Harnessing Meteors For VHF QSOs.

QSO Today Ham Expo

Jim Wilson, K5ND



RESENTATION

Presenter K5ND

- Active VHF operator and addicted grid chaser.
- Worked meteor scatter contacts on six and two meters to add to VUCC and FFMA totals.
- Provided presentations on six meters and VHF contesting for the QSO Today Ham Expo.



Agenda



How Meteor Scatter Works

Meteors & Ionosphere Meteor Showers



Meteor Scatter Operation

WSJT-X Settings Operating Protocol

Meteors

24 / 7 / 365

- Tons of Meteors every day
- Tiny debris grain of sand
- 3x more at 6 AM than 6 PM
- Friction ionizes the E-layer

S P O R A D I C

Showers

- Predictable comet trails
- High concentration of meteors
- Major and minor showers
- Happen every year

ON SCHEDULE

View From above the North Pole











Meteor Showers

Major Showers	Date Range	Peak Date	Time Max
Quadrantids	January 1-6	January 3-4	14 hours
Eta Aquarids	April 21 to May 12	May 4-5	3 days
Arietids	May 29 to June 19	June 7	
Perseids	July 23 to August 20	August 12	4 to 6 days
Orionids	October 2 to November 7	October 20	2 days
Geminids	December 4 to 16	December 13	2.6 days

Meteor Showers



Meteor Showers



Meteor Scatter Operation



WSJT-X Settings

Operating Protocol

Getting on the Air Burst of Excitement

WSJT-X FAST GRAPH



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111315 18 1.7 1496 & K5ND KOTPP EM48 111315 19 1.7 1495 & K5ND KOTPP EM48 111315 5 8.1 1500 & K5ND KOTPP EM48

Sample of MSK144 Audio File and Screen Shots

Pings at 1.7, 3.5, 6.1, and 8.1 Decodes only at 1.7 and 8.1 50.260 MHz

MSK144 Actual QSO

16 Minute QSOLots of silencePings without decodesPings with decodes

UTC dB T Freq Message 125530 -2 11.8 1466 4 W5AU KASUE H03 130300 5 14.3 1466 4 W5AU KASUE H03 130300 5 14.3 1466 4 W5AU KASUE H03 130300 5 1.4 1466 4 W5AU KASUE H03 130300 7 5.0 1466 4 KSND KASUE H02 125815 TK 1500 4 KASUE KSND EM12 125945 TK 1500 4 KASUE KSND KASUE BM12 130045 TK 1500 4 KASUE KSND KASUE BM12 130145 TK 1500 4 KASUE KSND KASUE BM12 130245 TK 1500 4					Band Ad	tivity								Тх	Messages				
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Aneral Dadio Audio Ty Macros Deporting Fraguencies Colors	Advanced	Consul Dadia A	udia Tu Magraa Daa	erting Exercise (Calara Advance
Station Details My Grid: EM12 AutoGrid IARU Region: Message generation for type 2 compound callsign holders: Full call in Tx3 Display Start new period decodes at top Image: Start new period decodes at top Islank line between decoding periods Decode	Font	TIG5 VHF/UHF/Microwa Random erasure patte Aggressive decoding le ☑ Two-pass decoding	ave decoding parameters rns: 6 2 vel: 0 2 p	Miscellaneous Degrade S/N of .wav file: Receiver bandwidth: Tx delay: Tone spacing X 2 Waterfall spectra () Low sidelobes	0.0 dB 5000 Hz 60.5 s 6
IX messages to KX mequency window Show DXCC, grid, and worked-before status Show principal prefix instead of Highlight DX Call in message Highlight DX Grid in message	country name	Special operating ac Fox NA VHF	Ctivity O Hound O ARRL Field Da	ay FD	Exch: 1D NTX
Monitor off at startup Monitor off at startup Monitor returns to last used frequer Double-click on call sets Tx enable Disable Tx after sending 73 Calling CQ forces Call 1st Alternate F1-F6 bindings Tx watchdog:	Disabled	O EU VHF Contest) FT Roundup) ARRL Digi Cor	FT RU	Exch:
CW ID after 73 Periodic CW ID Ir	nterval: 0				

Rig Control and Audio Settings are the Same as any WSJT Mode (FT8)

Enable VHF Settings and Single Decode

For Contest Mode use NA VHF

Band Activity Tx Message UTC dB T Freq Message		Band Activity Tx Messages UTC dB T Fri Message UTC dB T Fri Message UTC dB Log QS0 Stop Monitor Erase Decode Enable Tx Halt Tx Tune Men	la Configu	urations	View Mode	Decode Savo	Tools Help								
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Mode Menu — Select MSK144



MSK144 WSJT-X



	144.150 (000	Tx even/1st	-	Generate Std Msgs						
	DX Call	DX Grid	Rx 1500 Hz 🜩	~	WB0JPN K5ND EM12						
	WB0JPN	EM29	Report 0 🖨		WB0JPN K5ND EM12						
	Az: 12 A: 28 El: 11	495 mi	T/R 15 s 🖨		WB0JPN K5ND R EM12						
	Lookup	Add	Tx CQ 260 ≑ 🗌		WB0JPN K5ND RRR						
ഗ	2022 Δμα	16	Sh 🗹 Auto Seq		WB0JPN K5ND 73 V						
U	16:52:0	1			CQ TEST K5ND EM12						
Z		-									
-			Tx even/1st	\subset							
ш	144.150 (000	F Tol 200 🖨	5	Generate Std Msgs						
S	DX Call	DX Grid	Rx 1500 Hz 🖨	2	WB0JPN K5ND EM12						
	WB0JPN	EM29	Report 1 🚔		WB0JPN K5ND EM12						
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	2022 Aug	16	Sh 🗹 Auto Seq		<wb0jpn k5nd=""> 73 ~</wb0jpn>						
	16,52,5	1			CQ TEST K5ND EM12						

Contest Mode

RRR instead of RR73

Contest Mode with SH Messages Short-Hand 20 ms messages Normally 72 ms messages Meteor Scatter Operating Protocol

- Frequencies: 50.260 and 50.265 144.150
- Early Mornings are Best Times
- Pointing East, Send 1st Sequence
- Pointing West, Send 2nd Sequence
- Contest Mode often used on 6 meters
- Contest Mode + SH used on 2 meters
- Random Contacts Are Rare
- Usually, Coordinate via Chat Rooms
- Ping Jockey VHF-Chat-Slack ON4KST
- PSK Reporter Virgo

Meteor Scatter Operating Protocol

Major Showers	Date Range	Best Paths and Local Times
Quadrantids	January 1-6	NE-SW 1300 to 1500, SE-NW 0500 to 0700
Eta Aquarids	April 21 to May 12	NE-SW 0500 to 0700, E-W 0600 to 0900, SE-NW 0900 to 1100
Arietids	May 29 to June 19	N-S 0600 to 0700 and 1300 to 1400
Perseids	July 23 to August 20) NE-SW 0900 to 1100, SE-NW 0700 to 0800
Orionids	October 2 to November 7	NE-SW 0100 to 0300, N-S 0100 to 0200 and 0700 to 0900, NW-SE 0700 to 0800
Geminids	December 4 to 16	N-S 2200 to 2400 and 0500 to 0700

Sample QSO

		В	and Activity			Tx Messages								
UTC	dB	T Freq	Message			UTC	dB	T Freq	Messa	age				
173130	-1	8.9 1454 &	CQ CMSH KO9A	EN52	~	174330	0	3.9 1502 (s CQ TI	ST WO	VB DN'	74		
173130	0	9.6 1454 &	CQ CMSH KO9A	EN52		174449	Тx	1500 4	WOVB	K5ND	EM12			
173615	-6	8.8 1487 &	KO9A AA5AM EM	113		174515	Тx	1500 4	wovb	K5ND	EM12			
173615	-5	8.8 1486 &	KO9A AA5AM EM	113		174545	Тx	1500 4	wovb	K5ND	EM12			
173615	-2	9.9 1487 &	KO9A AA5AM EM	113		174615	Тx	1500 4	wovb	K5ND	EM12			
174200	0	5.5 1493 &	CQ TEST WOVE	DN74		174645	Тx	1500 4	wovb	K5ND	EM12			
174200	1	5.5 1495 &	CQ TEST WOVE	DN74		174715	Тx	1500 4	wovb	K5ND	EM12			
174330	-2	3.4 1499 &	CQ TEST WOVE	DN74		174745	Тx	1500 4	wovb	K5ND	EM12			
174330	0	3.9 1502 &	CQ TEST WOVE	DN74		174815	Тx	1500 4	wovb	K5ND	EM12			
175400	-3	14.9 1501 &	K5ND WOVE DN7	4		174845	Тx	1500 4	wovb	K5ND	EM12			
175600	1	0.9 1508 &	<k5nd wovb=""> F</k5nd>	RR		174915	Тx	1500 4	wovb	K5ND	EM12			
						174945	Тx	1500 4	wove	K5ND	EM12			
						175015	Тx	1500 4	wove	K5ND	EM12			
						175045	Тx	1500 4	wove	K5ND	EM12			
						175115	Тx	1500 4	wove	K5ND	EM12			
						175145	Tx	1500	WOVB	K5ND	EM12			
						175215	Tx	1500	WOVB	K5ND	EM12			
						175245	Tx	1500	WOVB	K5ND	EM12			
						175315	Tx	1500	WOVB	K5ND	EM12			
						175345	Tx	1500	WOVB	K5ND	EM12			
						175400	-3	14.9 1501 (K5ND	WOVB	DN74			
						175415	Tx	1500	WOVB	K5ND	R EM12	2		
						175445	Tx	1500	WOVB	K5ND	R EM12	2		
						175515	Tx	1500	WOVB	K5ND	R EML	2		
						175545	Tx	1500	WOVB	K5ND	R EML	2		
						175600	1	0.9 1508	s <k5ni< td=""><td>O WOVE</td><td>> RRR</td><td></td><td></td></k5ni<>	O WOVE	> RRR			
						175615	Tx	1500	s <wov< td=""><td>B K5NI</td><td>> 73</td><td></td><td></td></wov<>	B K5NI	> 73			
	0	Stop	Manitar	France	~	Decode	E	inable Ty	Halt Ty		Tup		Men	
LOG QS	0	Stop	Monitor	Erase	-	Jecoue		nable 1x	ndit 1 X		TUNE		Men	
2m ~	s	144.1	50 000	Tx even/1st	5		(Generate Std Msg	s		Next	Now	P	
Г	Н	DX Call	DX Grid	x 1500 Hz ≑	C						0	Tx 1		
-80	FT8			Report 0 😫							0	Tx 2		
-60	FT4			T/R 15 s 🖨							0	Tx 3		
-40		Lookup	Add	x CQ 260 韋 🗌								Tx 4		
-20	MSK	2022	A 12	Sh 🗹 Auto Seq		<w0vb k5n<="" td=""><td>D> 73</td><td></td><td></td><td>~</td><td></td><td>Tx 5</td><td>ī II</td></w0vb>	D> 73			~		Tx 5	ī II	
Lo	Q65	2022	Aug 13	NA VHF SWL		CO TEST KE		12				Ty 6	-	
77 dB	JT65	1/:	59:25									14.0		
Receiving	8%	HF 9100 Rcvr	MSK144 Last	Tx: <w0vb k5nd=""> 7</w0vb>	3								10/15	

Answering CQ TEST, which usually means Contest Mode, Short-Hand on 2 meter MS QSOs

10 minutes for a reply

Note the < brackets > for the SH

QSY QSO

				Band A	tivity				Tx Messages										
	dB	Т	Freq	Mes	sage				UTC	dB	Т	Freq		Message					
	-1 0 1 0 1	8.9 2.3 2.3	1523 1521 1520	& W55 & W55 & W55	UM NOLI UM NOLI UM NOLI	/P RRR /P RRR /P RRR		^	103300 103315	-2 Tx	8.2	1521 1500	& &	W5SUM NOL NOLL/P K5	L/P RRI ND EMI:	R 2			
CQ CALL	2 4 5 6 4 1 4 -4 2 1 0 14 14 14 13	0.8 0.9 8.5 8.5 9.3 2.0 0.7 5.5 4.2 2.5 1.3 0.5 1.4	1525 1523 1524 1524 1524 1525 1525 1525 1515 1493 1488 1487 1487	4 W5S 5 CQ 5 K5N 5 K5N 5 K5N 5 K5N 5 CQ 5 NOL 5 NOL 5 NOL	UM NOLI UM NOLI UM NOLI 250 CO UM NOLI D NOLL D NOLL D NOLL D NOLL 250 CO L/P WAS L/P WAS L/P WAS	/ P RRR / P R P R / P R P R P R P R P R P R P R P R P R P	7 U.S.A. 7 U.S.A. 6 6		103345 103400 103415 103430 103430 103445 103515 103835 103500 103900 103916 103945 104000	Tx 4 Tx -4 2 Tx Tx Tx 0 1 Tx Tx 2 Tx	0.7 5.5 14.2 2.5 8.5	1500 1525 1500 1525 1515 1500 1500 053 1493 1494 1500 1500 1475	د د د د د د د د د د د د د د د د د د د	NOLL/P K5 K5ND NOLL NOLL/P K5 K5ND NOLL K5ND NOLL NOLL/P K5 NOLL/P K5 50.250 CQ 250 KG WS5N KG5CC KG5CCI K5 K5ND KG5C	ND EM1: /P +00 ND R EL /P RRR /P RRR ND 73 SCCI EL CI 73 ND EM1: ND EM1: CI -03 ND R E1	2 M12 M07 U. 2 2	.s.a.		
Q S γ	13 12	0.4	1489 1487 Stop 50.	ε ΝΟΙ ε ΝΟΙ 250 (L/P WAS L/P WAS Monitor	TKU 73 TKU 73	Erase ven/1st 200		104030 104030 Decode	0 1 E	6 . 4 6 4 inable T Generat	1492 1493 x	د د sgs	KSND KGSC KSND KGSC Halt Tx	CI -03 CI -03 Tun Next	e Now	Mer F	ר ז א	
	H FT8 FT4 MSK Q65 JT65		DX Ca Lookup 202 1(an 2 Aug 2:44:(DX Grid Add 13 07	Rx 150 Report T/R 1 Tx CQ 2 Sh NA VH	0 Hz ÷ t 1 ÷ 5 s ÷ 60 ÷ · · ·	[2	KG5CCI K5N CQ TEST K5	ND 73	12					Tx 1 Tx 2 Tx 3 Tx 4 Tx 5 Tx 6			
)%	6m	SDR	MS	(144	Last Tx: K	G5CCI K5ND 7	3									7/1	5	

Used during heavy activity levels Call on the Calling Frequency QSY to another frequency for QSO Meteor Scatter Gear

- Computer and Rig Interface
- Rig with 100+ watts on 6 meters
- High power is helpful, particularly on 2 meters
- Directional antennas are best Preamps on 2
- K1JT recommends 16-degree beamwidth for long paths and
 32-degree beamwidth for shorter paths
- B or A indicate optimum offset azimuth vs. Az direct
- See the window on WSJT for Azimuth and Elevation





My station uses a push-up mast in the backyard with simple antennas.

Running about 200 watts on both 6 and 2.

Personal Distance Records: 6 m – N6RMJ – DM14 – 1,195 miles 2 m - W3XTT – FN01 – 1,224 miles Get on the Air WSJT-X Operating Manual <u>https://physics.princeton.edu//pulsar/k1jt/wsjtx-doc/wsjtx-</u> main-2.5.4.html# msk144

WSJT References Page – MSK144 Protocol, QEX July/August 2017 <u>https://physics.princeton.edu//pulsar/k1jt/refs.html</u>

VHF Meteor Scatter—An Astronomical Perspective By Michael Owen, W9IP/2, QST June 1986

References

Thanks.

Jim Wilson

