WSPR primer and W2ZQ experiment

WSPR definition Sound card modes Software Hardware W2ZQ reports

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WSPR basics

- WSPR in an acronym for Weak Signal Propagation Reporter.
- WSPR is a digital beacon mode (not a "QSO" mode) used primarily on the HF bands to track propagation.
 - WSPR will run on a station that is currently set up for digital modes
- A typical transmitting station uses ~ 1W (30dbm), or less
- A typical station transmits part time, duty cycle is selectable, and otherwise receives and decodes WSPR signals
- Transmitted data is:
 - Power
 - Location (grid square)
 - Call sign
- Transmissions are two minutes long, < 10hz BW (4-FSK) and sounds like a CW tone with a slight warble.
- Receiving stations can record and report the transmitted data plus frequency, time and SNR to the WSPRnet.org website.

Sound Card modes

- WSPR software can run on a station that is currently set up for sound card digital modes
- Sound card modes typically employ a computer and an HF radio which are interfaced for sound Input/Output, radio keying and possibly frequency control.
 - Frequency control required for WSPR
- There are many ways to learn how to interface your radio to digital mode software.
 - See online articles,
 - ARRL publications,
 - enlist a knowledgeable DVRA member to assist you.

Software

• WSPR-X

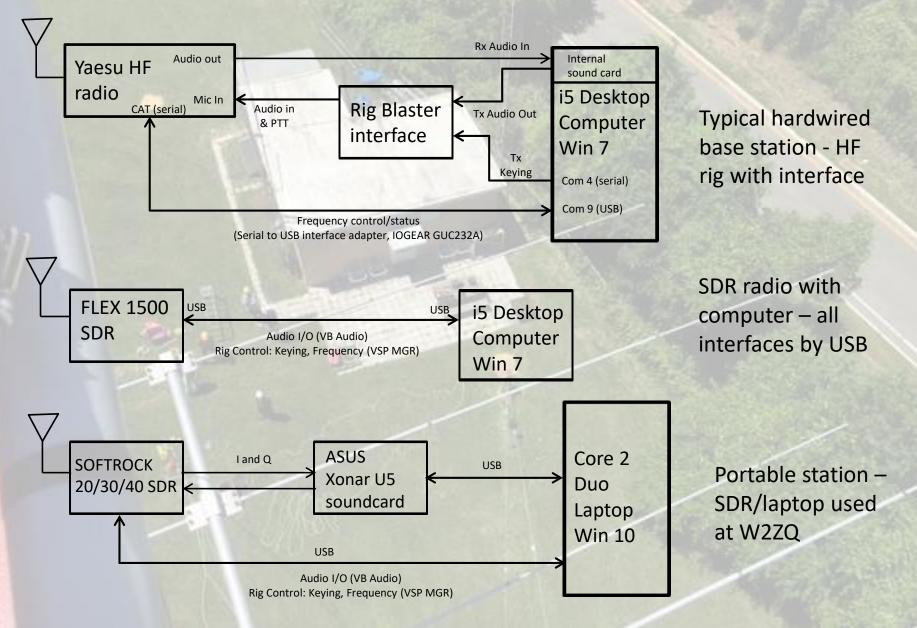
- Part of the WSJT (Weak Signal Communication by K1JT) suite of software <u>http://physics.princeton.edu/pulsar/K1JT/wspr.html</u>
- Current version is WSPR-X v0.9, r4178
- Uses "sound card" modes setup
- Runs well on Win 7
- Other useful software
 - Radio Control (frequency and keying)
 - Com ports (Omni Rig <u>http://www.dxatlas.com/Download.asp</u>)
 - Virtual ports (VSP manager) <u>http://k5fr.com/DDUtilV3wiki/index.php?title=VSP_Manager</u>)
 - Sound interface with virtual audio (VB-CABLE <u>http://vb-audio.pagesperso-orange.fr/Cable/#DownloadCable</u>)
 - Time Updates
 - Need accurate timing for WSJT modes
 - Preferred software is Meinberg NTP <u>https://www.meinbergglobal.com/english/sw/ntp.htm</u>

Hardware

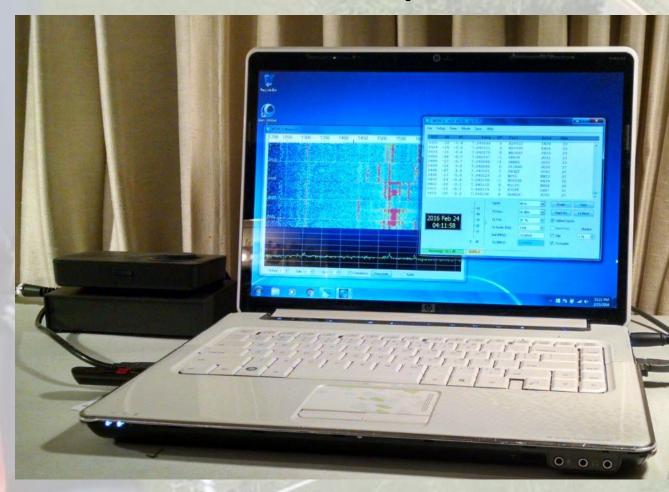
Computer

- Computer with sound card
 - Hardwired or...
 - Software Virtual audio (VB Cable)
- Radio
 - Computer interface (keying and frequency control)
 - USB or serial control port on radio
 - Hardware interface, i.e. Rigblaster
 - Software methods of interface Omnirig, VSP manager
 - Stand alone
 - Ultimate 3S (see May 2017 QST article "WSPR Weekends" and November 2016 review)

Example digital stations



WSPR setup used at W2ZQ



WSPR's windows:

- Rx Waterfall
- Control panel and rx log

- Station was operated using the W2ZQ call
- 1W output was used into the 40 meter beam
- 50% duty was selected TX 2minutes, RX 2 minutes
 - Received spots can be sent to WSPRnet. This option was not selected.

W2ZQ WSPR Results

- WSPR Station was operated at the W2ZQ guest station
 - 12V power and all of W2ZQ antennas are available
 - Interface requirements are a power cord (preferably PowerPole) and ability to interface to a PL259
- The idea was to use an antenna and band that would yield the best results.
 - 40 meters was chosen with the W2ZQ 40 meter beam
- The beam was pointed to the middle of the Pacific, halfway between Australia and Japan
- The goal was to try to get "spots" from Japan, other Asian countries or Pacific islands
- We successfully got spots from Australia, Reunion Island (Indian Ocean), New Zealand and Hawaii.
 - The furthest spot was 18,704km (VK6XT) in Western Australia

WSPR reports

WSPR interface

- Wsprnet.org for reports
- Many stations also report their operating conditions
- Typical reports generated on WSPRnet
 - Distance, Time, Band
 - Graphical Display on a map
- W2ZQ experiment
 - 40m beam aimed at 300 degrees azimuth
 - Pointed to middle of Pacific in an attempt to get "hits" from Asia.

WSPR Database Query Screen



WSPRnet

Welcome to the Weak Signal Propagation Reporter Network

Activity | Map | Database | Stats | Forum | Downloads

User login	Spot Database Query					
Username *	Band					
k3ea	40m T					
Password *	Show only spots on this band.					
Create new account	Count					
Request new password	1000 Maximum number of spots to show					
Log in	Call					
	w2zq					
Frequencies USB dial (MHz): 0.136, 0.4742,	Only show spots of this callsign Reporter					
1.8366, 3.5926, 5.2872, 7.0386, 10.1387, 14.0956, 18.1046, 21.0946, 24.9246, 28.1246, 50.293, 70.091, 144.489, 432.300, 1296.500	Only show spots reported by this call. If same					
	Consider spots only of this recent time perio					
Spot Count	Sort by Timestamp ▼					
622,961,632 total spots 805,468 in the last 24 hours	Field to sort by					
31,120 in the last hour	 Reverse Check to reverse sort order 					
Navigation						

Band
40m •
Show only spots on this band.
Count 1000 Maximum number of spots to show
Call
w2zq
Only show spots of this callsign
Reporter
Only show spots reported by this call. If same as "Call", then show spots of this call OR heard by this call.
In last 24 Hours T
Consider spots only of this recent time period
Sort by
Timestamp •
Field to sort by
Reverse
Reverse Check to reverse sort order
Unique
Check to show only unique call/reporter combinations
Update

W2ZQ query by time

Pwr Reporter

DK8FT/A

1 DL5RBD

1 WB3DZC

1 GM4SFW

1 G3XBI

1 GOMJI

1 W8JRN

1 KA3JIJ

1 DL1KAI

1 EIRESWL

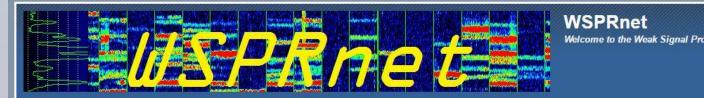
1 PAOMLC

1 DL/PA0EHG

1 LX1DQ

1 VK6QA

1 DK6UG



MHz

SNR Drift Grid

0 FN20og

0 FN20og

0 FN20og

-1 FN20og

-2 FN20og

0 FN20og

-17

-20

-20

-12

-24

-13

+4

+6

-21

-12

-9

-19

-24

-7

-18

-24

-7

-22

-16

-11

-2

-2

-20

-23

-19

-10

-14

-20

-4

Frequencies

Database

1000 spots:

Timestamp

Specify query parameters

Call

2017-04-11 22:42 W2ZQ 7.040088

2017-04-11 22:42 W2ZQ 7.040087

2017-04-11 22:42 W2ZQ 7.040073

2017-04-11 22:42 W2ZQ 7.040106

2017-04-11 22:42 W2ZQ 7.040091

2017-04-11 22:42 W2ZQ 7.040122

2017-04-11 22:42 W2ZQ 7.040121

2017-04-11 22:42 W2ZQ 7.040090

2017-04-11 22:42 W2ZQ 7.040096

2017-04-11 22:42 W2ZQ 7 040052

2017-04-11 22:42 W2ZQ 7.040086

2017-04-11 22:42 W2ZQ 7.040087

2017-04-11 22:42 W2ZQ 7.040107

2017-04-11 22:42 W2ZQ 7.040101

2017-04-11 22:42 W2ZQ 7.040094

2017-04-11 22:42 W2ZQ 7.040088

2017-04-11 22:42 W2ZQ 7.040076

2017-04-11 22:42 W2ZQ 7.040095

2017-04-11 22:42 W2ZQ 7.040090

2017-04-11 22:42 W2ZQ 7.040088

2017-04-11 22:42 W2ZQ 7.040099

2017-04-11 22:42 W2ZQ 7.040108

2017-04-11 22:42 W2ZQ 7.040090

2017-04-11 22:42 W2ZQ 7.040110

2017-04-11 22:42 W2ZQ 7.040088

2017-04-11 22:42 W2ZQ 7.040063

2017-04-11 22:42 W2ZQ 7.040120

2017-04-11 22:42 W2ZQ 7.040085

2017-04-11 22:42 W2ZQ 7.040072

USB dial (MHz): 0.136, 0.4742, 1.8366, 3.5926, 5.2872, 7.0386, 10.1387, 14.0956, 18.1046, 21.0946, 24.9246, 28.1246, 50.293, 70.091, 144.489, 432.300, 1296,500

Spot Count

631,226,922 total spots 883,108 in the last 24 hours 35,818 in the last hour

Navigation

- Add content
- Forums

Who's online

There are currently 136 users online.

K3EA

K5DOG

210BEZ
 KK5PJ

on7kb

G3THQ

G6NHU

PAORBL
KC4VZT

k6pzb

KC2WUF

• vu3dxr

G4KRW

Over 25 spots in a two minute transmission period!!

1265 288 0 FN20og 1 KF9KV EN52et -1 FN20og 1 G3VYZ IO95fb 5450 47 1 KB8UVN 665 272 0 FN20og EN80ge 0 FN20og 1 N4AU EM62vp 1325 234 0 FN20og 1 KK1D FN31vi 249 60 1 KC8YJJ 0 FN20og EN90 530 275 0 FN20og 1 DG2HSI JO51mr 6359 47 0 FN20og 1 K5CZD EM32vn 1774 247 -1 FN20og 1 G7RMG IO80tu 5526 52 0 FN20og 1 K3EA FN20of 5 180 0 FN20og 1 VK6CQ OF78xa 18682 310 0 FN20og 1 K4RCG FM08si 381 237 0 FN20og 1 G4CPD IO94hc 5488 48 1 K9DZT 0 FN20og EN52wx 1147 290

EM84cj

JO42vj

1063ri

JO31aw

JN39cg

JO32sa

OF77vv

JN49cm

RGrid

JN58oe

JN69kb

FM07ux

1077sn

IO81mf

1083ni

EN82kd

km

6544 51

6608

5215 44

5415 49

az

395 231

5475 52

727 289

1029 233

6143 51

18703 310

6282 51

6251 47

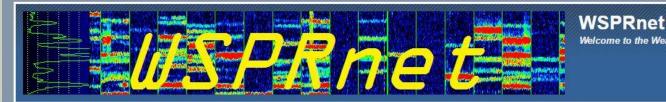
5179 50

6035 49

6098 47

50

W2ZQ by distance over 24hrs



User login

Database

238 spots:

Specify query parameters

k3ea Password

Create new account Request new password

Log in

Username *

FIC	uuc	ncies

USB dial (MHz): 0.136, 0.4742, 1.8366, 3.5926, 5.2872, 7.0386, 10.1387, 14.0956, 18.1046, 21.0946, 24.9246, 28.1246, 50.293, 70.091, 144.489, 432.300, 1296.500

Spot Count

624,629,762 total spots 975,565 in the last 24 hours 44,137 in the last hour

Navigation

Forums

Who's online

There are currently 111 users online.

F5RRS

M1VLS

*	Timestamp	Call	MHz	SNR	Drift	Grid	Pwr	Reporter	RGrid	km	az
	2017-04-10 23:34	W2ZQ	7.040096	-8	0	FN20og	1	VK6XT	OF86td	18704	299
count	2017-04-11 10:58	W2ZQ	7.040110	-24	0	FN20og	1	VK6CQ	OF78xa	18682	310
ssword	2017-04-11 09:22	W2ZQ	7.040104	-21	0	FN20og	1	VK5UV	PF96ib	16981	273
	2017-04-11 09:26	W2ZQ	7.040107	-8	0	FN20og	1	VK5AKJ	QF02id	16959	263
	2017-04-11 09:18	W2ZQ	7.040097	-17	-1	FN20og	1	VK3PD	QF21nt	16598	261
	2017-04-11 11:58	W2ZQ	7.040104	-22	0	FN20og	1	VK3ANL	QF22	16590	262
	2017-04-11 05:26	W2ZQ	7.040096	-17	0	FN20og	1	VK7DIK	QE38cu	16590	255
	2017-04-11 09:26	W2ZQ	7.040109	-14	0	FN20og	1	VK3KCX	QF22qd	16566	261
6, 0.474 2,	2017-04-11 07:50	W2ZQ	7.040111	-19	-1	FN20og	1	EJTSWL	QE37pd	16538	251
2, 7.0386,	2017-04-11 11:30	W2ZQ	7.040108	-18	-1	FN20og	1	VK1AAH	QF44mp	16165	264
1046,	2017-04-11 10:58	W2ZQ	7.040102	-20	-1	FN20og	1	VK2XAB	QF56mf	15928	265
1246,	2017-04-11 10:54	W2ZQ	7.040100	-23	0	FN20og	1	VK2TPM	QF56of	15914	265
89,	2017-04-11 06:58	W2ZQ	7.040098	-26	0	FN20og	1	VK4NE	QG62nj	15436	273
	2017-04-11 06:58	W2ZQ	7.040114	-21	0	FN20og	1	VK4KRC	QG56	15374	279
	2017-04-11 00:34	W2ZQ	7.040106	-20	0	FN20og	1	FR5ZX	LG78pu	14871	81
	2017-04-11 12:02	W2ZQ	7.040102	-28	0	FN20og	1	ZL2FT	RF70mb	14241	246
ts	2017-04-11 11:02	W2ZQ	7.040101	-20	0	FN20og	1	ZL4EI	RF74ci	14099	251
hours	2017-04-10 23:18	W2ZQ	7.040116	-27	0	FN20og	1	ZR6AIC	KG43ar	12897	103
r	2017-04-11 01:06	W2ZQ	7.040144	-28	0	FN20og	1	UB6HMI	LN14ka	8761	40
	2017-04-10 23:18	W2ZQ	7.040107	-31	0	FN20og	1	4CE059	GF05ng	8498	167
	2017-04-11 00:30	W2ZQ	7.040091	-26	0	FN20og	1	LU3BCM	GF05sj	8492	166
	2017-04-11 02:10	W2ZQ	7.040084	-23	1	FN20og	1	LU3HO/M	FF54fm	8440	176
	2017-04-11 12:14	W2ZQ	7.040116	-22	0	FN20og	1	KH6RD	BL01xl	7931	283
	2017-04-11 03:22	W2ZQ	7.040039	-27	0	FN20og	1	IQ8ST	JN70fq	7183	57
	2017-04-11 00:06	W2ZQ	7.040088	-12	0	FN20og	1	IW6ATQ	JN63so	6949	55
	2017-04-11 00:58	W2ZQ	7.040101	-24	0	FN20og	1	OE6PWD	JN77rb	6883	51
1 users	2017-04-11 01:10	W2ZQ	7.040082	-22	0	FN20og	1	OE3BUB	JN88fg	6881	49
	2017-04-11 01:10	W2ZQ	7.040100	-17	0	FN20og	1	OE1RPW	JN88eg	6875	49
	2017-04-11 04:54	W2ZQ	7.040097	-22	0	FN20og	1	DH5RAE	JN68qv	6649	49

Sample Map Report



Map

WSPRnet

Welcome to the Weak Signal Propagation Reporter Network

Chat | Activity | Map | Database | Stats | Forum | Downloads My account | Log out

Search

Frequencies



- 20 meters, one hour of data from Eastern PA
- Online users can center the map for any location. Can be used as propagation tool for anyone!

Why Try WSPR?

- Propagation tool WSPRnet website
 - Check the propagation before you get on 20 meters
- Method to test out the effectiveness of your equipment
 - Compare antennas, receivers, transmitters
- Being a transmit station contributes to propagation study efforts
- Low power stations with restricted antennas can effectively get on the mode and make contributions
- If you already have a digital sound mode station, its another mode to try!