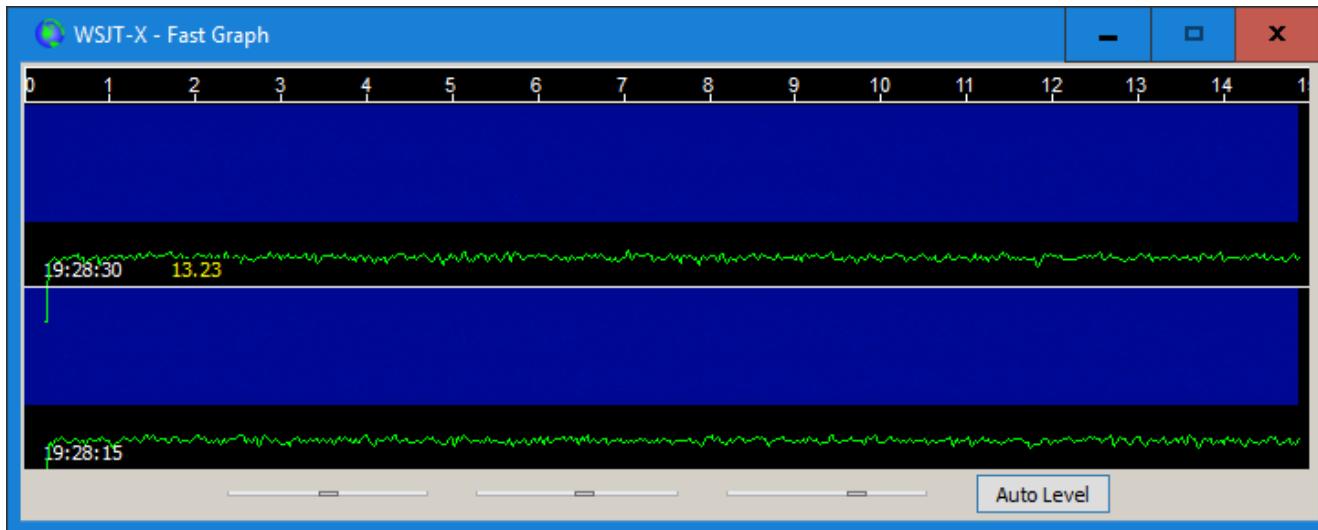


- Focussed toward contest style operation that include:
 - a machine human interface that facilitates rapid population of QSO specific information
 - shorter TX and RX periods than FSK441
 - auto sequencing that reduces human error and improves operator efficiency important considerations during contest operation

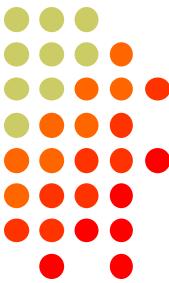


Meteor Scatter – MSK144

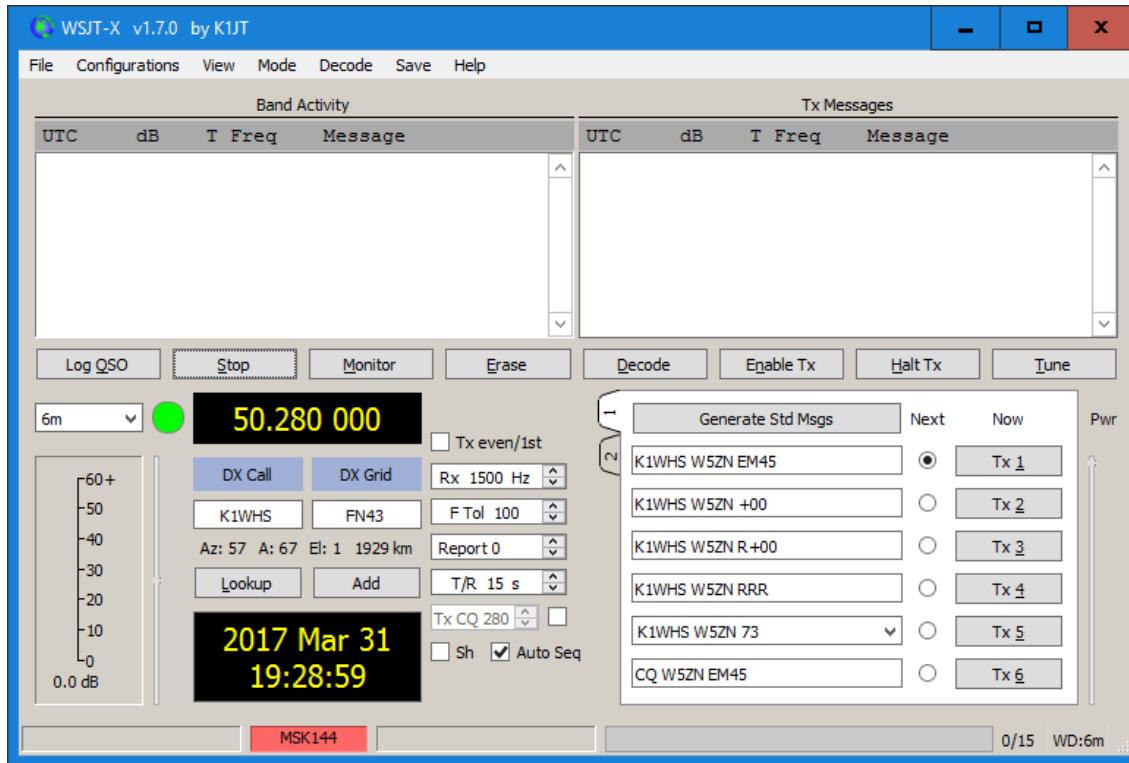
Graph still exists but in a separate window called “Fast Graph”



Meteor Scatter – MSK144



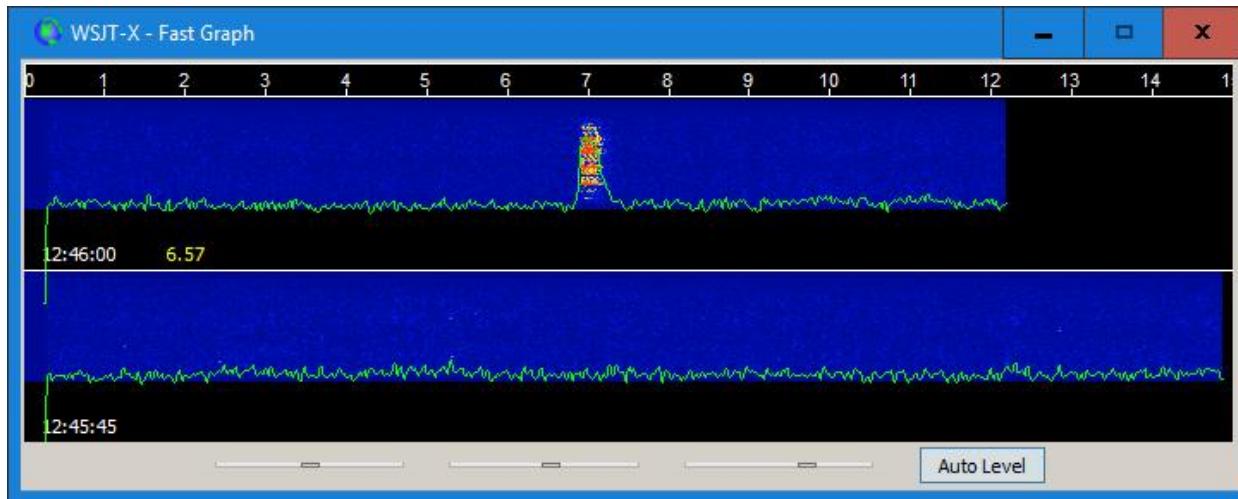
MSK144 Window is different from previous FSK441 Window"

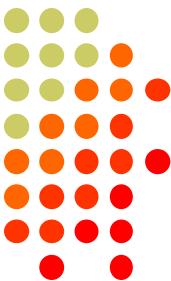




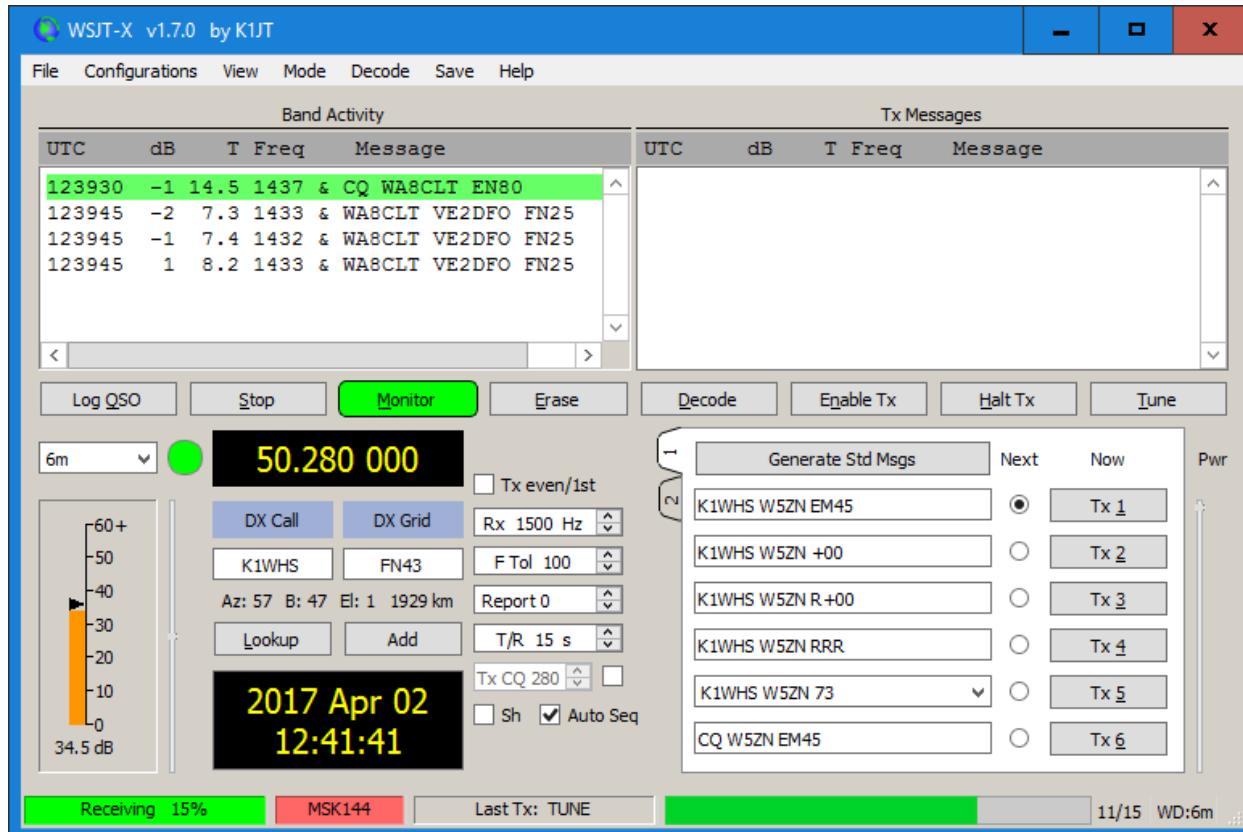
Meteor Scatter – MSK144

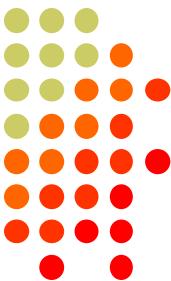
Signal bursts still appear in the “Fast Graph”



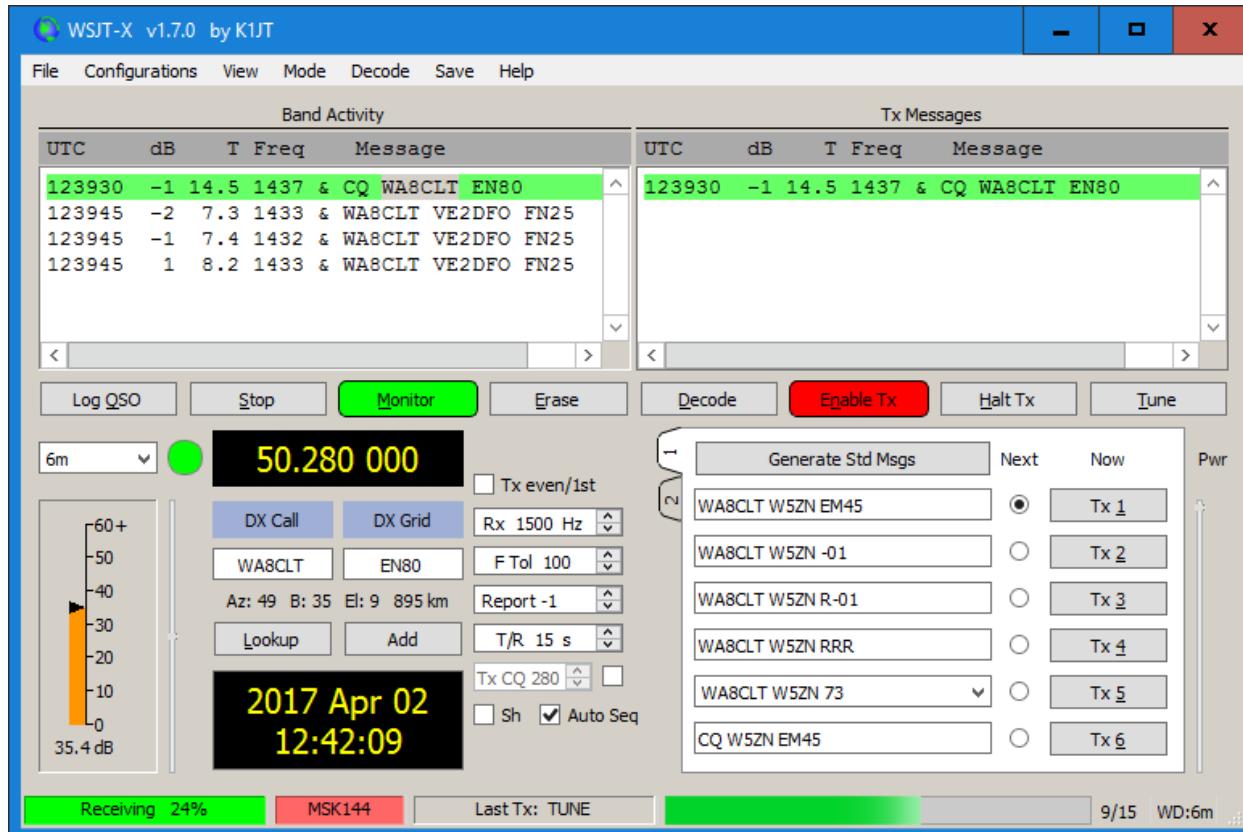


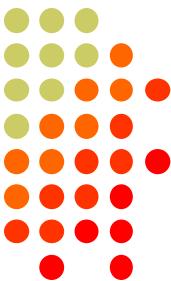
Meteor Scatter – MSK144



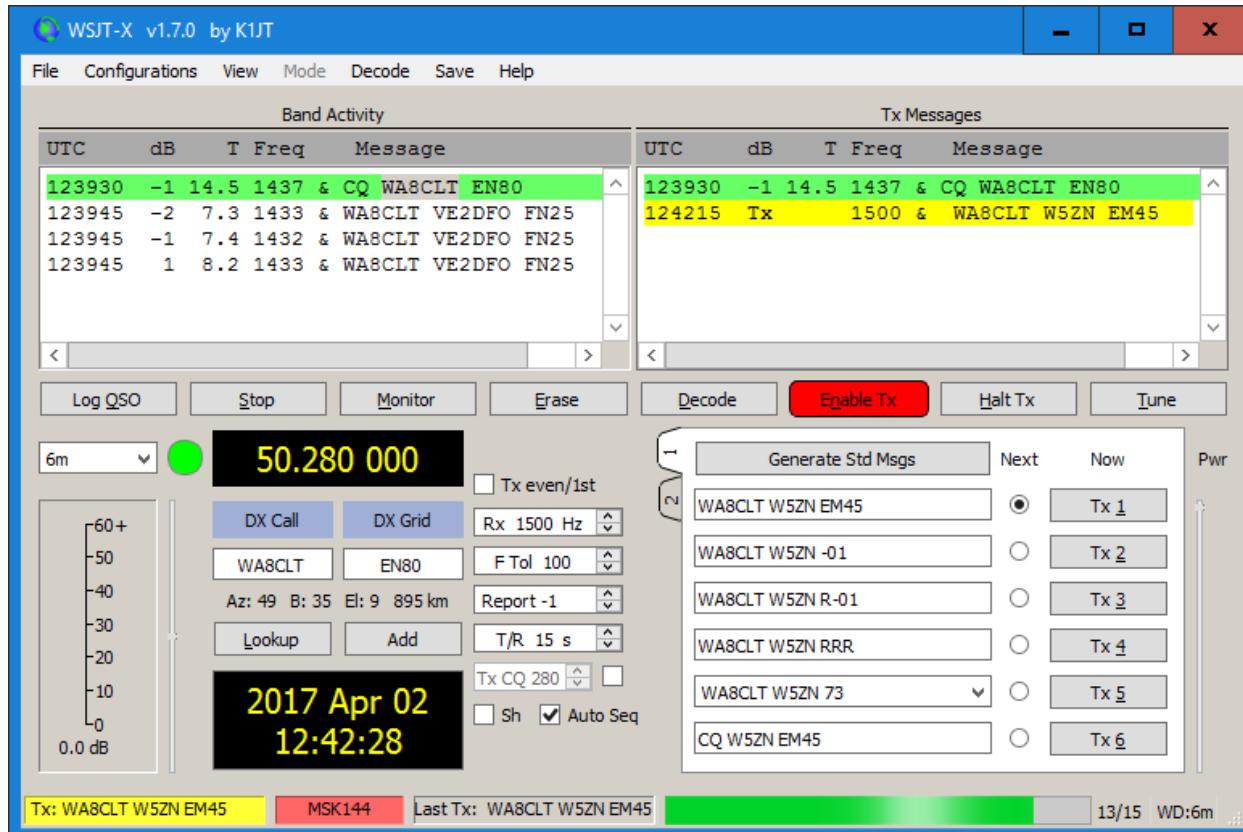


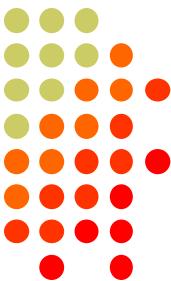
Meteor Scatter – MSK144





Meteor Scatter – MSK144





Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T	Freq	Message
124215	7	3.8	1432	& K4GYD W3IP FM19
124215	3	6.0	1425	& WA5ZFP W8KEN +07
124245	1	1.4	1437	& K4GYD W3IP FM19
124245	2	1.5	1435	& K4GYD W3IP FM19
124245	3	1.9	1430	& WA5ZFP W8KEN +07
124245	3	14.0	1438	& K4GYD W3IP FM19
124315	3	10.8	1409	& K4GYD AA4PB FM18

Tx Messages

UTC	dB	T	Freq	Message
124330	Tx		1500	& CQ W5ZN EM45

Log QSO Stop Monitor Erase Decode **Enable Tx** Halt Tx Tune

6m Tx even/1st

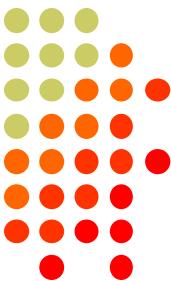
DX Call DX Grid Rx 1500 Hz
K4GYD EM57 F Tol 100
Az: 38 A: 56 El: 18 285 km Report 8
Lookup Add T/R 15 s
Tx CQ 280
 Sh Auto Seq

2017 May 13 12:43:32

Generate Std Msgs Next Now Pwr

1 K4GYD W5ZN EM45 Tx 1
K4GYD W5ZN +08 Tx 2
K4GYD W5ZN R+08 Tx 3
K4GYD W5ZN RRR Tx 4
K4GYD W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Tx: CQ W5ZN EM45 MSK144 Last Tx: CQ W5ZN EM45 2/15 WD:6m



Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T Freq	Message
124415	2	8.9	1444 & W5ZN W3IP FM19
124415	4	8.9	1444 & W5ZN K8LEE EM79
124415	5	9.2	1440 & W5ZN K8LEE EM79
124415	5	9.7	1442 & W5ZN W3IP FM19
124415	4	10.0	1445 & W5ZN K8LEE EM79
124415	5	10.2	1440 & W5ZN W3IP FM19
124415	2	12.9	1443 & W5ZN K8LEE EM79

Tx Messages

UTC	dB	T Freq	Message
124330	Tx	1500	& CQ W5ZN EM45
124400	Tx	1500	& CQ W5ZN EM45
124430	Tx	1500	& CQ W5ZN EM45
124415	5	9.7	1442 & W5ZN W3IP FM19
124431	Tx	1500	& W3IP W5ZN +05

Log QSO Stop Monitor Erase

6m Tx even/1st

DX Call DX Grid Rx 1500 Hz
W3IP FM19 F Tol 100
Az: 66 B: 55 El: 5 1313 km Report 5
Lookup Add T/R 15 s
Tx CQ 280
 Sh Auto Seq

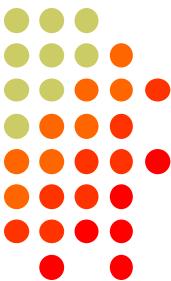
50.280 000

2017 May 13 12:44:37

Generate Std Msgs Next Now Pwr

W3IP W5ZN EM45 Tx 1
W3IP W5ZN +05 Tx 2
W3IP W5ZN R+05 Tx 3
W3IP W5ZN RRR Tx 4
W3IP W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Tx: W3IP W5ZN +05 MSK144 Last Tx: W3IP W5ZN +05 7/15 WD:6m



Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T	Freq	Message
124415	9	13.8	1438	& W5ZN W8KEN EN91
124415	10	14.0	1437	& W5ZN W8KEN EN91
124445	5	0.6	1441	& W5ZN W8KEN EN91
124445	2	1.9	1436	& W5ZN K1SIX FN43
124445	0	2.1	1439	& W5ZN W8KEN EN91
124445	7	3.5	1444	& W5ZN W3IP R+09
124445	7	5.9	1436	& W5ZN W8KEN EN91

Tx Messages

UTC	dB	T	Freq	Message
124330	Tx		1500	& CQ W5ZN EM45
124400	Tx		1500	& CQ W5ZN EM45
124430	Tx		1500	& CQ W5ZN EM45
124415	5	9.7	1442	& W5ZN W3IP FM19
124431	Tx		1500	& W3IP W5ZN +05
124445	7	3.5	1444	& W5ZN W3IP R+09

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune

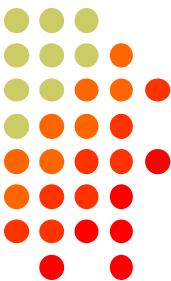
6m 50.280 000 Tx even/1st

DX Call DX Grid Rx 1500 Hz
W3IP FM19 F Tol 100
Az: 66 B: 55 El: 5 1313 km Report 7
Lookup Add T/R 15 s
Tx CQ 280
Sh Auto Seq

2017 May 13 12:44:53

Receiving 13% MSK144 Last Tx: W3IP W5ZN +05 8/15 WD:6m

Generate Std Msgs Next Now Pwr
W3IP W5ZN EM45 Tx 1
W3IP W5ZN +07 Tx 2
W3IP W5ZN R+07 Tx 3
W3IP W5ZN RRR Tx 4
W3IP W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6



Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T	Freq	Message
124445	5	0.6	1441	& W5ZN W8KEN EN91
124445	2	1.9	1436	& W5ZN K1SIX FN43
124445	0	2.1	1439	& W5ZN W8KEN EN91
124445	7	3.5	1444	& W5ZN W3IP R+09
124445	7	5.9	1436	& W5ZN W8KEN EN91
124445	-1	9.6	1433	& W5ZN K1IED FN31
124445	-4	13.2	1440	& W5ZN W8KEN EN91

Tx Messages

UTC	dB	T	Freq	Message
124330	Tx		1500	& CQ W5ZN EM45
124400	Tx		1500	& CQ W5ZN EM45
124430	Tx		1500	& CQ W5ZN EM45
124415	5	9.7	1442	& W5ZN W3IP FM19
124431	Tx		1500	& W3IP W5ZN +05
124445	7	3.5	1444	& W5ZN W3IP R+09
124500	Tx		1500	& W3IP W5ZN RRR

Log QSO Stop Monitor Erase Decode **Enable Tx** Halt Tx Tune

6m **50.280 000** Tx even/1st

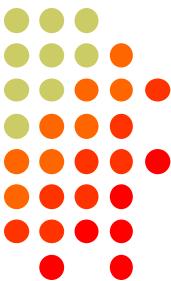
DX Call DX Grid Rx 1500 Hz
W3IP FM19 F Tol 100
Az: 66 B: 55 El: 5 1313 km Report 7
Lookup Add T/R 15 s
Tx CQ 280 Sh Auto Seq

2017 May 13 12:45:06

Generate Std Msgs Next Now Pwr

1 W3IP W5ZN EM45 Tx 1
W3IP W5ZN +07 Tx 2
W3IP W5ZN R+07 Tx 3
W3IP W5ZN RRR Tx 4
W3IP W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Tx: W3IP W5ZN RRR. MSK144 Last Tx: W3IP W5ZN RRR. 6/15 WD:6m



Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T	Freq	Message
124545	5	2.0	1448	& KF5MDY K8LEE EM79
124545	6	2.1	1446	& KF5MDY K8LEE EM79
124545	12	8.2	1441	& W5ZN K1SIX FN43
124545	3	9.1	1444	& W5ZN W3IP 73
124545	3	9.8	1440	& W5ZN W8KEN EN91
124545	2	11.4	1444	& W5ZN W3IP 73
124545	7	13.9	1450	& KF5MDY K8LEE EM79

Tx Messages

UTC	dB	T	Freq	Message
124431	Tx		1500	& W3IP W5ZN +05
124445	7	3.5	1444	& W5ZN W3IP R+09
124500	Tx		1500	& W3IP W5ZN RRR
124530	Tx		1500	& W3IP W5ZN RRR
124545	3	9.1	1444	& W5ZN W3IP 73
124545	2	11.4	1444	& W5ZN W3IP 73
124600	Tx		1500	& W3IP W5ZN 73

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune

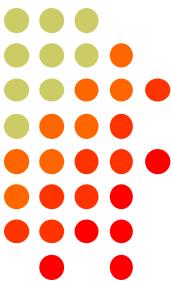
6m 50.280 000 Tx even/1st

DX Call DX Grid Rx 1500 Hz
W3IP FM19 F Tol 100
Az: 66 B: 55 El: 5 1313 km Report 2
Lookup Add T/R 15 s
Tx CQ 280
Sh Auto Seq

2017 May 13 12:46:00

Generate Std Msgs Next Now Pwr
W3IP W5ZN EM45 Tx 1
W3IP W5ZN +02 Tx 2
W3IP W5ZN R+02 Tx 3
W3IP W5ZN RRR Tx 4
W3IP W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Tx: W3IP W5ZN 73 MSK144 Last Tx: W3IP W5ZN 73 0/15 WD:6m



Meteor Scatter – MSK144

WSJT-X v1.7.0 by K1JT

File Configurations View Mode Decode Save Help

Band Activity

UTC	dB	T Freq	Message
124645	3	1.0	1439 & CQ NZ3M FN10
124645	4	1.6	1439 & CQ NZ3M FN10
124645	-2	3.4	1445 & W5ZN K1IED R+02
124645	0	5.3	1450 & KF5MDY K8LEE EM79
124645	3	5.4	1451 & KF5MDY K8LEE EM79
124645	5	5.7	1445 & KF5MDY K8LEE EM79
124645	7	7.4	1445 & W5ZN K1IED R+02

Tx Messages

UTC	dB	T Freq	Message
124545	3	9.1	1444 & W5ZN W3IP 73
124545	2	11.4	1444 & W5ZN W3IP 73
124600	Tx	1500	& W3IP W5ZN 73
124445	-1	9.6	1433 & W5ZN K1IED FN31
124630	Tx	1500	& K1IED W5ZN -01
124645	-2	3.4	1445 & W5ZN K1IED R+02
124645	7	7.4	1445 & W5ZN K1IED R+02

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune

6m 50.280 000 Tx even/1st

DX Call DX Grid Rx 1500 Hz
K1IED FN31 F Tol 100
Az: 62 B: 52 El: 3 1701 km Report 7
Lookup Add T/R 15 s
Tx CQ 280
 Sh Auto Seq

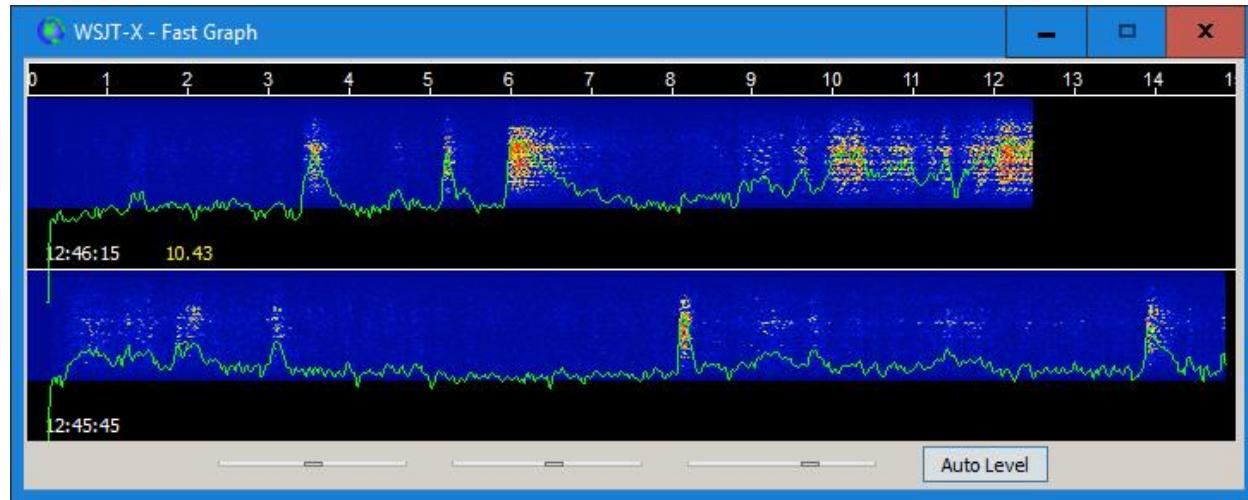
Generate Std Msgs Next Now Pwr

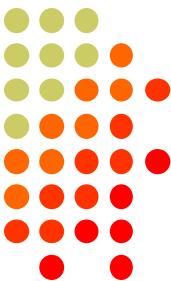
2 K1IED W5ZN EM45 Tx 1
K1IED W5ZN +07 Tx 2
K1IED W5ZN R+07 Tx 3
K1IED W5ZN RRR Tx 4
K1IED W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Receiving 16% MSK144 Last Tx: K1IED W5ZN -01 10/15 WD:6m



Meteor Scatter – MSK144

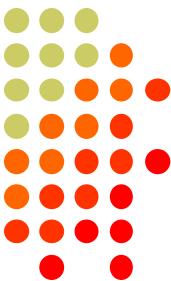




Meteor Scatter – MSK144

K8ZR Test Results

- **Contest QSO Non-Contest QSO**
- **Tx Time:**
- 15 sec. CQ N8JX EN64
- 15 sec. N8JX K8ZR EN91
- 15 sec. K8ZR N8JX R EN64
- 15 sec. N8JX K8ZR RRR
- 15 sec. K8ZR N8JX 73
- Total time: 75 seconds
- **Non-Contest QSO**
- **Tx Time:**
- 15 sec. CQ WB4JWM EM83
- 15 sec. WB4JWM K8ZR EN91
- 15 sec. K8ZR WB4JWM +05
- 15 sec. WB4JWM K8ZR R+07
- 15 sec. K8ZR WB4JWM RRR
- 15 sec. WB4JWM K8ZR 73
- Total time: 90 seconds

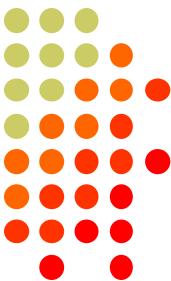


Meteor Scatter – MSK144

K8ZR Test Results

50 MHz MSK144 QSO Summary

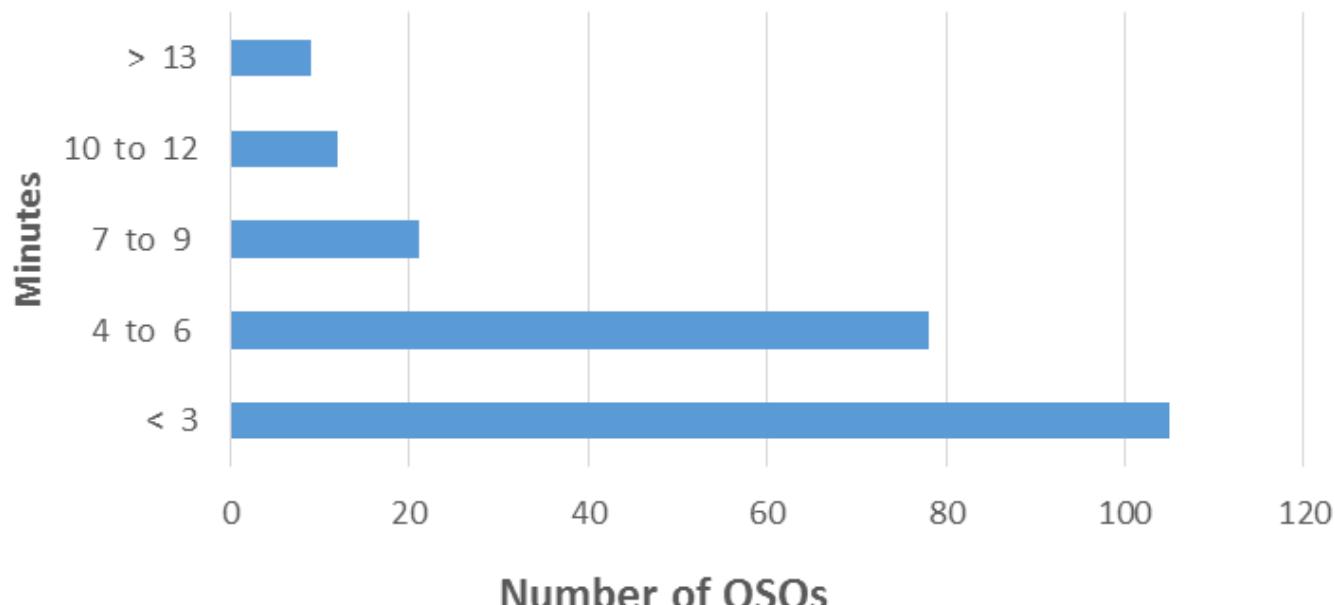
- Period January 23rd- March 13th: 50 days
- Number of 50 MHz MSK144 QSOs: 225
- Average number of minutes to complete a QSO: 4.6
- Number of unique callsigns worked: 50
- Number of unique callsigns decoded: 98
- Number of States worked: 22
- Number of unique Grids worked: 42
- Number of 90 second QSOs: 10
- Best DX K5DOG EM00wh: 1,223 miles

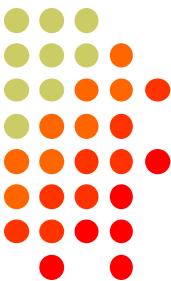


Meteor Scatter – MSK144

K8ZR Test Results

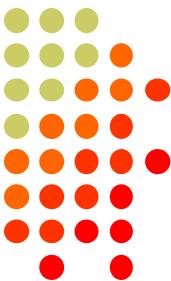
Table 2.
Time to Complete





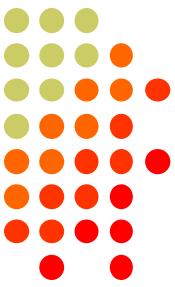
FT-8 “The Game Changer” ?

- **Outgrowth of JT65**
- **Shorter transmit-receive cycle**
 - Faster contacts – up to 4 times faster
 - Can complete within 1 minute
- **Sensitivity down to -20 dB**
- **Uses 8-Frequency Shift Keying format**

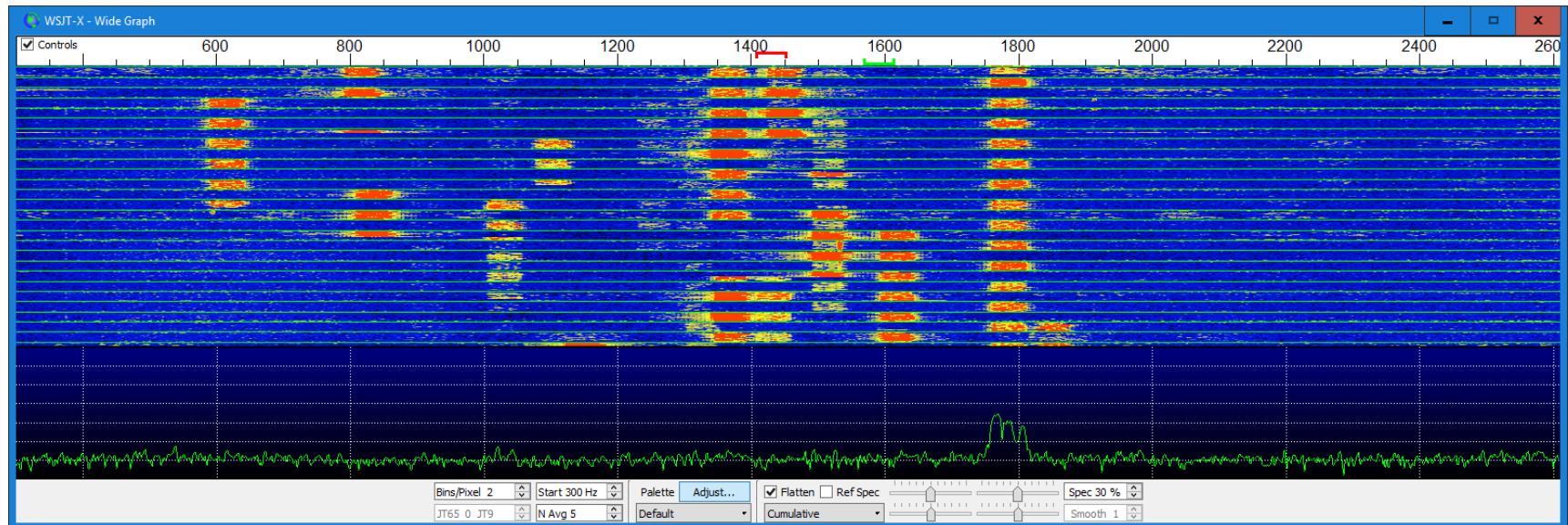


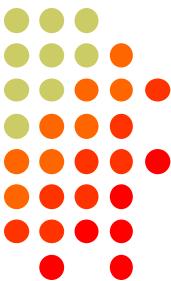
FT-8 “The Game Changer” ?

- **Excellent for multi-hop sporadic E**
 - Deep QSB often times impacts normal mode Q's
- **Operation centered on 50.313**

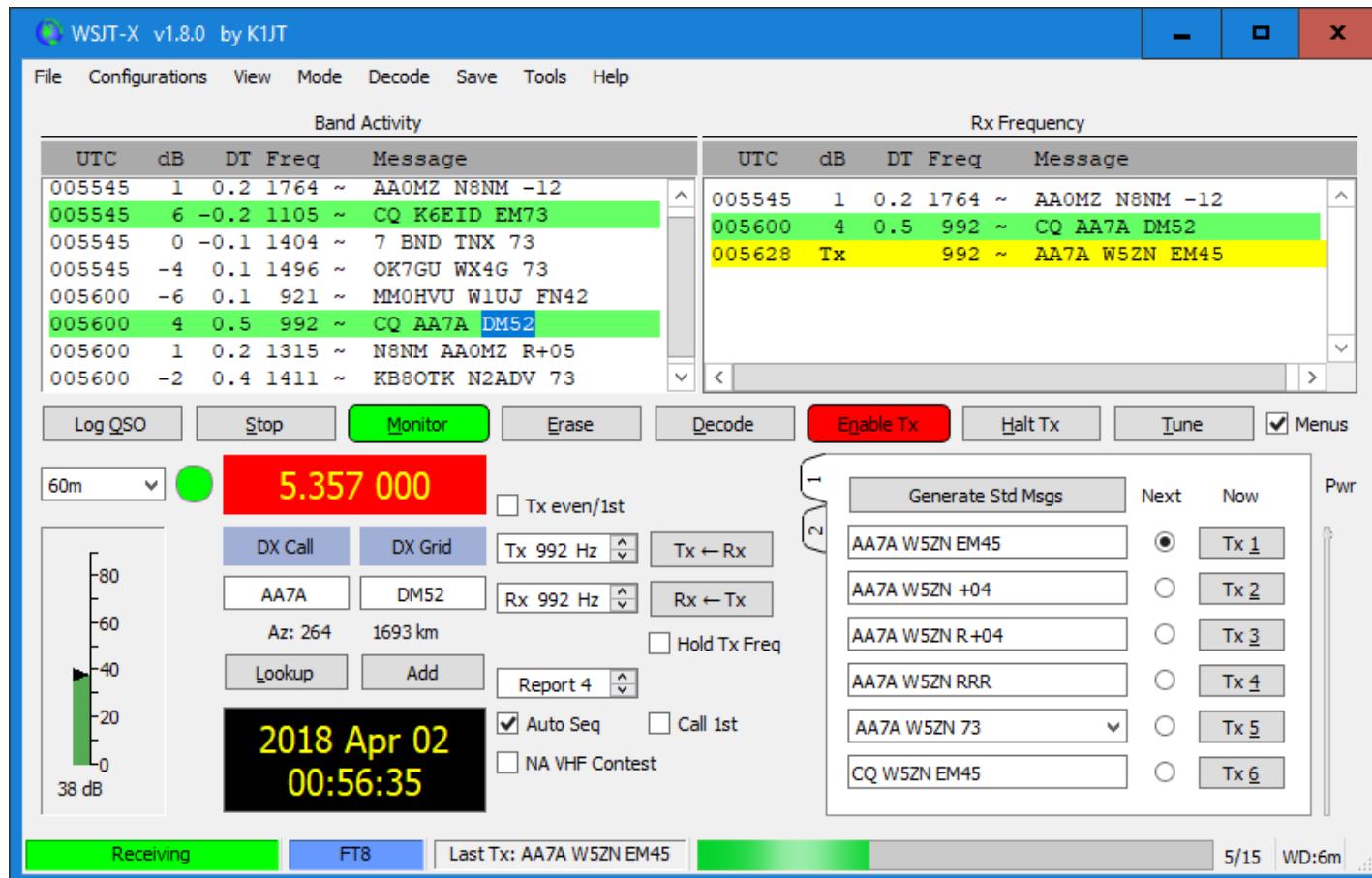


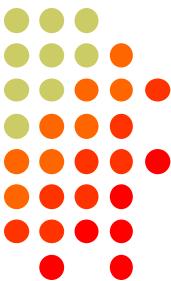
FT-8 “The Game Changer” ?





FT-8 “The Game Changer” ?





FT-8 “The Game Changer” ?

WSJT-X v1.8.0 by K1JT

File Configurations View Mode Decode Save Tools Help

Band Activity Rx Frequency

UTC	dB	DT	Freq	Message
005630	-10	0.2	1648	~ CQ OK7GU JN69
005700	3	0.5	992	~ KB8OTK AA7A -01
005700	1	0.3	1411	~ CQ N2ADV FN23
005715	3	-0.1	986	~ AA7A KB8OTK R-15
005730	5	0.5	992	~ KB8OTK AA7A RR73
005730	-2	0.3	1411	~ CQ N2ADV FN23
005800	2	0.5	992	~ W5ZN AA7A +10
005800	2	0.4	1411	~ CQ N2ADV FN23

UTC	dB	DT	Freq	Message
005655	Tx		992	~ AA7A W5ZN EM45
005700	3	0.5	992	~ KB8OTK AA7A -01
005715	3	-0.1	986	~ AA7A KB8OTK R-15
005730	5	0.5	992	~ KB8OTK AA7A RR73
005746	Tx		992	~ AA7A W5ZN EM45
005800	2	0.5	992	~ W5ZN AA7A +10
005815	Tx		992	~ AA7A W5ZN R+02

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune Menus

60m 5.357 000 Hold Tx Freq

DX Call DX Grid Tx 992 Hz Tx even/1st

AA7A DM52 Rx 992 Hz Hold Tx Freq

Az: 264 1693 km Auto Seq Call 1st

Lookup Add Report 2 NA VHF Contest

2018 Apr 02 00:58:20

Pwr

Generate Std Msgs Next Now

AA7A W5ZN EM45 Tx 1
AA7A W5ZN +02 Tx 2
AA7A W5ZN R+02 Tx 3
AA7A W5ZN RRR Tx 4
AA7A W5ZN 73 Tx 5
CQ W5ZN EM45 Tx 6

Tx: AA7A W5ZN R+02 FT8 Last Tx: AA7A W5ZN EM45 5/15 WD:6m



FT-8 “The Game Changer” ?

WSJT-X v1.8.0 by K1JT

File Configurations View Mode Decode Save Tools Help

Band Activity Rx Frequency

UTC	dB	DT	Freq	Message
005700	1	0.3	1411	~ CQ N2ADV FN23
005715	3	-0.1	986	~ AA7A KB8OTK R-15
005730	5	0.5	992	~ KB8OTK AA7A RR73
005730	-2	0.3	1411	~ CQ N2ADV FN23
005800	2	0.5	992	~ W5ZN AA7A +10
005800	2	0.4	1411	~ CQ N2ADV FN23
005830	5	0.5	992	~ W5ZN AA7A RR73
005830	3	0.3	1411	~ CQ N2ADV FN23

UTC	dB	DT	Freq	Message
005715	3	-0.1	986	~ AA7A KB8OTK R-15
005730	5	0.5	992	~ KB8OTK AA7A RR73
005746	Tx		992	~ AA7A W5ZN EM45
005800	2	0.5	992	~ W5ZN AA7A +10
005815	Tx		992	~ AA7A W5ZN R+02
005830	5	0.5	992	~ W5ZN AA7A RR73
005845	Tx		992	~ AA7A W5ZN 73

Log QSO Stop Monitor Erase Decode Enable Tx Halt Tx Tune Menus

60m 5.357 000 Hold Tx Freq

DX Call DX Grid Tx 992 Hz Tx even/1st

AA7A DM52 Rx 992 Hz

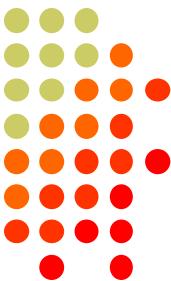
Az: 264 1693 km Auto Seq Call 1st

Lookup Add Report 5 NA VHF Contest

2018 Apr 02 00:58:45

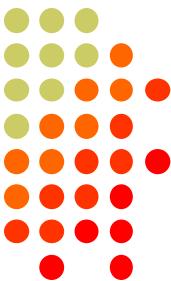
Generate Std Msgs Next Now Tx 1
 Tx 2
 Tx 3
 Tx 4
 Tx 5
 Tx 6

Tx: AA7A W5ZN 73 FT8 Last Tx: AA7A W5ZN R+02 0/15 WD:6m



FT-8 Disadvantage

- **QSO rates can be larger on other modes during big Sporadic E Openings**
 - While a quick FT-8 contact can be completed in 1 minute, SSB or CW rates can be 5 to 10 times that
- **Too many stations sit on 50.313 when the band opens and closes quickly on CW & SSB Frequencies!**



The Competitive Advantage

- **REMEMBER – you can use any mode**
 - Be prepared to USE THEM ALL!
- **Strategy:**
 - 1800z to 0200z
 - Monitor ~50.095 CW; ~50.125 SSB; 50.313 FT8
 - 0200z to 1500z
 - Meteors with MSK144 centered on 50.265
 - Use PingJockey to monitor activity & set skeds
 - <https://www.pingjockey.net/cgi-bin/pingtalk>



The Competitive Advantage

Home Webmail - Main The Low Band (160-40m) chat Ping Jockey Central by NØUK

https://www.pingjockey.net/cgi-bin/pingtalk

Ping Jockey Central.

Relief page Skeds in progress CO Announcements JT65 Link
Refresh Look back Distance/Bearing Locator Who's Earwigging?
Update User details AA1YN Callsign database Joel, WSZN AR EM45dh Refreshed 02Apr 01:13

This page is to be used only for the purposes of discussing matters related to amateur radio meteor scatter communications. Any non-meteor scatter use is strictly prohibited.

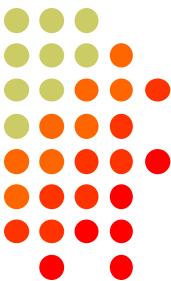
That means DO NOT USE THIS PAGE TO WORK JT65 or for General chit-chat.

Remember, in North America, 50.260MHz and 144.140MHz are calling not operating frequencies.

Exchanging any contact details on here before you're complete, invalidates the contact, and, if it's not HIGH-SPEED METEOR SCATTER, it doesn't belong here!

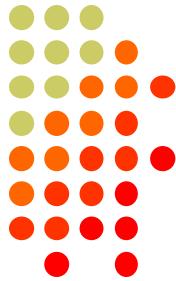
Enter your message here Go!

```
DDMM UTC
02Apr 00:46 73 Mike... (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:46 W5LDA Larry, RR... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:45 Dont know why the upgrade anyway... (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:45 OFF PJ BB In The Morning Maybe :-) (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:45 Mine stays as long as you dont X out and restart (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:45 I agree... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:45 I think I will never upgrade it any more... Every time it goes bonkers... (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:44 Oh well I am giving up for now..73 Larry... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:43 W5LDA Larry, I can not get the Font to be stable...Size keeps changing in the list of those signed in. (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:41 DID the same..Keep having to reset font color after loading up it sit... (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:40 W5LDA Larry, GE just trying to get PJ font set after installing Updat... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:39 GE... (W5LDA Larry OK EM15xu 192.169.27.149)
02Apr 00:38... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:37 W7OUU 73 Mike you still in the USA? (N2EME Paul MA FN32vo 74.78.8.127)
02Apr 00:05 QRT 2 Mats... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:05 AG6CV Mats, just not enough things to bounce off of at this time of day (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:04 ~ CQ 2nd - 260... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:03 K9VSW Mike yes. Thanks for trying with me. Strange it just died on us. (AG6CV/2/6 Mats CA DM12jw 75.25.160.100)
02Apr 00:03 rr that way it will count towards your DXCC (N2EME Paul MA FN32vo 74.78.8.127)
02Apr 00:02 AG6CV Mats, Going to have here..Thanks for try... (K9VSW Mike NM DM76el 216.158.249.18)
02Apr 00:01 N2EME, with luck from my real QTH (KF2T George DC FM18lw 66.44.24.95)
01Apr 23:59 W8BYA rrrr...73 (W7OUU/6/2/QRO Jim ID DN22sn 160.3.161.78)
01Apr 23:59 RRR could he come to work our from the coast? length, kind of sign... (N2EME Paul MA FN32vo 74.78.8.127)
01Apr 23:58 W7OUU RRR TU Jim...wilco 73 (W8BYA Gedas IN EN70jt 173.30.161.187)
01Apr 23:58 W8BYA well if anything changes hit me on the dingswh... (W7OUU/6/2/QRO Jim ID DN22sn 160.3.161.78)
01Apr 23:58 K9VSW Mike no RRR yet (AG6CV/2/6 Mats CA DM12jw 75.25.160.100)
01Apr 23:57 AG6CV Mats, Get anything lik a RRR? (K9VSW Mike NM DM76el 216.158.249.18)
01Apr 23:57 Maybe we can get together and buy one of those Japanese iron filings payloads -- artificial rox! (KF2T George DC FM18lw 66.44.24.95)
01Apr 23:57 I cannot afford the American Mark up on the Junta that the US sellers buy from China. Bloody shipping kills me :) (N2EME Paul MA FN32vo 74.78.8.127)
01Apr 23:57 WOLQQ-HI Greg, are you QRV on 2M MSK144? (N2AMC Gary NY FN32vo 174.202.11.115)
01Apr 23:56 I guess we would like to build something from China so they can hurry up & build another so it can fail and burn up in a couple years... (W8BYA Gedas IN EN70jt 173.30.161.187)
01Apr 23:55 But anything is possible... lots of error bars... (KF2T George DC FM18lw 66.44.24.95)
01Apr 23:55 W8BYA well drat, LOL (W7OUU/6/2/QRO Jim ID DN22sn 160.3.161.78)
01Apr 23:55 Jim, yes as of right now NA is OUT of the running ::-( (W8BYA Gedas IN EN70jt 173.30.161.187)
01Apr 23:55 W8BYA got any updates--I didn't see any other than it may land off the coast of chile (W7OUU/6/2/QRO Jim ID DN22sn 160.3.161.78)
01Apr 23:48 Back to cleanup... Will check PJ in a few minutes (K9VSW Mike NM DM76el 216.158.249.18)
01Apr 23:47 K9VSW Mike I know. Scenario (AG6CV/2/6 Mats CA FM123m 75.25.160.100)
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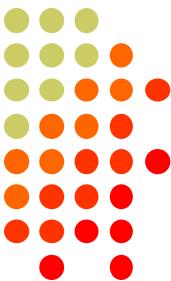
The Competitive Advantage

- **Use 2 Radios or 2nd RX**
 - Keep 2nd Radio on 50.313 FT-8 **at all times**
 - Keep main radio on CW/SSB frequencies
 - Move to MS frequencies during those peak times
- **Put up a separate antenna for RX #2**
 - Even a 3 or 4 element antenna will produce results
 - Fixed direction will work if toward activity area



The Competitive Advantage

- Remember you can listen on several frequencies at the same time
 - Only one transmitted signal per band at one time
- !!!!



The Competitive Advantage

- **How do I log digital Q's?**
 - Remember you can use any mode so you are not penalized if the mode is not logged correctly (SSB –vs- FT8, digital, etc)
- **Making the contact is the important step!**
 - Get the callsign & grid correct in your log