2109 Version

630 Meters Now Open

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NCØB

WSJT X Digital Communications

Two new bands: 630 meters and 2200 meters !

Finally most amateurs have access to 630m / 472 to 479 kHz if they file their application.

In late summer of 2017 I chose to become familiar with WSJT due to all the FT8 signals I was hearing on the HF bands.

At times there was no activity except FT8 on 15, 12, 10 & 6m.

11/19/2017 12m was full of FT8 signals.

Digital is the prime mode for 630 meters, so my timing was opportunistic.

Sign up for 630 & 2200 meter bands !

- I signed up for my Ault & Denver QTHs.
- I will never operate out of Denver, but once you get permission from the power utilities, they cannot later put a signal on our frequencies.
- Here is the URL, or get it from ARRL.
- https://utc.org/plc-database-amateur-notification-process/

How do you get on 630 meters ?

Two problems:

A functional antenna and what transmits on 630 meters?

I already had a 160 meter Marconi T antenna, so that was simple.

All I needed was a new tuner.

What did I have that transmits on 475 kHz? Nothing !

A Google search located a transverter, 160m to 630m.

5 watts in on 160 meters produces 50 watts out on 630 meters

Transverter out of VK for $720 delivered

Attributes:

RX and TX

Small

Powered off it bypasses itself

Excellent front-end

Good fault protection

Simple to use

630m station on the lower left

The IC-7300 drives the Monitor Sensors transverter on 160 meters.

No the Acom 1000 does NOT cover 630 meters!

Running a rig at 5 watts is an issue

There are two issues with such a low drive level.
A transmitter has more broadband noise at 5 watts.
I hate driving 100 watts into the transverter by mistake, even though it immediately faults into bypass mode.

I really need more RX attenuation to set band noise between S1 and S2. (IC-7300 20 dB attenuator ON)

My setup has a 10 dB 75 watt Bird attenuator between the IC-7300 and the transverter.

Voila: Both problems solved. Rig now runs at 50 watts.

How do we match an antenna on 475 kHz?

You will need a high Q coil between 200 & 300 uH.

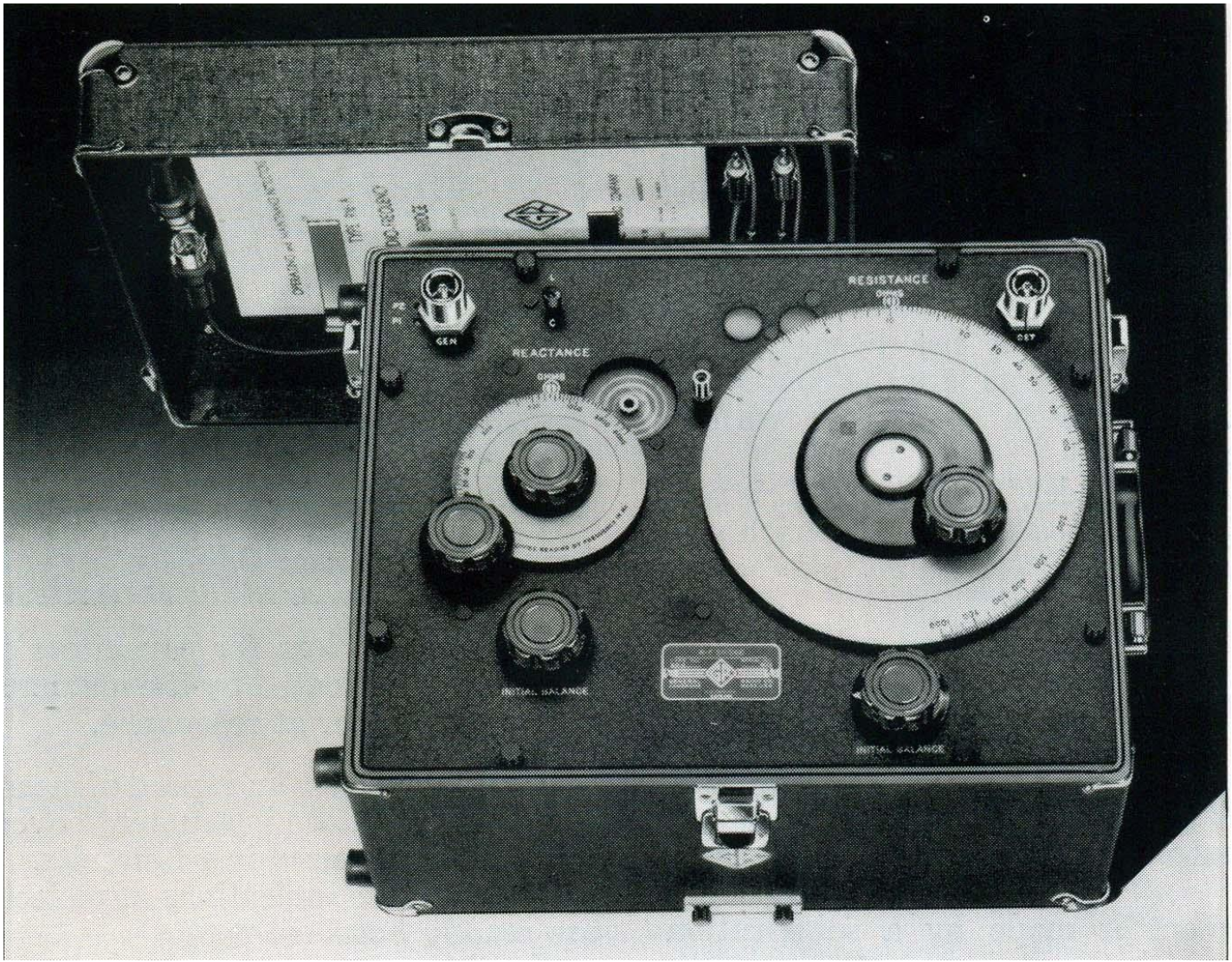
Antenna measured with GR 916A & 916AL RF bridges.

4 ohms –j850 The 4-ohm value includes ground losses.

Efficiency likely a few percent.

W0IVJ simulated an L-network tuner for 475 kHz.

GR 916A RF Bridge



Doesn't overload from BC stations.

No Arduino chips inside!

Proof of Concept Tuner Lash-up

Surprisingly the Drake W-4 wattmeter reads a proper null on SWR on 475 kHz.

The forward power reading is way low, 50 watts reads about 20 watts.

The vacuum variable was preset to the simulation value, as was the coil tap.

220 uH and about 120 pF

120 pF on 475 kHz?

L & C in a Home Depot WX proof tub

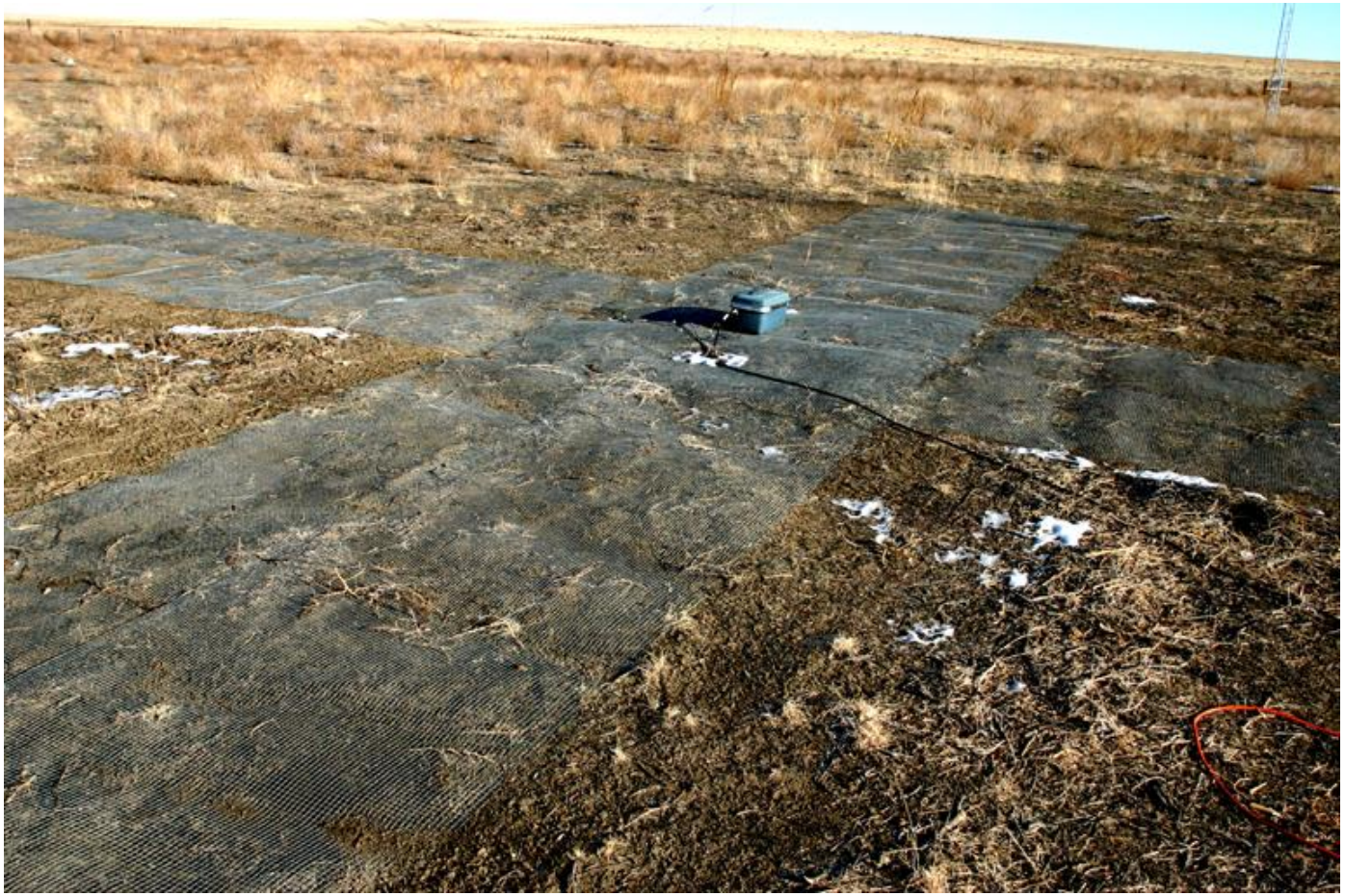
630 meter tuner tub lashed on top of remotely tuned 160 meter tuner tub.

2:1 SWR bandwidth = 2 kHz Larger tub to mount the coil horizontal

Green wire goes to 160 meter ground system. Wood antenna wire support

The ground system is critical

12 years ago here was my ground screen for 160 meters.

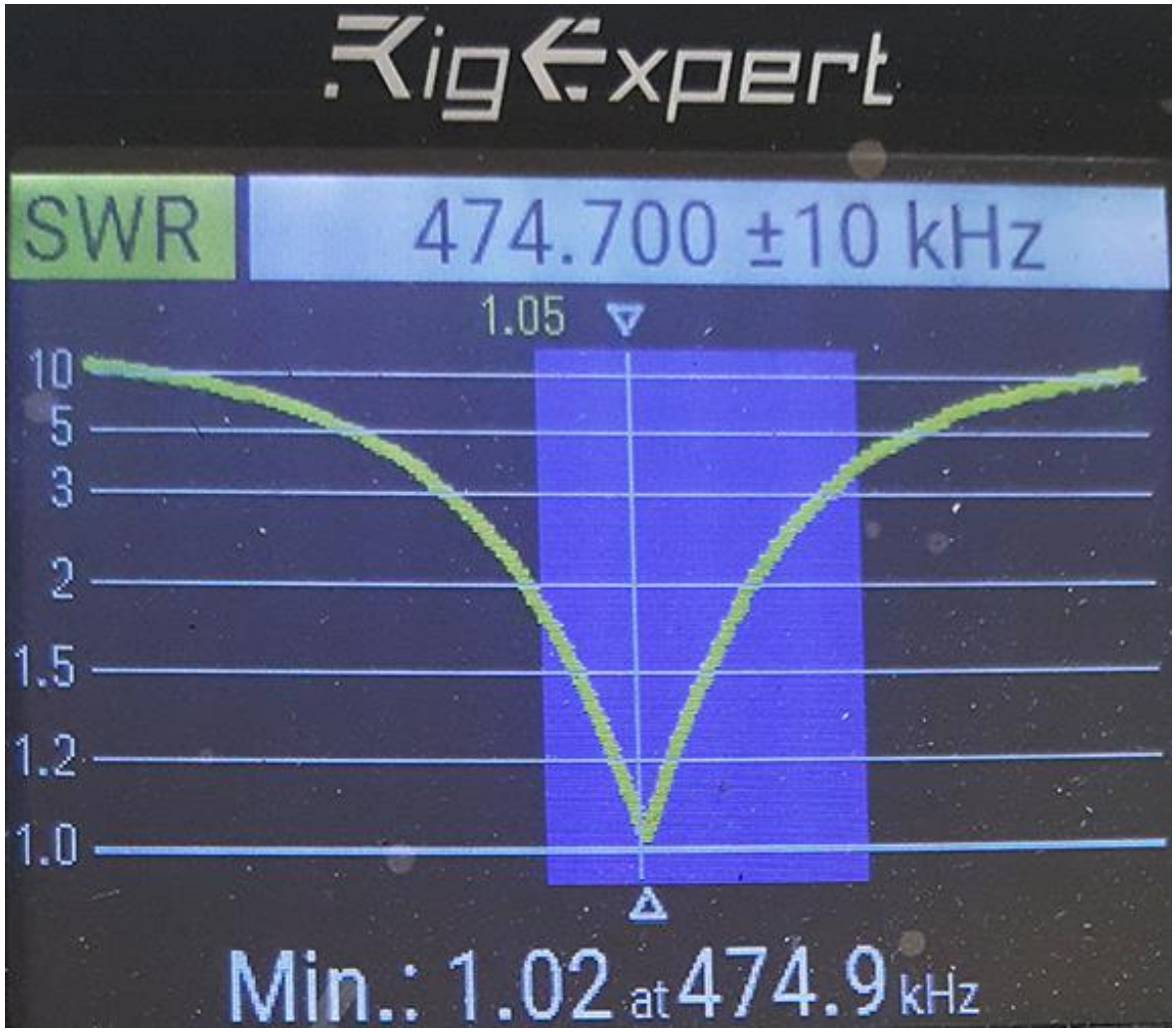


Later I added 40 100-foot radials

2:1 SWR bandwidth is a key indicator of your efficiency.

NC0B:	2 kHz	Marconi T, Coil 220 uH, 120 pF high pass
K0KE:	2 kHz	Marconi T, Coil 230 uH, 10,000 pF low pass
K0KE:	7 kHz	Smaller portable antenna, limited ground
VK6HP:	12 kHz	Drooping Marconi T, limited ground system Coil inductance around 345 uH

K0KE's Marconi T antenna bandwidth



Rig Expert
AA-35
Zoom

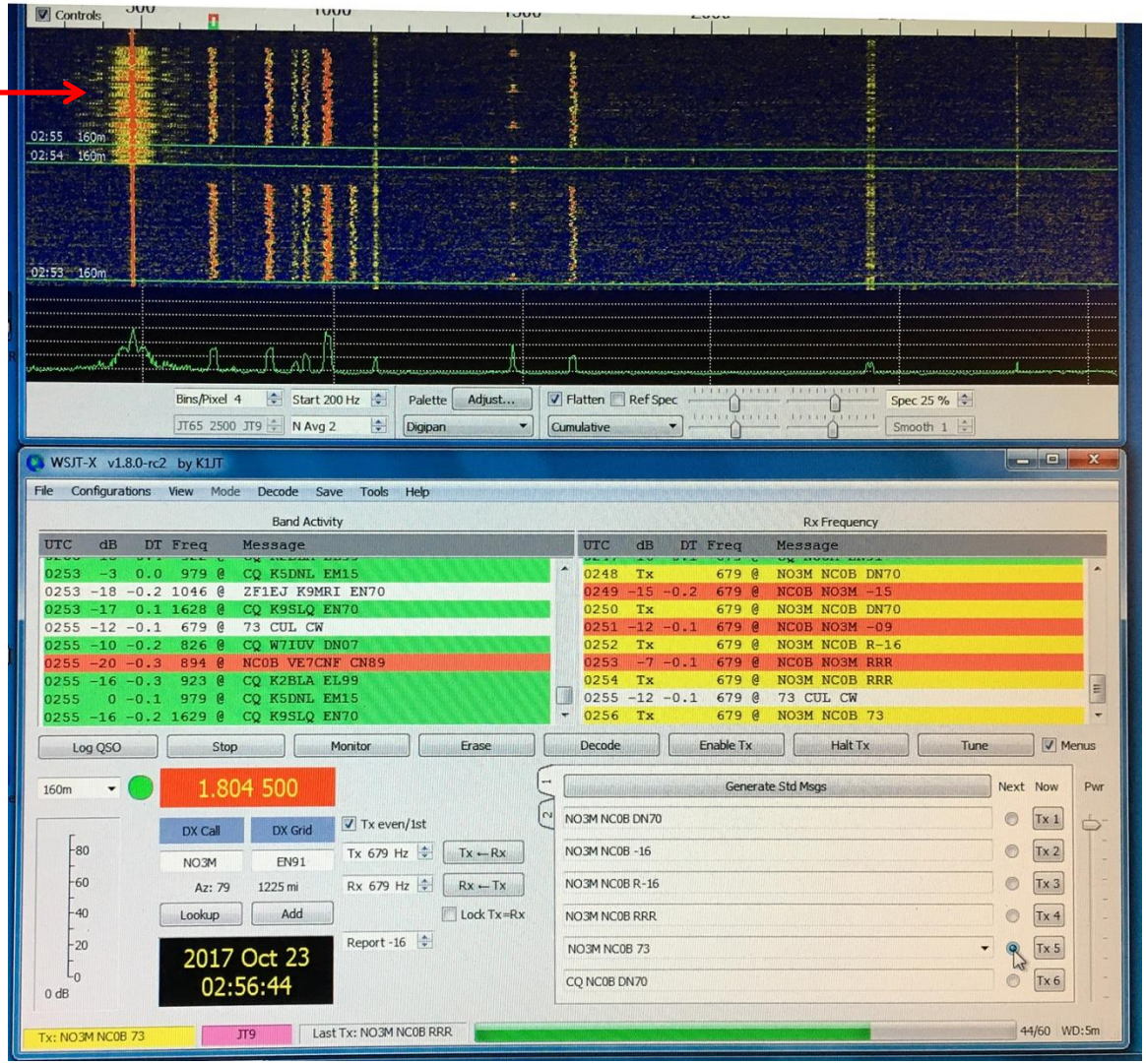
Note: This is a very reactive feed point

The other side of the WX proof tub

WSJT X 1.8 version in 2018

What does the band look like?

? Signal



NC0B working NO3M in Saegertown, PA

Mode: JT9 receives down to about R -28 level

60 seconds per transmission.

QSO typically takes about 6 minutes.

I sent R -16 level
I received R -9 level

Three main modes on 630 meters

WSJT: JT9, WSPR (beacon) and CW

What have I heard? WSPR beacons screen shot

ZF1EJ Cayman Islands, K9FD Hawaii

Band Activity

UTC	dB	DT	Freq	Message				
1108	-6	0.1	1.805745	0	AE5X	EM20	30	878
1108	-17	0.2	1.805746	0	<AH6EZ>	CN88PB	30	1035
1110	-7	0.1	1.805629	0	NU6O	CN70	30	1076
1110	-25	0.2	1.805677	0	WB0DBQ	EN46	23	788
1110	-21	0.2	1.805690	0	ZF1EJ ←	EK99	33	2012
1110	-13	0.1	1.805696	0	N6GN	CM88	27	997
1110	-13	0.4	1.805795	0	W9XA	EN51	23	810
1112	-21	0.1	1.805612	0	K9FD ←	BL11	30	3323
1112	7	0.1	1.805683	0	W7IUV	DN07	30	862
1112	10	0.1	1.805705	0	K5DNL	EM15	33	540

Best WSPR DX beacon ?

VK4YB in Australia 8045 miles away.

Also the OEM of my transverter.

Band Activity

UTC	dB	DT	Freq	Message				
1126	-12	0.1	1.805602	0	W8RUT	EN80	27	1128
1126	-18	0.1	1.805612	0	K9FD	BL11	30	3323
1126	-9	0.1	1.805629	0	NU6O	CN70	30	1076
1126	-5	0.1	1.805696	0	N6GN	CM88	27	997
1126	-3	0.1	1.805745	0	AE5X	EM20	30	878
1128	-21	0.1	1.805653	0	KR6LA	CN90	37	867
1128	-21	0.1	1.805677	0	WB0DBQ	EN46	23	788
1128	9	0.0	1.805705	0	K5DNL	EM15	33	540
1128	-26	-0.1	1.805761	0	VK4YB	QG62	37	8045

WSPR around 1 PM 1/14/2018

UTC	dB	DT	Freq	Drift	Call	Grid	dBm	mi
1918	-26	0.1	1.805735	0	KA7OEI	DN40	27	342
1920	-8	0.1	1.805707	0	K5DNL	EM15	37	540
1922	-30	0.1	1.805735	0	KA7OEI	DN40	27	342
1924	-8	0.1	1.805707	0	K5DNL	EM15	37	540
1926	-29	0.1	1.805685	0	W7IUV	DN07	30	862
1928	-9	0.1	1.805707	0	K5DNL	EM15	37	540
1932	-9	0.0	1.805707	0	K5DNL	EM15	37	540
1932	-26	0.1	1.805735	0	KA7OEI	DN40	27	342
1936	-11	0.1	1.805707	0	K5DNL	EM15	37	540
1940	-10	0.1	1.805707	0	K5DNL	EM15	37	540
1946	-10	0.1	1.805707	0	K5DNL	EM15	37	540
1950	-11	0.1	1.805707	0	K5DNL	EM15	37	540
1956	-12	0.2	1.805707	0	K5DNL	EM15	37	540
2002	-12	0.1	1.805707	0	K5DNL	EM15	37	540
2004	-26	0.1	1.805735	0	KA7OEI	DN40	27	342
2006	-10	0.1	1.805707	0	K5DNL	EM15	37	540
2010	-9	0.1	1.805707	0	K5DNL	EM15	37	540
2010	-28	0.0	1.805735	0	KA7OEI	DN40	27	342
2014	-9	0.1	1.805707	0	K5DNL	EM15	37	540
2014	-28	0.0	1.805735	0	KA7OEI	DN40	27	342
2020	-8	0.1	1.805707	0	K5DNL	EM15	37	540
2022	-27	0.2	1.805685	0	W7IUV	DN07	30	862
2026	-9	0.1	1.805707	0	K5DNL	EM15	37	540

UT
WA
OK

QSOs 630 meters Nov. 2017 to present P. 1

- K9FD (KH6), HI
- KL7L, AK
- W7IUV, W7RNB, W0YSE, AH6EZ, N6PIG, WA
- K5DNL, OK
- NO3M, W8CDX, K3MF, W3SZ, W3TS, W3XY, PA
- KC4SIT, K4SV, NC
- WA9CGZ, W9XA, N9RU, IL
- K2BLA, FL
- N1VF, NU6O, KR7O, WB7ABP, CA
- WB0DBQ, W0DJK, MN
- K9SLQ, K9KFR, K9MRI, KA9OKH, W9GT, K9BLI, K9OMA, N9RU, IN
- KA7OEI, UT
- W0RW, K0KE, W0QL, CO
- KB5NJD, K5DOG, W5EMC, K5DN, KE7A, TX
- K4EJQ, KU4XR, TN
- WA3ETD, W1IR, VT
- W3LPL, W3XY, WB3AVN, K1BZ, MD
- KC3OL, KB0PPQ, KS
- WB4JWM, K4AEK, GA
- NC8W, W8RUT, K8TV, OH

QSOs 630 meters Nov. 2017 to present P. 2

- NC8W, W8RUT, K8TV, N8IVE, OH
- N1BUG, ME
- N4WLO, AL
- W0SD, W7XU, SD
- W0ETH, MO
- KM5SW, NM
- K4LY, SC
- WA3U, DE
- W1XT, MA
- W8MQW, KB8U, MI
- K2DVA, NY
- KI7KG, NV

- VE7CNF, VE7VV, VE7BDQ, CF7MM, VE7SL, CF7MAY, VA7MM, BC
- VE3CIQ, ON

- ZF1EJ, Cayman
- VK4YB, Australia

Comments from K9FD (Hawaii)

- Holy smokes Rob, fantastic signal, best was -5 and its daylite here yet, sunset still few minutes away.
- Thanks much for that one, my first daylite QSO on JT9.
- Your set up working great.
  73 Merv K9FD

March 3, 2019 QSO

Comments from VK4YB – Australia

- Hi Rob,
- I got such a surprise to see your call sign appear in the decode box.
- I was wondering if it was VK3DQL or VK5FQ. I decided it must be VK5FQ because it was too strong to be VK3DQL.
- It never occurred to me that it might be DX.
- Also in my surprise I did not notice that you had sent me a report on the first call. I had been asking stations to do just that!
- So I just clicked the dB button. I should have sent R+dB. I corrected that next time and conditions were good so it didn't matter.

More from Roger, VK4YB

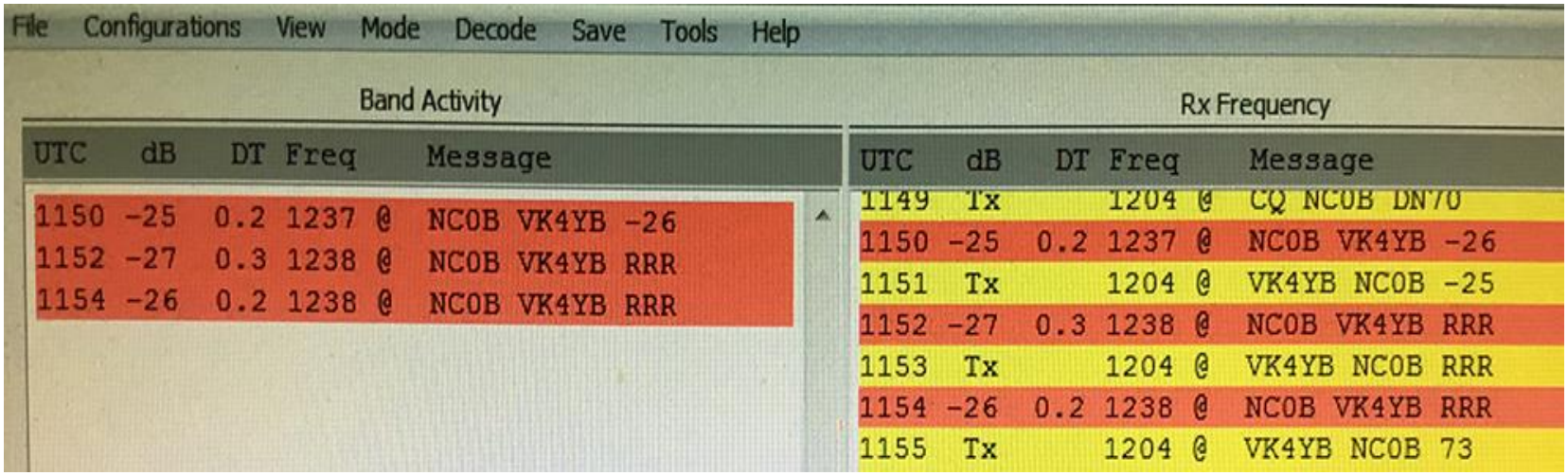
- I have been struggling to receive stations throughout my summer and I have been feeling guilty that my receive ability is below par.
- I have been trying various loops and combinations but I have not found any antenna as good as my NE beam.
- That's one of two 900 foot long wires with 120 foot vertical sections on sloping ground.
- Our QSO of last night confirms that this is a superb RX antenna bringing you in at JT9 -22.

- The sloping ground lowers the elevation angle in the direction of USA. The arrival angle varies with the propagation. When the angle is high, the signal is the same strength on NE beam as the NNW (Japan) beam. Last night it was low angle.

One of three JT9 contacts between Roger and I

DX goal on 630 meters achieved

- Worked Roger VK4YB in Moorina Australia November 9, 2018 at 4:50 AM MST.
- Incomplete on 10th, and a second QSO on 11th.



5:14 AM MST QSO with Roger

March 3, 2019 Decodes VK4YB

1210	-25	0.2	1211	@	CQ VK4YB QG62
1212	-24	0.2	1211	@	CQ VK4YB QG62
1213	Tx		1292	@	VK4YB NC0B -25
1214	-23	-0.1	1212	@	NC0B VK4YB -22
1215	Tx		1292	@	VK4YB NC0B RR73
1216	-23	0.0	1212	@	NC0B VK4YB R-22
1217	Tx		1292	@	VK4YB NC0B RR73
1218	-24	0.0	1212	@	TNX ROB 73
1220	-25	0.2	1212	@	VK3DQL VK4YB -25
1224	-25	0.1	1212	@	CQ VK4YB QG62
1226	-21	0.2	1212	@	CQ VK4YB QG62
1228	-26	0.0	1212	@	CQ VK4YB QG62

Openings are not very long to VK

The March 3rd opening lasted for 18 minutes, better than average.

Some openings are barely long enough for a complete contact.

At times there is one way skip.

Longer cycle times than 60 seconds might decode deeper into the noise, but a complete contact might be longer than the DX opening.

Next goal on 630 meters?

- WAS - Worked All States !
- 32 down, 18 to go.
- We need more hams on 630m, as some states do not even have one operator on the band.
- For instance, there is no one on 475 kHz in Wyoming, my neighbor to the north!
- Since I have worked Hawaii, Alaska and Maine from Colorado, WAS can be done once more states get on the air.

What is the dynamic range of WSJT X?

Frank Donovan, W3LPL, (and multi-multi contest super station) asked me to measure the dynamic range of WSJT X.

The best I could do was test a complete system that included a receiver (IC-7300), a Monitor Sensors transverter (reviewed QST July 2018) and WSJT X running on an HP i7 quad-core PC.

I have a white paper PDF available if anyone is interested in reading the details of the two hour test using WSPR in January 2018 from 1210 PM to 1412 PM MST.

Bottom line, the dynamic range of the system, with 7300 running normal AGC on FAST, was at least 75 dB, and possibly 80 dB.

While the WSJT recommendations are to run manual AGC, I see no reason to not let the AGC handle receiver gain.

Sherwood Engineering

630 Meters at NC0B Ault, Colorado

40 miles east of WWV