

World Wide Digi DX Contest

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Why?

- **Tremendous FT8 adoption over CW/SSB/RTTY**
- **World Wide DX contests are the most popular**
- **WWROF & SCC want to lead into the future**



WW Digi Contest

- **Idea floated at Visalia IDXC, 19 April 2019**
- **29 June 2019 Press Release**
- **18 July Reflector Posting on Rules revision:**
 - **SNR becomes optional in the 2019 exchange**
 - **Fox and Hound method of multi-streaming QSOs is strongly discouraged for 2019**
- **Vision vs. 2019 reality**
 - **Long-term contest vision**
 - **2019 reality**



Vision

1. Equitable Scoring

- QSO points: distance-based Grid Squares
- Multipliers: 324 Grid Fields per band

2. True Signal Reports

3. Transparent Inter-Operability with Non-Contesters

4. State-of-the-Art Signal Mode

- Deeply sensitive
- Narrow with near-vertical skirts
- FEC for “perfect” copy (obsoletes SCP)
- Multiple parallel QSOs (narrow-band Skimmer)



Vision – *2019 Limitations*

1. Equitable Scoring

- QSO points: distance-based Grid Squares
- Multipliers: 324 Grid Fields per band

2. *True Signal Reports (optional)*

3. *Transparent* Inter-Operability with Non-Contesters

4. State-of-the-Art Signal Mode

- Deeply sensitive
- Narrow with near-vertical skirts
- FEC for “perfect” copy
- *Multiple parallel QSOs*



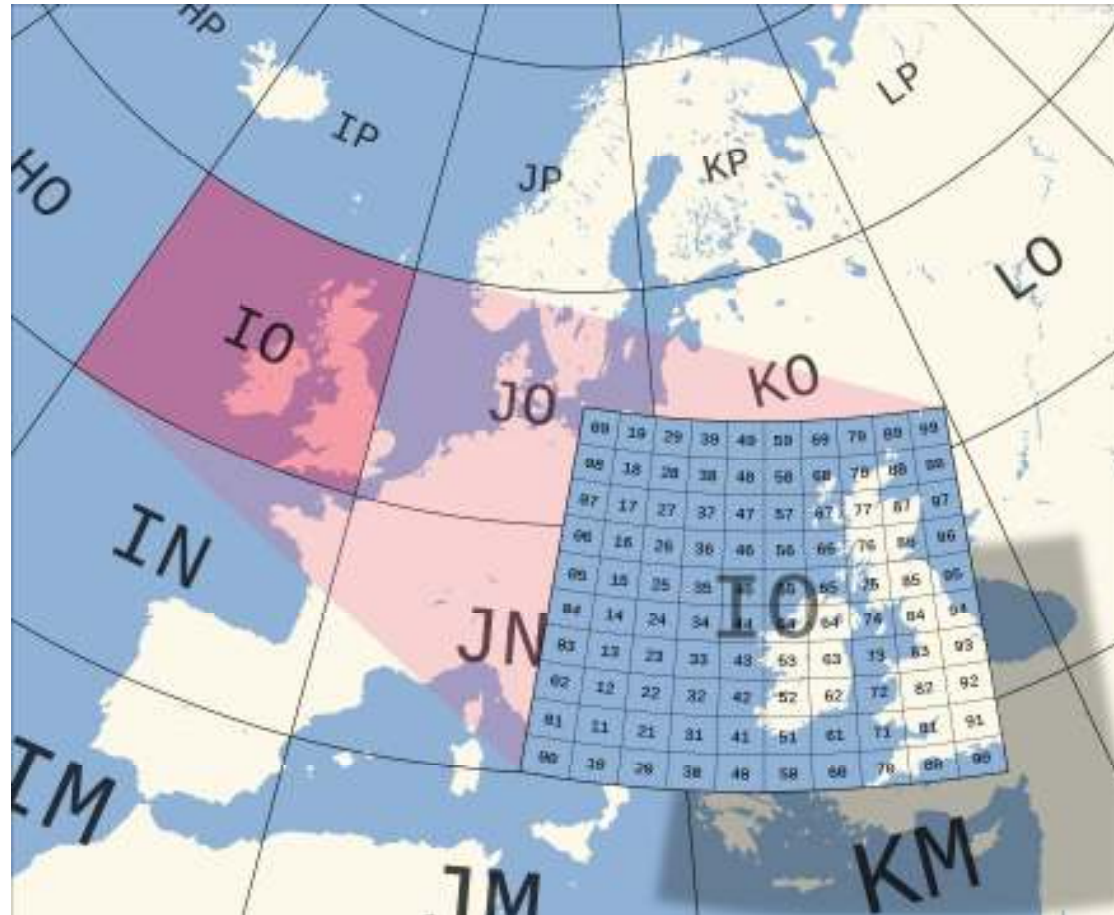
Grid Fields

(c) E181C

AR	BR	CR	DR	ER	FR	GR	HR	IR	JR	KR	LR	MR	NR	OR	PR	QR	RR
AQ	BQ	CQ	DQ	EQ	FQ	GQ	HQ	IQ	JQ	KQ	LQ	MQ	NQ	OQ	PQ	QQ	RQ
AP	BP	CP	DP	EP	FP	GP	HP	IP	JP	KP	LP	MP	NP	OP	PP	QP	RP
AO	BO	CO	DO	EO	FO	GO	HO	IO	JO	KO	LO	MO	NO	OO	PO	QO	RO
AN	BN	CN	DN	EN	FN	GN	HN	IN	JN	KN	LN	MN	NN	ON	PN	QN	RN
AM	BM	CM	DM	EM	FM	GM	HM	IM	JM	KM	LM	MM	NM	OM	PM	QM	RM
AL	BL	CL	DL	EL	FL	GL	HL	IL	JL	KL	LL	ML	NL	OL	PL	QL	RL
AK	BK	CK	DK	EK	FK	GK	HK	IK	JK	KK	LK	MK	NK	OK	PK	QK	RK
AJ	BJ	CJ	DJ	EJ	FJ	GJ	HJ	IJ	JJ	KJ	LJ	MJ	NJ	OJ	PJ	QJ	RJ
AI	BI	CI	DI	EI	FI	GI	HI	II	JI	KI	LI	MI	NI	OI	PI	QI	RI
AH	BH	CH	DH	EH	FH	GH	HH	IH	JH	KH	LH	MH	NH	OH	PH	QH	RH
AG	BG	CG	DG	EG	FG	GG	HG	IG	JG	KG	LG	MG	NG	OG	PG	QG	RG
AF	BF	CF	DF	EF	FF	GF	HF	IF	JF	KF	LF	MF	NF	OF	PF	QF	RF
AE	BE	CE	DE	EE	FE	GE	HE	IE	JE	KE	LE	ME	NE	OE	PE	QE	RE
AD	BD	CD	DD	ED	FD	GD	HD	ID	JD	KD	LD	MD	ND	OD	PD	QD	RD
AC	BC	CC	DC	EC	FC	GC	HC	IC	JC	KC	LC	MC	NC	OC	PC	QC	RC
AB	BB	CB	DB	EB	FB	GB	HB	IB	JB	KB	LB	MB	NB	OB	PB	QB	RB
AA	BA	CA	DA	EA	FA	GA	HA	IA	JA	KA	LA	MA	NA	OA	PA	QA	RA



Grid Squares



Maidenhead Locator System

Grid Fields

- **Two letters, A-R**
 - e.g., 'CM'
- **18 x 18 equal grid**
- **324 world wide**
- **Size-based, not geo-political**

Grid Squares

- **10 x 10 grids per Field**
 - e.g., 'CM97'
- **180 x 180 equal grid**
- **32,400 world wide**
- **Size-based, not geo-political**

en.wikipedia.org/wiki/Maidenhead_Locator_System



Vision

1. Equitable Scoring

- QSO points: distance-based on Grid Squares
 - 32,400 Grid Squares
 - 223 x 445 km
 - Center-to-center distance
 - 3,000 km/point; 1-7 points per QSO
- Multipliers: 324 Grid Fields per band
 - 2,226 x 4,453 km
 - <200 active
 - Encourages DXing
 - Grid Squares would dilute value of distant locations



W6 QSO Points (1-4)



4 Aug 2019



Slovenia
contest club

10/48

W6 QSO Points (5-7)



DL QSO Points (1-4)



4 Aug 2019



12/48

DL QSO Points (5-7)



4 Aug 2019



Exchange *Constraint*

S50A K3LR EN91 +02

- **16-bit Exchange constraint**
- **15-bit Grid Square**
- ***9-bit SNR doesn't fit***



Vision – 2019 Limitations

2. True Signal Reports (optional)

- *Grid Square + SNR won't fit in 16-bit exchange*
- *Standard FT messaging uses two exchange messages:*
 - CQ K1JT FN20**
 - K1JT K9AN EN50**
 - K9AN K1JT -03**
 - K1JT K9AN R+01**
- *NA VHF Contest messaging only sends Grid Square message:*
 - CQ WW K1JT FN20**
 - K1JT K9AN EN50**
- *Future: Perhaps a new messaging technique will include both*



Vision – *2019 Limitations*

3. *Transparent* Inter-Operability with Non-Contesters

- Auto-Sequencing works fine between both messaging sequences, *unless ...*
 - *Non-contester is confused by not getting SNR*
 - *May repeat their SNR message hoping to get one in return*
 - *Non-contester sends Tx 2 (SNR) instead of Tx 1 (Grid Square)*
 - *Contester doesn't get Grid Square*
- *May not log the QSO, but unlikely to submit a log anyway*

(more details later)



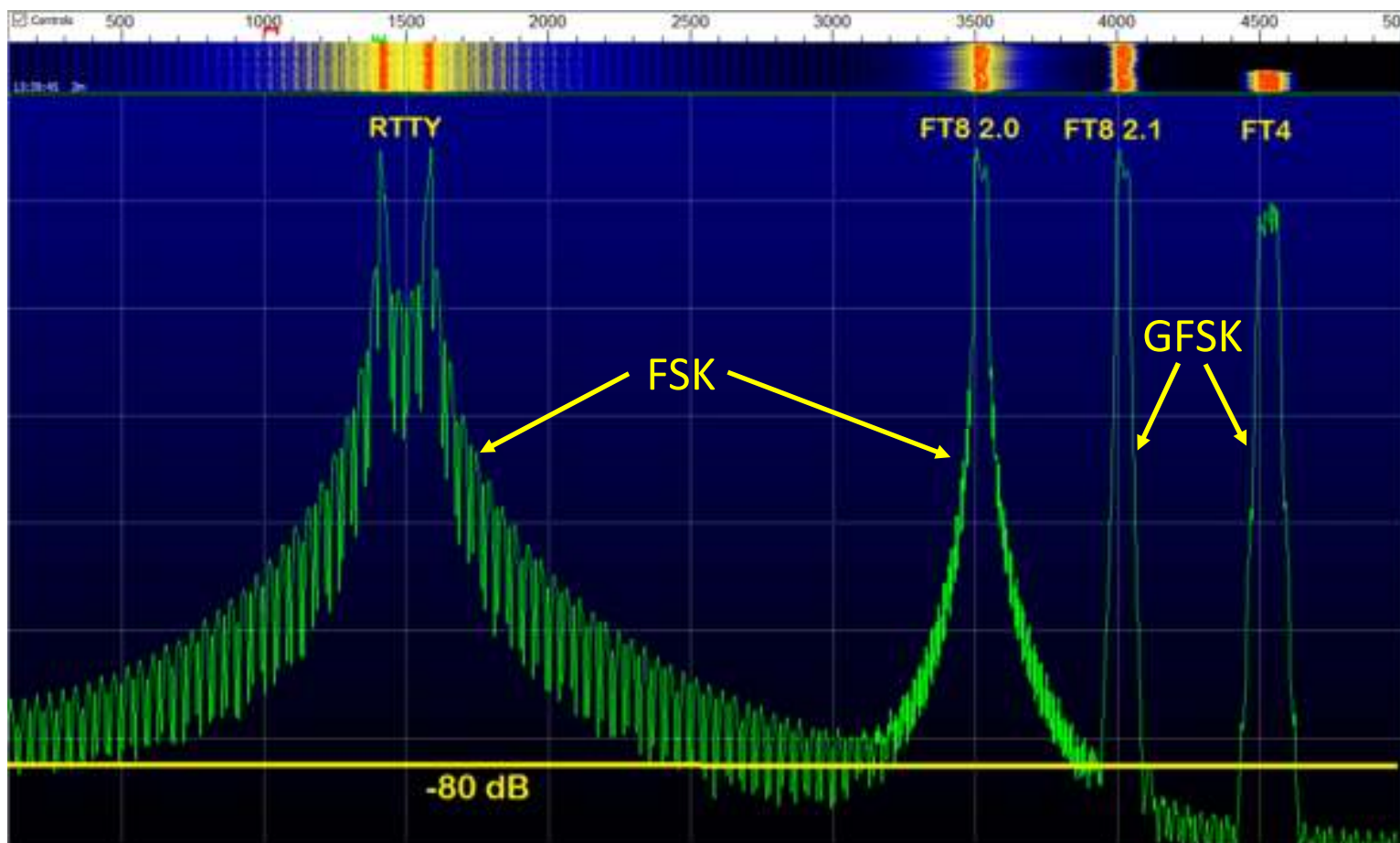
Vision – *2019 Limitations*

4. State-of-the-Art Signal Mode

- Deeply sensitive
- Narrow with near-vertical skirts
- FEC for “perfect” copy
- *Multiple parallel QSOs*
 - *Fox and Hound mode unsuitable for contesting*
 - *Different technique is required in the future*
 - *(Perhaps a ‘TU;’ message for rolling QSOs)*



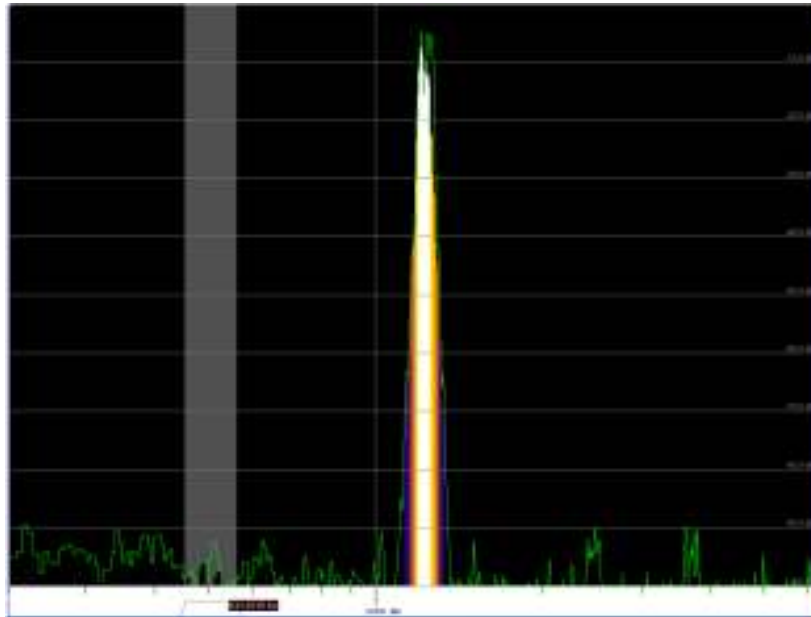
GFSK FT4/8 vs. FSK RTTY



Courtesy of Joe Taylor, K1JT

Single Audio Signal

Single GFSK FT4 Audio Signal

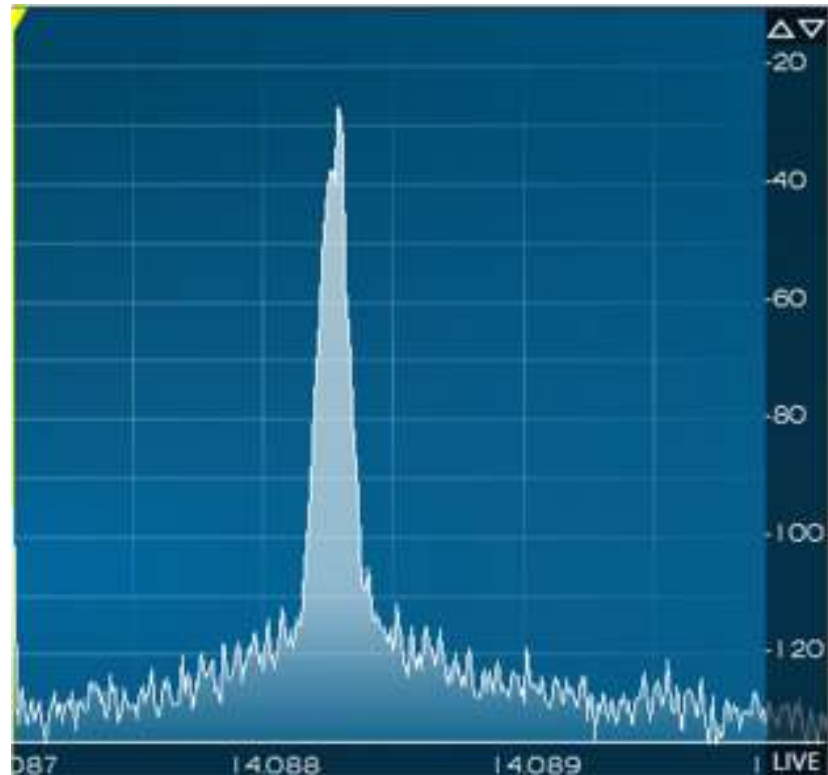


Courtesy of Christo Hristov, LZ2HV



4 Aug 2019

On-the-Air RF Signal



Courtesy of Wayne Wright, W5XD



19/48

Fox and Hound Mode

Triple GFSK FT4 Audio Signal

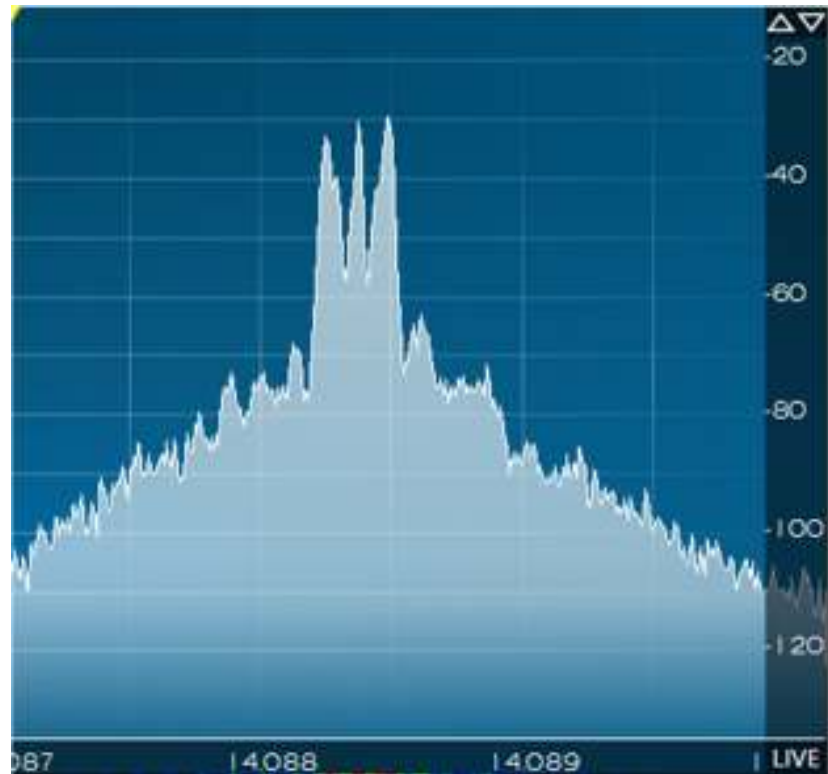


Courtesy of Christo Hristov, LZ2HV



4 Aug 2019

On-the-Air RF Signal



Courtesy of Wayne Wright, W5XD



20/48

Supporting Software

Modem

- **WSJT-X (or JTDX)**
- **DigiRite**
- **MSHV 2.24 or later**
- **WSJT-X**
 - **NA VHF Contest mode**
 - **Default mode**
- **JTDX (default mode)**

Contest Logging

- **N1MM+**
 - **WriteLog**
 - **MSHV 2.24 or later**
 - **WSJT-X**
 - **Cabrillo export**
 - **ADIF Converter**
 - **JTDX (ADIF Converter)**
- Dupe checking
Scoring
SO2V, SO2R
Multi-Op



Messages

WSJT-X NA VHF Contest mode

Tx 1: AA5AU S52D JN76

Tx 2: AA5AU S52D JN76

Tx 3: AA5AU S52D R JN76

Tx 4: AA5AU S52D RR73

Tx 5: AA5AU S52D 73

Tx 6: CQ TEST S52D JN76



NA VHF Contest Mode

S52D's Messages

Tx 1: AA5AU S52D JN76

Tx 2: AA5AU S52D JN76

Tx 3: AA5AU S52D R JN76

Tx 4: AA5AU S52D RR73

Tx 5: AA5AU S52D 73

Tx 6: CQ TEST S52D JN76

AA5AU's Messages

Tx 1: S52D AA5AU EL49

Tx 2: S52D AA5AU EL49

Tx 3: S52D AA5AU R EL49

Tx 4: S52D AA5AU RR73

Tx 5: S52D AA5AU 73

Tx 6: CQ TEST AA5AU EL49



NA VHF Contest Mode

Tx 6: CQ TEST S52D JN76

Tx 2: S52D AA5AU EL49

Tx 3: AA5AU S52D R JN76

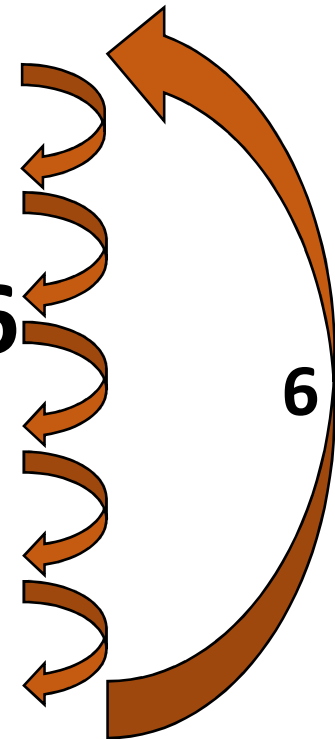
Tx 4: S52D AA5AU RR73

Tx 5: AA5AU S52D 73



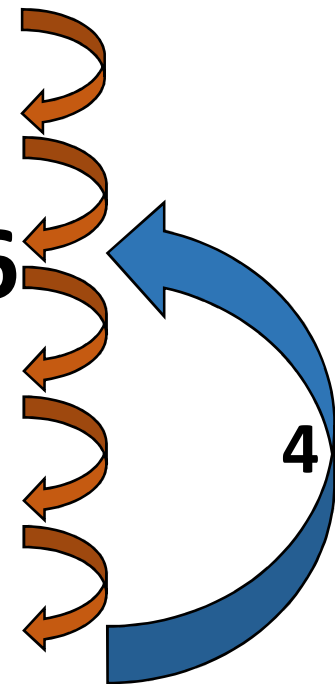
NA VHF Contest Mode

1. Tx 6: CQ TEST S52D JN76
2. Tx 2: S52D AA5AU EL49
3. Tx 3: AA5AU S52D R JN76
4. Tx 4: S52D AA5AU RR73
5. Tx 5: AA5AU S52D 73
6. [RX cycle]



NA VHF Contest Mode

1. Tx 6: CQ TEST S52D JN76
2. Tx 2: S52D AA5AU EL49
3. Tx 3: AA5AU S52D R JN76
4. Tx 4: S52D AA5AU RR73
5. Tx 5: AA5AU S52D 73
2. Tx 2: S52D K6YT CM97



Default Mode

S52D's Messages

Tx 1: AA5AU S52D EN53

Tx 2: AA5AU S52D -15

Tx 3: AA5AU S52D R -15

Tx 4: AA5AU S52D RR73

Tx 5: AA5AU S52D 73

Tx 6: CQ S52D EN53

AA5AU's Messages

Tx 1: S52D AA5AU EL49

Tx 2: S52D AA5AU -09

Tx 3: S52D AA5AU R -09

Tx 4: S52D AA5AU RR73

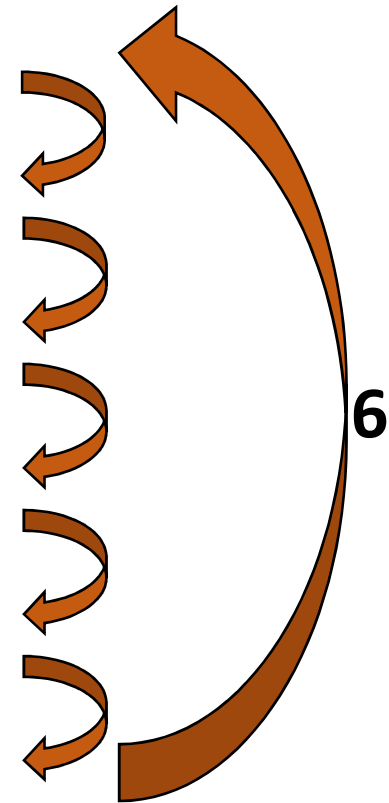
Tx 5: A52D AA5AU 73

Tx 6: CQ AA5AU EL49



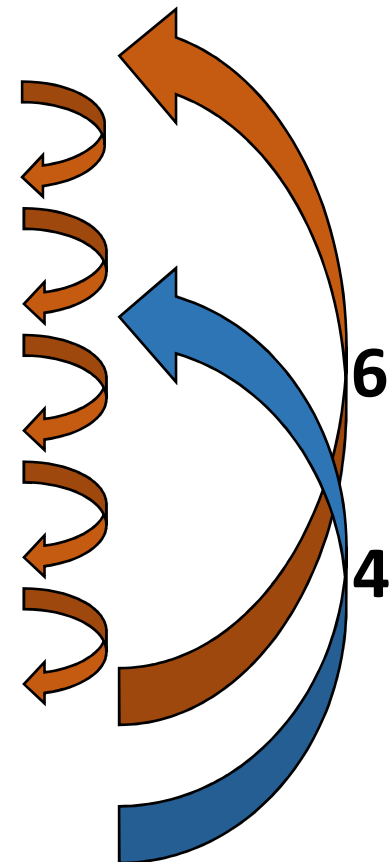
Default Mode

1. Tx 6: CQ S52D JN76
2. Tx 1: S52D AA5AU EL49
3. Tx 2: AA5AU S52D -15
4. Tx 3: S52D AA5AU R -09
5. Tx 4: AA5AU S52D RR73
6. Tx 5: S52D AA5AU 73



Default Mode

1. Tx 6: CQ S52D JN76
 2. Tx 1: S52D AA5AU EL49
 3. Tx 2: AA5AU S52D -15
 4. Tx 3: S52D AA5AU R -09
 5. Tx 4: AA5AU S52D RR73
 6. Tx 5: S52D AA5AU 73
- Tx 1: S52D K6YT CM97*



Mixed Mode QSOs

Contester CQ; Non-Contester S&P

UTC	dB	DT	Freq	Message
172715	-6	0.1	1278	~ CQ WW JA1XS PN92 Japan
172730	Tx		1278	~ JA1XS K6YT CM97
172745	-1	-0.1	923	~ K6YT JA1XS R PN92
172800	Tx		1278	~ JA1XS K6YT RR73
172815	-1	0	1755	~ K6YT JA1XS 73

} 4 cycles

Non-Contester CQ; Contester S&P

UTC	dB	DT	Freq	Message
172715	-6	0.1	1278	~ CQ JA1XS PN92 Japan
172730	Tx		1278	~ JA1XS K6YT CM97
172745	-1	-0.1	923	~ K6YT JA1XS -12
172800	Tx		1278	~ JA1XS K6YT R CM97
172815	-1	0	1755	~ K6YT JA1XS RR73
172830	Tx		923	~ JA1XS K6YT 73

} 6 cycles

- **Contester set up for NA VHF Contest mode messages**
- **Non-Contester set up for standard default messages**
- **Both have Auto Seq enabled and let it run**



Dysfunctional Mixed Mode QSO

Non-Contester is confused by not receiving SNR.

UTC	dB	DT	Freq	Message
172715	-6	0.1	1278	~ CQ JA1XS PN92 Japan
172730	Tx		1278	~ JA1XS K6YT CM97
172745	-1	-0.1	923	~ K6YT JA1XS -13
172800	Tx		1278	~ JA1XS K6YT RR73
172815	-1	0	1755	~ K6YT JA1XS -13
172830	Tx		923	~ JA1XS K6YT RR73
172845	-4	0.2	1465	~ K6YT JA1XS -13
172900	Tx		923	~ JA1XS K6YT RR73
172915	-6	0.1	1278	~ CQ JA1XS PN92 Japan

8 cycles
wasted

- *Non-Contester re-sends SNR, hoping to receive one back*
- *Contester re-sends RR73, hoping to complete the QSO*



Dysfunctional Mixed Mode QSO

Non-Contester sends Tx 2 (SNR) instead of Tx 1 (Grid Square).

UTC	dB	DT	Freq	Message
172715	-6	0.1	1278	~ CQ WW JA1XS PN92 Japan
172730	Tx		1278	~ JA1XS K6YT -07
172745	-1	-0.1	923	~ K6YT JA1XS PN92
172800	Tx		1278	~ JA1XS K6YT -07
172815	-1	0	1755	~ K6YT JA1XS PN92
172830	Tx		923	~ JA1XS K6YT -07
172845	-4	0.2	1465	~ K6YT JA1XS PN92
172900	Tx		923	~ JA1XS K6YT -07
172915	-6	0.1	1278	~ CQ WW JA1XS PN92 Japan

8 cycles
wasted

- *Contester re-sends his Grid Square, hoping to receive one back.*
- *Non-contester keeps sending SNR, hoping to get one back.*



Inter-Operability

Daily Sub-Bands

- Default Mode
- **NA VHF Contest** 

WW Digi Sub-Bands

- NA VHF Contest Mode
- **Non-Contester**
 - Tx 1: Auto Seq works
 - Tx 2:
 - Auto Seq retries
 - Manual intervention
 - Log QSO
 - With Grid Square



Dynamic Messaging

WSJT-X

- **Setup Two Configurations of WSJT-X**
 1. Special operating activity/NA VHF Contest
 2. Standard messaging (uncheck 'Special operating ...')
- **Dynamically select which configuration to use**
 - Only feasible between QSOs
 - Not after a new call is already queued up
- **Streamlines QSO with non-contester**
 - Satisfies his desire for SNR
 - Eliminates wasted time with repeats
 - Maximizes probability that non-contester logs QSO



Dynamic Messaging

DigiRite (WriteLog's FT4/8 Modem)

- In DigiRite's File/Setup, select:
 1. Grid Square for NA VHF Contest mode, or
 2. Grid Square & dB report for defaultmode
- **ADIF log** will have SNR entries for QSOs made with default mode.
 - The ADIF Converter on the WW Digi website will strip off the SNRs for the Cabrillo log file.
- Starting with WriteLog 12.42, the **Cabrillo log** file will not have any SNRs, even for QSOs made with default mode.
 - If WriteLog 12.41 is used, export an ADIF log file, not Cabrillo.



FT4 vs. FT8

FT4

- 7.5-second cycle
- 80 Hz bandwidth
- -17.5 dB SNR sensitivity
- *Higher rate*
 - *Start contest*

FT8

- 15-second cycle
- 50 Hz bandwidth
- -21 dB SNR sensitivity
- *Weaker signals*
 - *Rate drops off*
- *Non-contester QSOs*



WW Digi Sub-Bands

FT4

- 1.840-1.844
- 3.580-3.590
- 7.080-7.090
- 14.080-14.090
- 21.080-21.090
- 28.080-28.090

FT8

- 1.844-1.848
- 3.590-3.600
- 7.090-7.100
- 14.090-14.100
- 21.090-21.100
- 28.090-28.100



Reverse QSO Phases

CW/SSB/RTTY

1. CQ K5ZD K5ZD
 2. *S52D*
 3. S52D FN42 FN42
 4. *TU JN76 JN76*
-
1. TU K5ZD
 2. *AA5AU*
 - ⋮

WSJT-X

1. CQ TEST K5ZD FN42
 2. *K5ZD S52D JN76*
 3. S52D K5ZD R FN42
 4. *K5ZD S52D RR73*
-
1. S52D K5ZD 73
 2. *K5ZD AA5AU EL49*
 - ⋮



Reverse QSO Phases

CW/SSB/RTTY

1. CQ K5ZD K5ZD
2. *S52D*
3. S52D FN42
4. *TU JN76*
1. TU K5ZD
2. *AA5AU*
- ⋮

S52D QSL

K5ZD QSL

← QSL & QRZ/CQ

WSJT-X

1. CQ TEST K5ZD FN42
2. *K5ZD S52D JN76*
3. S52D K5ZD R FN42
4. *K5ZD S52D RR73*
1. S52D K5ZD 73
2. *K5ZD AA5AU EL49*
- ⋮

K5ZD QSL

S52D QSL

← QRZ/CQ



No Pileup

- *Everyone can (should) be on unique frequencies*
- Pileups therefore don't obscure signals
- Everyone in the pileup plus all "tail-enders" are perfectly copied



Log Submittal

- Cabrillo: ww-digi.com/logcheck/
- ADIF: ww-digi.com/adif/
 - SNR, if any, will be stripped out for Cabrillo log creation
- 5-day log submittal deadline: 6 September 2019



Log Submittal Method

Logging Software	Only NA VHF Contest QSOs	Some standard default QSOS
N1MM+, WriteLog	Cabrillo	Cabrillo
MSHV	Cabrillo	Cabrillo
WSJT-X	Cabrillo	ADIF Converter
JTDX	n/a	ADIF Converter



Plaque Sponsorship

- Give back by sponsoring a plaque!
- Choose any category you want; no limitations
- Plaque program compliments of SCC
- Contact Tine, S50A, for details:
tine.brajnik@gmail.com



8 Practice Sessions

EU-centric

- Friday evenings local
- 19-20 UTC Friday
- 9, 16, 23, 30 August

NA-centric

- Friday evenings local
- 01-02 UTC Saturday
 - 23-00 UTC Friday 16 Aug.
- 10, ~~17~~, 24, 31 August
16

Submit your practice logs:

- Cabrillo: ww-digi.com/logcheck/
- ADIF: ww-digi.com/adif/

SARTG WW
RTTY Contest



Website Resources

- www.ww-digi.com
- en.wikipedia.org/wiki/Maidenhead_Locator_System
- n1mmwp.hamdocs.com/manual-windows/wsjt-x-decode-list-window/
- writelog.com/digirite
- physics.princeton.edu/pulsar/k1jt/wsjtx.html
- jtdx.groups.io/g/main
- lz2hv.org/mshv
- rttycontesting.com/ww-digi



Email Discussion Lists

- rttydigital@groups.io
- N1MMLoggerPlus@groups.io
- writelog-bounces@contesting.com
- wsjt-devel@lists.sourceforge.net
- main@JTDX.groups.io
- MSHV@groups.io



Thanks

- **WW Digi Contest Committee:**
 - Iztok, S52D
 - Don, AA5AU
 - Ed, W0YK
- **“Kitchen Cabinet”**
 - Randy, K5ZD
 - Trey, N5KO
 - Ken, K1EA
 - Tim, K3LR and the WWROF BoD
 - Tine, S50A and the SCC BoD
 - Doug, K1DG
- **Supporters**
 - Joe, K1JT and the WSJT-X dev’t team
 - Wayne, W5XD
 - Bruce, WA7BNM
- **Everyone who provided constructive feedback!**



Have Fun!

- **WW Digi is a work-in-progress**
 - Lots to learn, e.g., inter-operating with non-contesters
 - Emerging best practices
 - Experience-based rules critique
- **29-30 August 2020**
 - “TU;” feature for rolling QSOs?
 - Multiple parallel QSOs for higher rate?
 - SNR for QSO-by-QSO interest?

