

Frequency spread from WSPR using `wsprd` modified by Ryan Tolboom and implemented in WD 3.1.3 by Rob Robinett

Tests of WSPR transmissions from UK to OE9GHV/Q receiver KA9Q
Nov-Dec 2023

Introduction

Following a deconstruction and explanation of the code used within WSJT-X to compute frequency spread in FST4W by Ryan Tolboom N2BP [1], he showed how frequency spread could be measured with WSPR [2]. Further, he wrote Python code to process WSPR wav files and output frequency spread.

Ryan's program has been added to a test version (V3.1.3) of Rob Robinett AI6VN WsprDaemon [3] and installed at several trial sites.

This analysis uses WSPR transmissions from several UK stations to the RX888 Mk II receiver at OE9GHV/Q receiver running the modified decoder.

The next slide summarises the results in table form. Subsequent slides show the data as scatterplots of frequency spread against SNR with a Control plot from my own transmissions with a QRP Labs QDX with an external GPSDO from N6GN.

Most notable is that the QRP Labs 'analogue' TCXO module results in frequency spread on one-hop paths that is comparable with measurements from a transmitter with a GPSDO. Homebrew WSPR transmitters with simple crystal oscillators are of little value for frequency spread measurements.

[1] <https://using.tech/posts/fst4/>

[2] <https://using.tech/posts/wspr-spread/>

[3] <https://github.com/rrobinett/wsprdaemon>

Acknowledgement

This work could not have been done without the analysis, programming and implementation by Ryan Tolboom and Rob Robinett, and the kind permission of Holger Gatternig for installation at his excellent 'Radio Hill' location. I am grateful to the UK amateurs that provided details of their WSPR transmitters.

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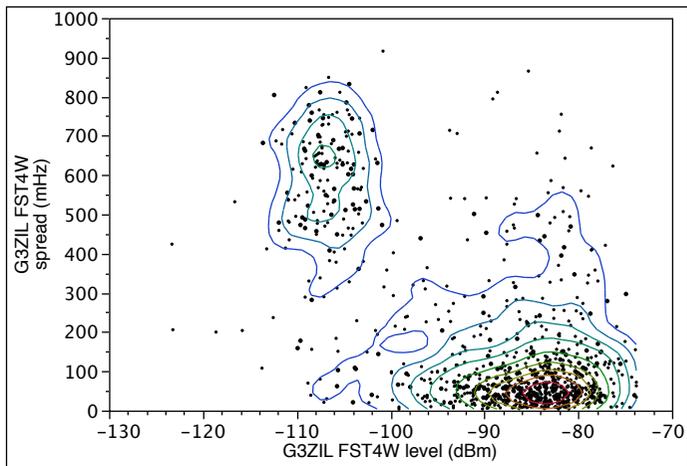
Callsign	Mode	Spread (mHz)	SNR (dB)	Level (dBm)	Comments
G3ZIL	FST4W	47	1.1	-84.0	Control. QDX with N6GN ext GPSDO
G3ZIL	WSPR	59	9.0	-77.0	Control. QDX with N6GN ext GPSDO
G8MCD	WSPR	55	5.0	-80.9	QRP Labs U3S with ext. QRP Labs 'special' analogue TCXO module
G1WSA	WSPR	87	-10.5	-100.8	QRP Labs U3S with ext. QRP Labs 'special' analogue TCXO module
G7GYP	WSPR	98	-1.0	86.7	QRP Labs U3S with FOX 924 TCXO option
2E0DLC	WSPR	98	-4.0	-90.6	SOTAbears WSPRlite Abracon ASTX-H11 TCXO
GI3VAF	WSPR	115	0.0	-90.3	Yaesu FT450D
G4HSB	WSPR	117	-3.0	-96.3	<u>Zachtek WSPT-TX LP1 Abracon ASTX-H11 TCXO</u>
M0GUC	WSPR	119	3.0	-81.7	<u>Zachtek WSPT-TX LP1 Abracon ASTX-H11 TCXO</u>
M0JFG	WSPR	128	-4.0	-90.5	email sent
G0NFY	WSPR	209	-11.0	-97.1	Raspberry Pi controlled beacon'. No email
G4RVH	WSPR	448	-11.5	-97.4	Homebrew. Xtal Si5351+amp 100 mW W3PM code
M7CSU	WSPR	490	-14.0	-99.9	<u>Homebrew. 25MHz xtal Si5351+ESP8266 module</u>

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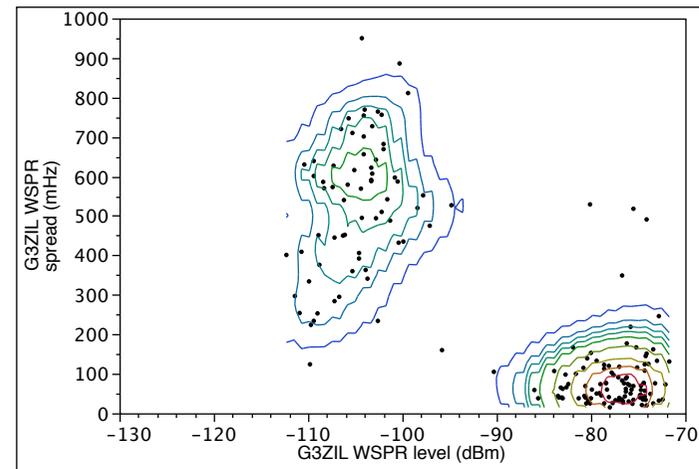
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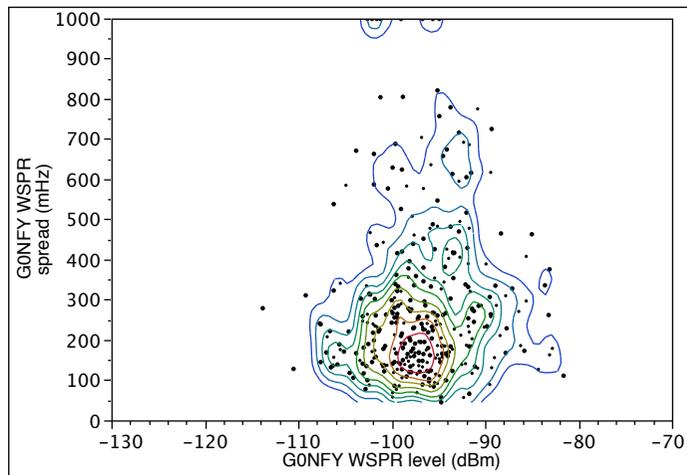
Control: G3ZIL FST4W transmissions from 20-30 Nov 2023 from QDX with N6GN GPSDO clock.



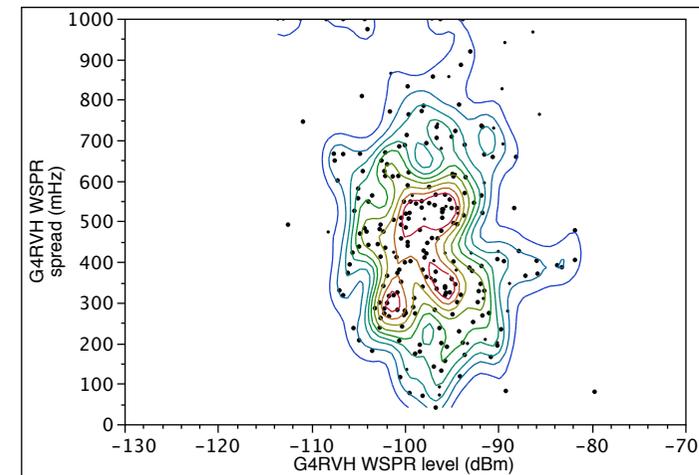
*G3ZIL WSPR transmissions from 2-4 Dec 2023 from QDX with N6GN GPSDO clock. **Stable clock.***



G0NFY WSPR transmissions from 2-4 Dec 2023 "Raspberry Pi controlled beacon" – no more details.



G4RVH WSPR transmissions from 2-4 Dec 2023 homebrew with Si5351 and a plain crystal.

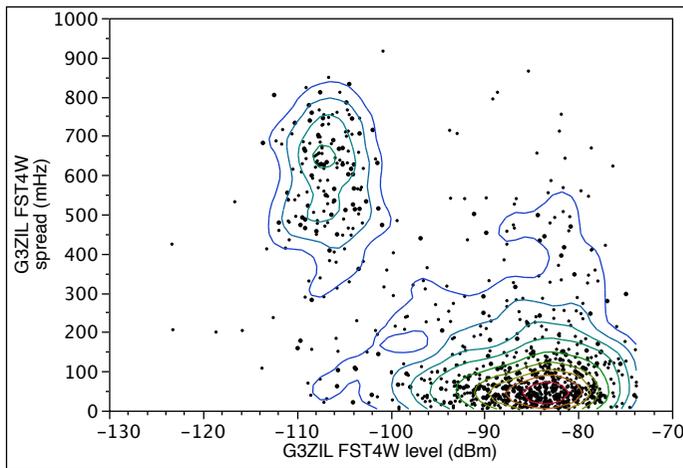


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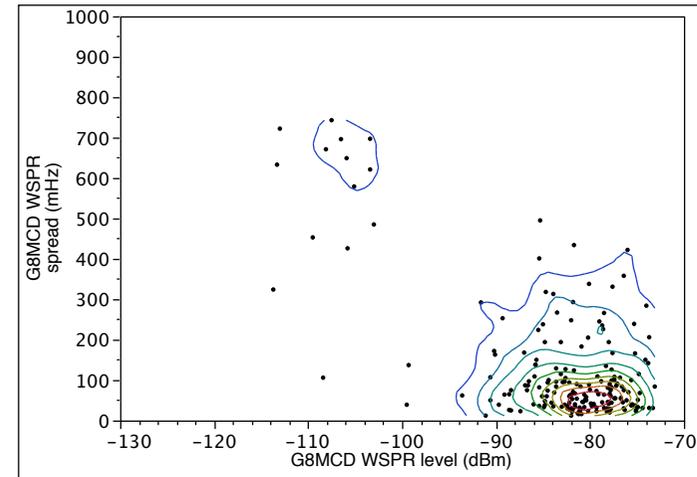
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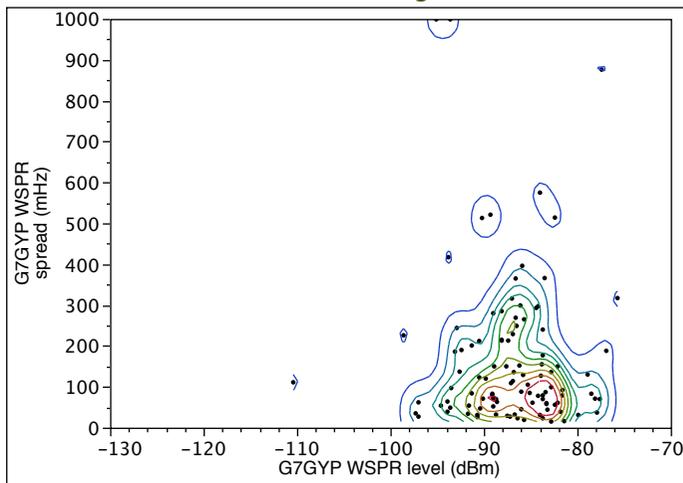
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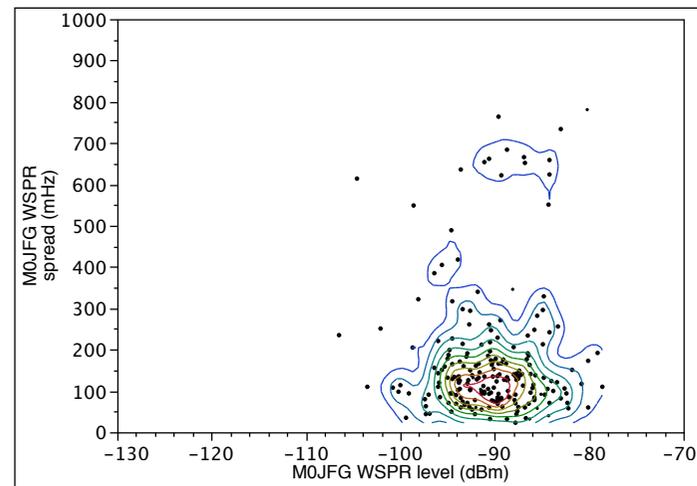
G8MCD WSPR transmissions from 2-4 Dec 2023 U3S with QRP Labs analog TCXO



G7GYP WSPR transmissions from 2-4 Dec 2023 QRP Labs U3S with Fox 924 digital TCXO



MOJFG WSPR transmissions from 2-4 Dec 2023 ...

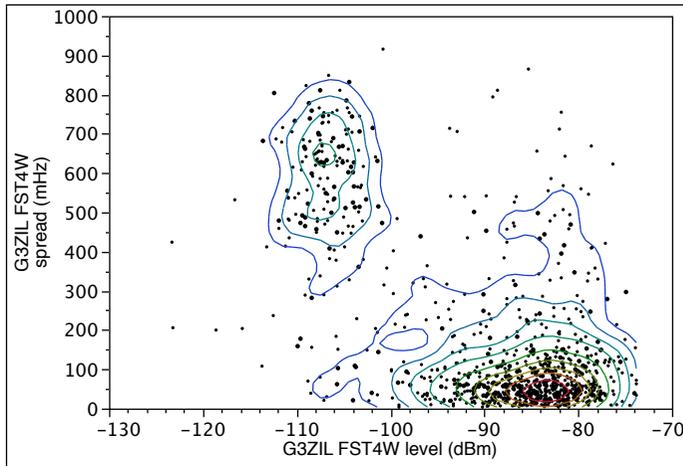


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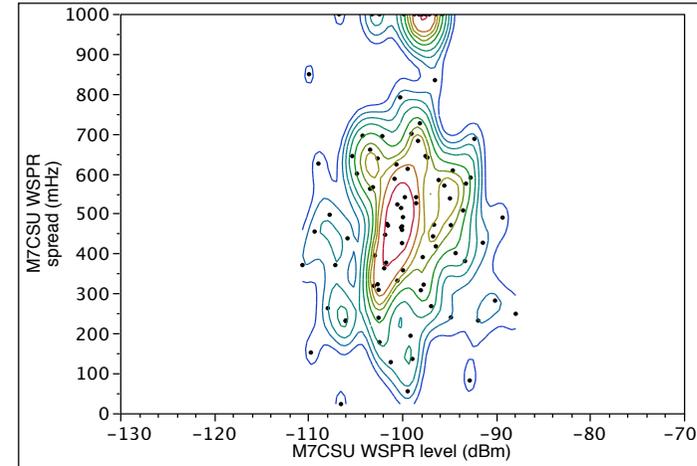
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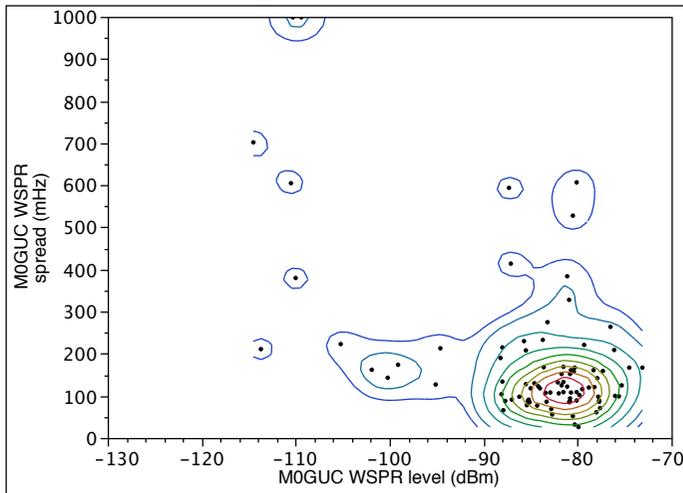
Control: G3ZIL FST4W transmissions from 20-30 Nov 2023 from QDX with N6GN GPSDO clock.



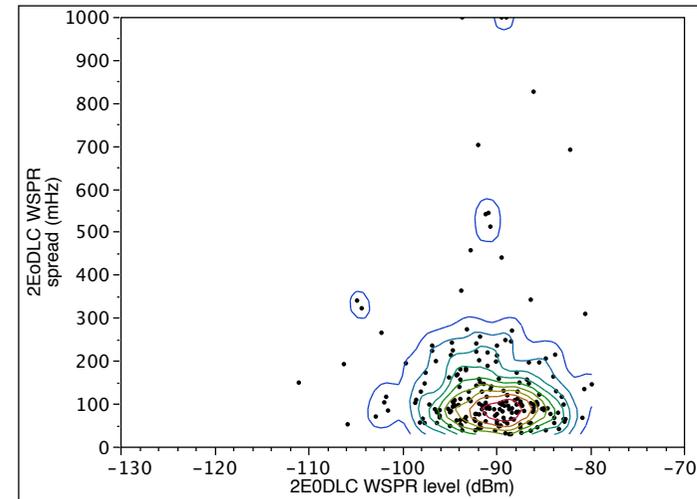
*M7CSU WSPR transmissions from 2-4 Dec 2023
Homebrew Si5351, plain crystal and ESP8266*



*MOGUC WSPR transmissions from 2-4 Dec 2023
Zachtek WSPR-TX_LP1 Abracon ASTX-H11 TCXO*



*2E0DLC WSPR transmissions from 2-4 Dec 2023
SOTABEAMS WSPRlite Classic*

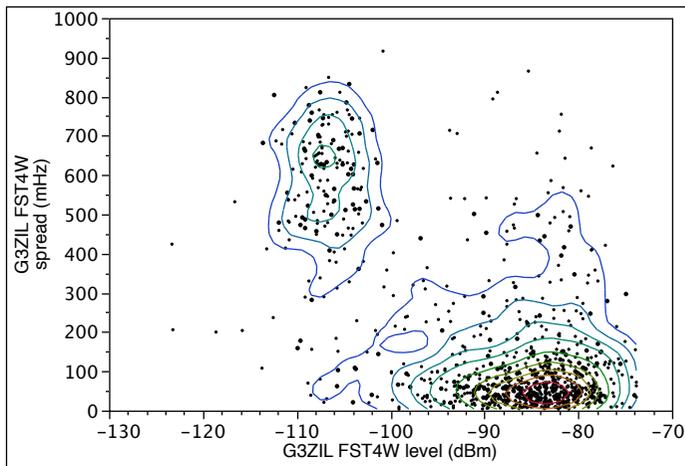


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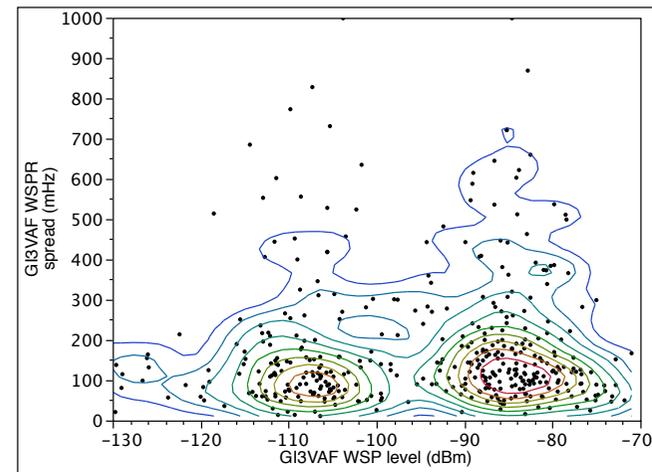
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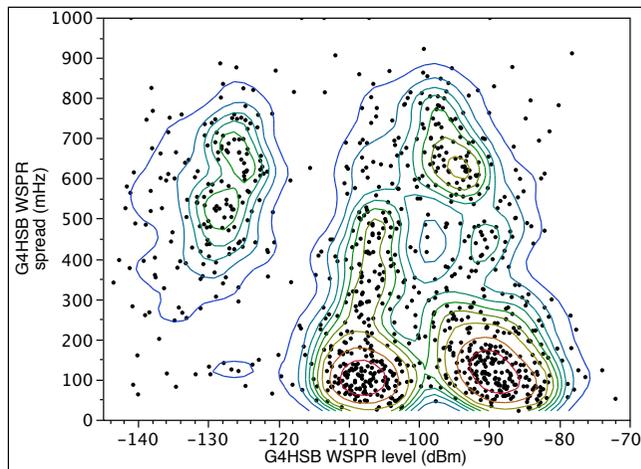
Control: G3ZIL FST4W transmissions from 20-30 Nov 2023 from QDX with N6GN GPSDO clock.



*G13VAF WSPR transmissions from 2-10 Dec 2023
Yaesu FT450D*



*G4HSB WSPR transmissions from 2-10 Dec 2023
Zachtek*



*G1WSA WSPR transmissions from 2-10 Dec 2023
U3S with QRP Labs analog TCXO*

