



630m (472-479kHz)

Amateur Experimentation VK/ZL

Presentation by

Justin Giles-Clark VK7TW

April 2014

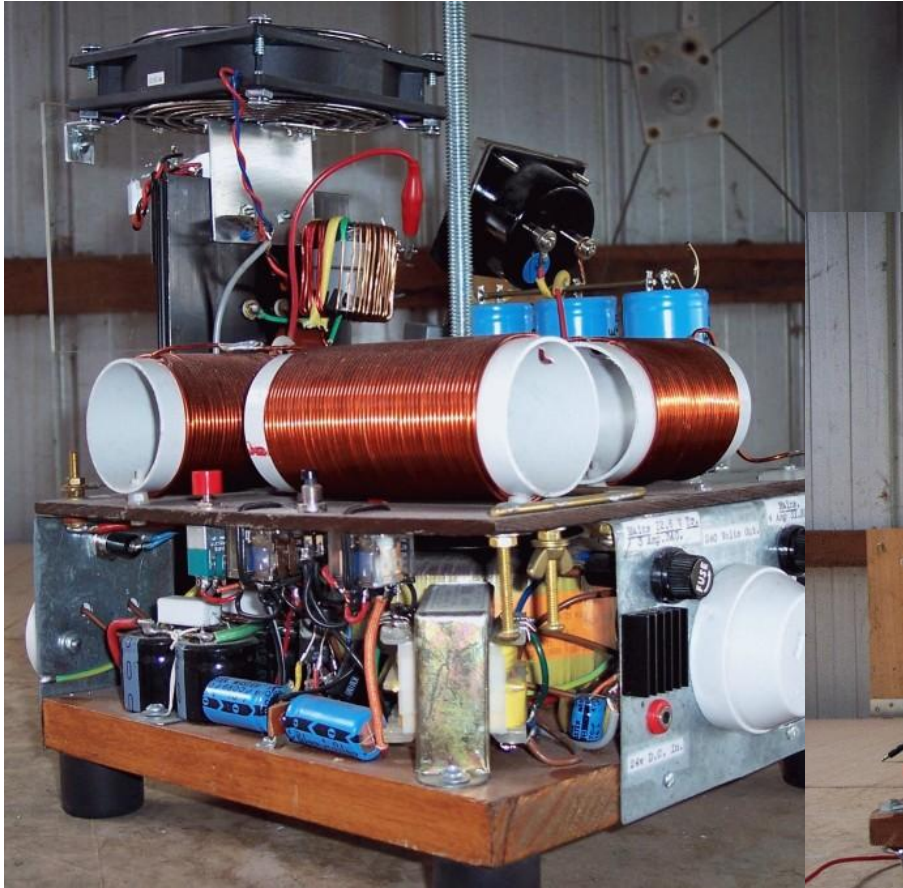
Some MF History

- 405-535 kHz with 500 kHz int marine calling & distress frequency, 512 kHz sec calling & distress & 410 kHz DF frequency.
- Keys dates 1906, 1912/13 and 1932
- World Radiocommunication Conference 2012 allocated 427-479kHz to the amateur service
- Secondary basis - 1 watt effective isotropic radiated power (EIRP)
- Don't forget we also have 137kHz (2200m)

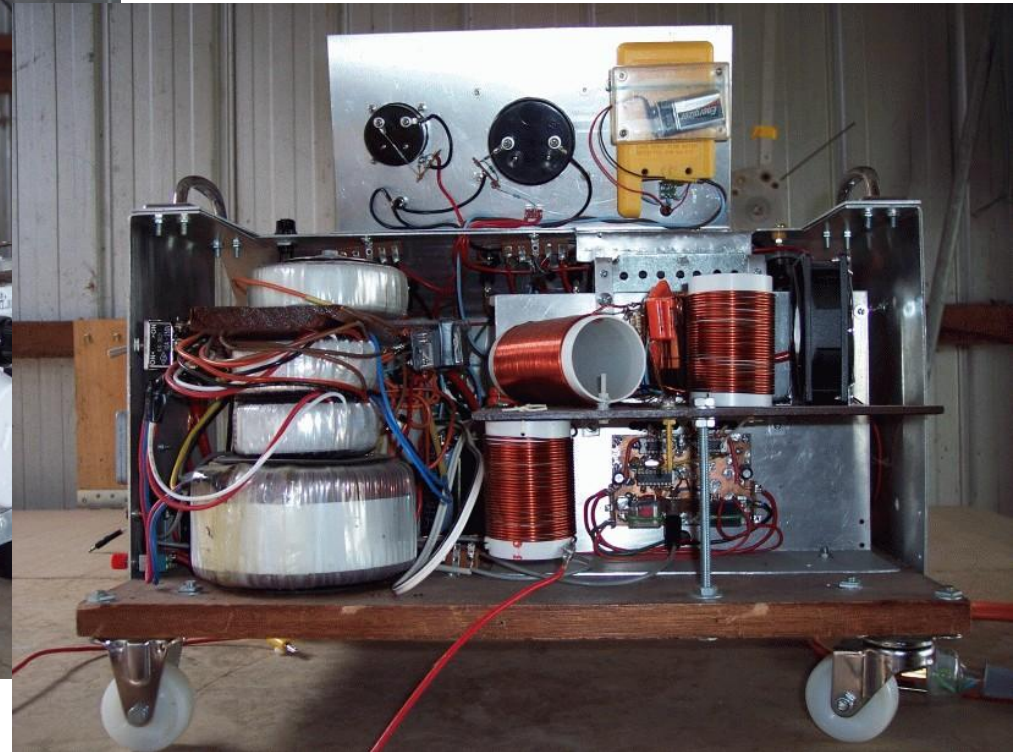
Some VK/ZL LF & MF Experimenters

- Robert Milne AX2TAR/VK7ZAL SK – 171.5kHz experimenter – 30/8/97 – Two way with ZL3FJ 1941km extended to 2444km with ZL1WB
- ZL2CA, ZL3PN and ZL4MD RX John Adcock AX3T35(VK3ACA) – 13/09/92
- Bob ZL2CA & Andrew ZL2BBJ - First ZL's 2-way QSO – 19/06/91
- Drew Diamond VK3XU – Published Transmitters – Vol 4 Radio Projects 137 & 500kHz + AR Mag
- Dimitris VK1SV, Dale VK1DSH, Nick VK2DX, Murray ZL1BPU to name but a few

AX2TAR/VK7ZAL - LF Experimenter



- 350W – 171.5kHz



- 1 kilowatt – 171.5kHz

LF Distance Records

QRB km	DATE	Call RX	QTH-loc	Equipment	Call TX	Mode	QTH-loc	Equipment
19187,2	11-Apr-05	ZL4OL	RE54GG	Active whip 10m, IC-R75, Argo	G3AQC	DFCW180	IO90NT	1W ERP
17933,7	26-Mar-05	ZL2CA	RE78IR	Active whip 10m, TS850, Argo	YU7AR	120	KN05BW	?
16833	1-Nov-13	Edgar J Twining (VK7 - EJTSWL)	QE37WK	1m Active whip @9m, IDC-136II receiver, SL	DK7FC	DFCW180	JN49IK00WD	Inv-L, H eff=25m, 470pF / 3 mH
16820,2	6-Apr-05	ZL4OL	RE54GG	Active whip 10m, IC-R75, Argo	RA3YO	120	KO73DG	1-2W ERP
16815,3	6-Apr-05	ZL2CA	RE78IR	Active whip 10m, TS850, Argo	RA3YO	120	KO73DG	1-2W ERP
16805,2	20-Mar-12	Edgar J Twining (VK7 - EJTSWL)	QE37PD35UC	Active whip 1m, IC-R75, SL	DK7FC	DFCW180	JN49IK00WD	Inv-L, H eff=25m, 470pF / 3 mH
16784,8	20-Mar-12	VK7ZL	QE37MF75AA	pa0rdt, IC-R75, SL	DK7FC	DFCW180	JN49IK00WD	Inv-L, H eff=25m, 470pF / 3 mH
16546,8	24-Mar-12	VK2DDI	QF55HF	pa0rdt, IC-R75, SL	DK7FC	DFCW180	JN49IK00WD	Inv-L, H eff=25m, 470pF / 3 mH
16507,2	2-Oct-04	ZL2BBJ	RE78JS	Active Loop(1.6m square), Home Brew RX, Argo	RU6LA	120	KN97LN09IG	15-20W ERP
16503,1	2-Oct-04	ZL2CA	RE78IR	Active whip 10m, TS850, Argo	RU6LA	120	KN97LN09IG	15-20W ERP
16472,7	14-Apr-04	ZL2BBJ	RE78JS	Active Loop(1.6m square), Home Brew RX, Argo	RN6BN	DFCW120	KN95LC27AU	40W ERP
16468	11-Apr-04	ZL2CA	RE78IR	Active whip 10m, TS850, Argo	RN6BN	60	KN95LC27AU	40W ERP
16464	14-Mar-12	VK1SV	QF44MT	pa0rdt, TenTex RX331	DK7FC	DFCW180	JN49IK00WD	Inv-L, H eff=25m, 470pF / 3 mH

472-479kHz Operation- The VK Rules

- Advanced Amateurs only
- 2.1 kHz maximum transmit bandwidth - CW, digital & narrow SSB modes
- EIRP of 5 watts (<5% efficient)
- Southern Australia can use - exclusion zones apply in the north and north-west.
- Further details in the amateur section at acma.gov.au

Common Antennas Used

- Receiving antennas:
 - Active antennas - PAORDT
 - Verticals – Marconi-T
 - Loops
 - Earth dipole – Beveridges – long long wires
- Transmitting antennas:
 - Marconi T
 - Verticals
 - Loops
 - Earth dipole

Active Antennas

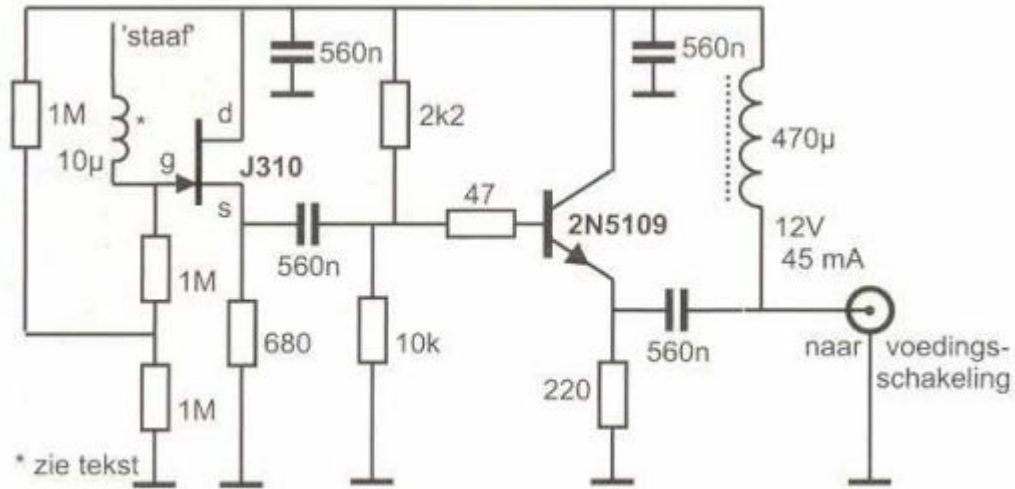
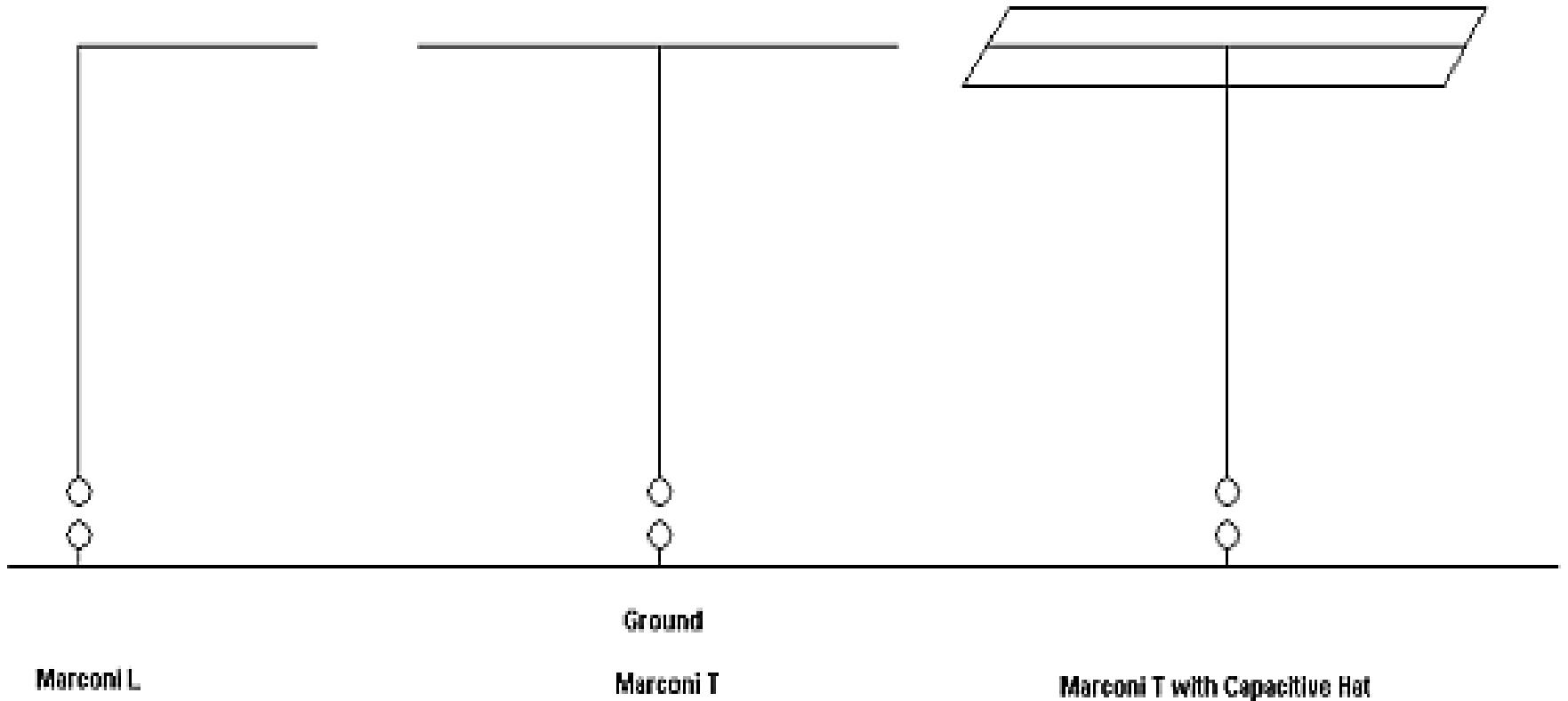


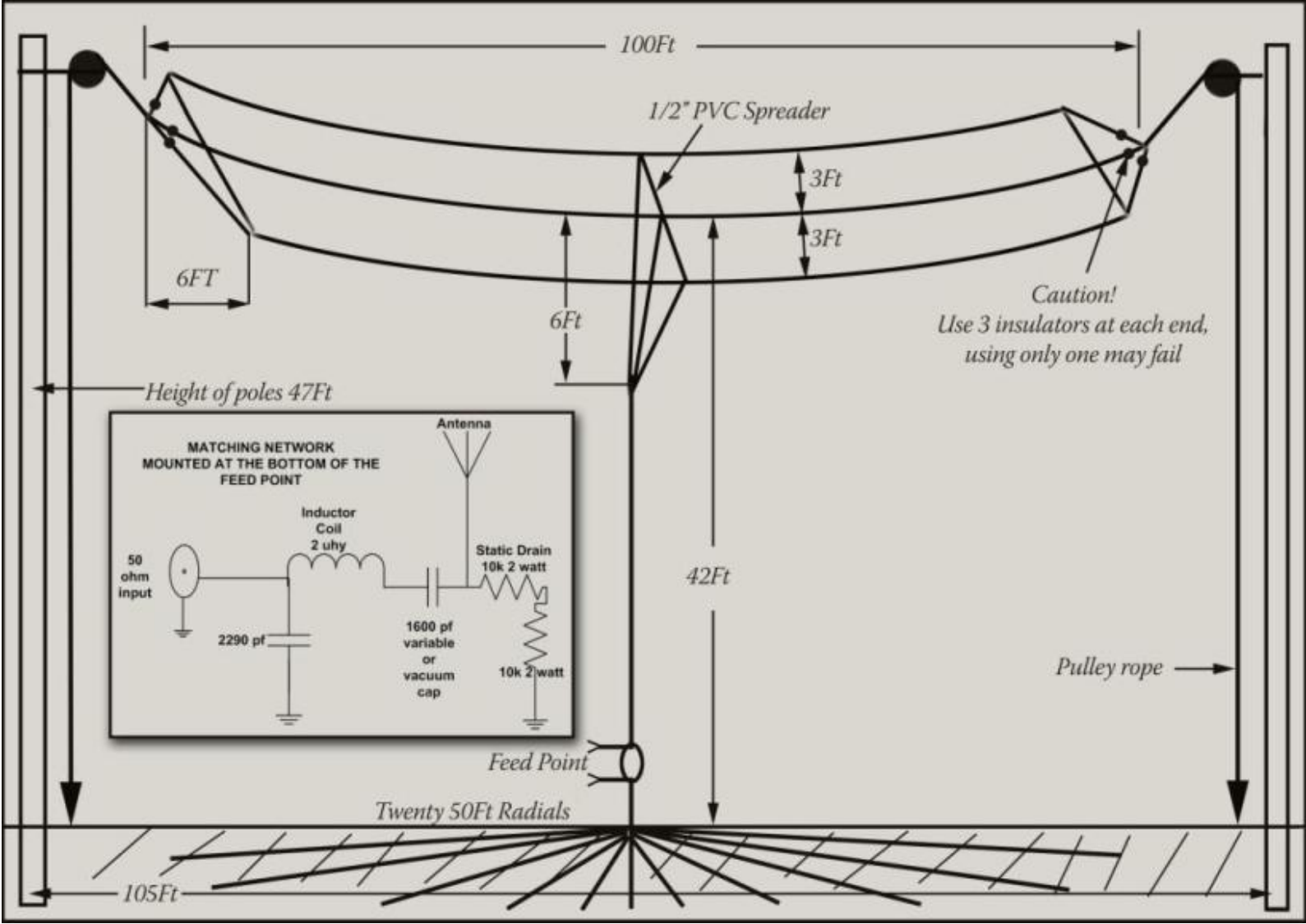
Figure 8 - pa0rdt-Mini-Whip ©



Inv L/Verticals/ Marconi-T



Marconi-T



Marconi-T – Stahan NDB (1)



Marconi-T – Stahan NDB (2)



Loops (1)

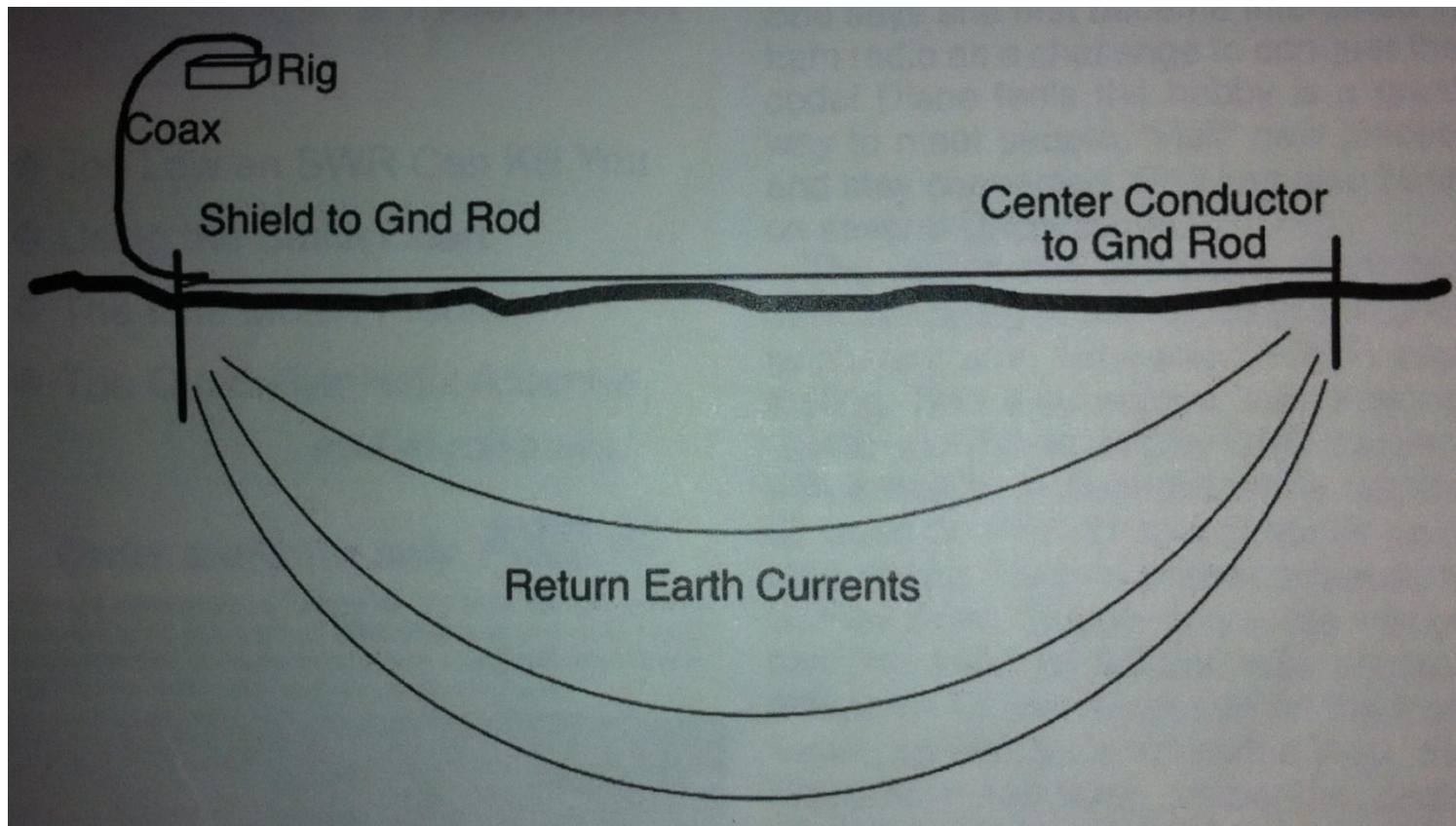




Loops (2)

Earth Dipoles/ Earth Electrodes

One man's ground is another man's antenna or
How to tune antennas with a sledge hammer!



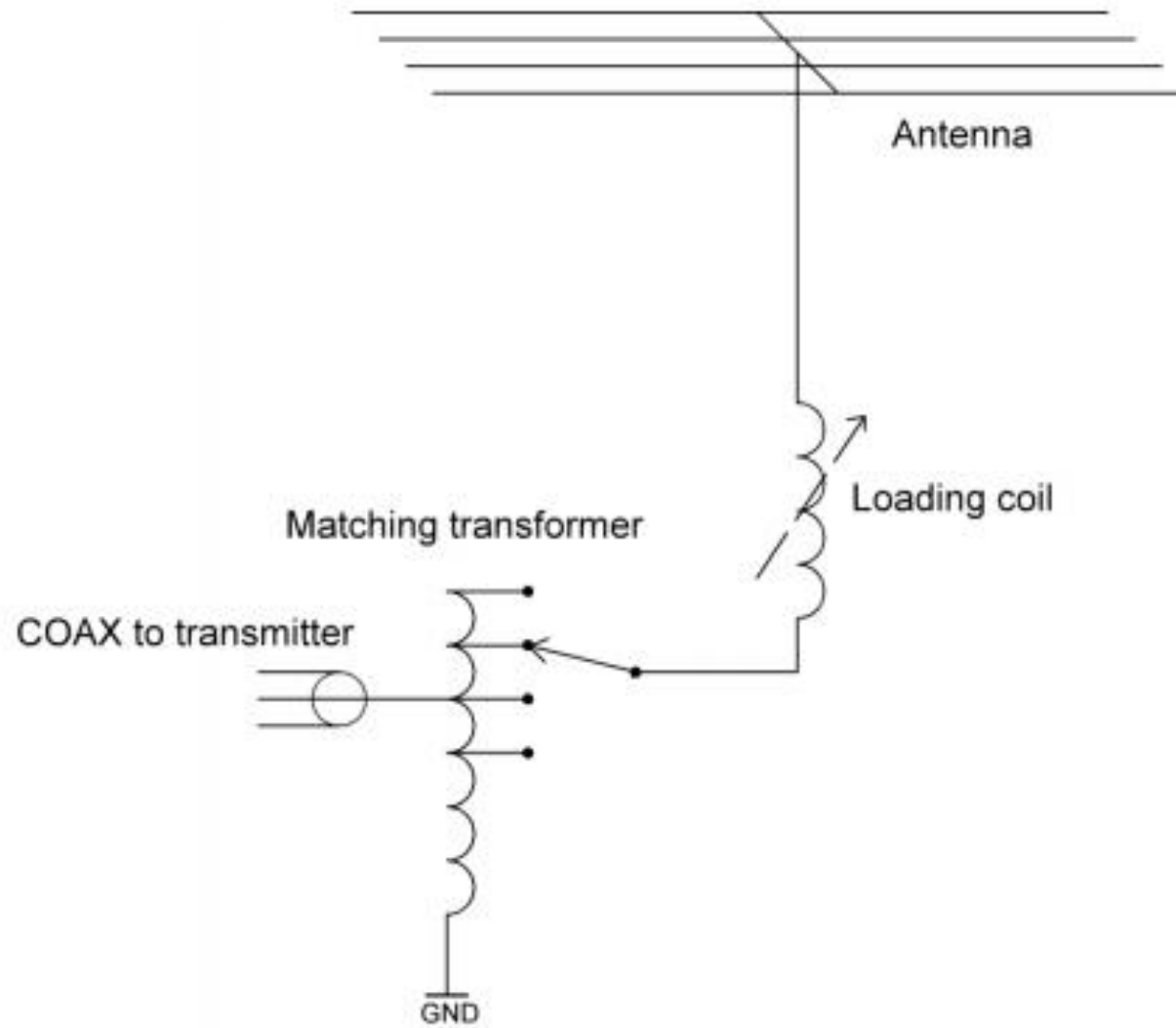
Antenna Tuning (1)

- Variometer
- Loading coils (VK1DSH):

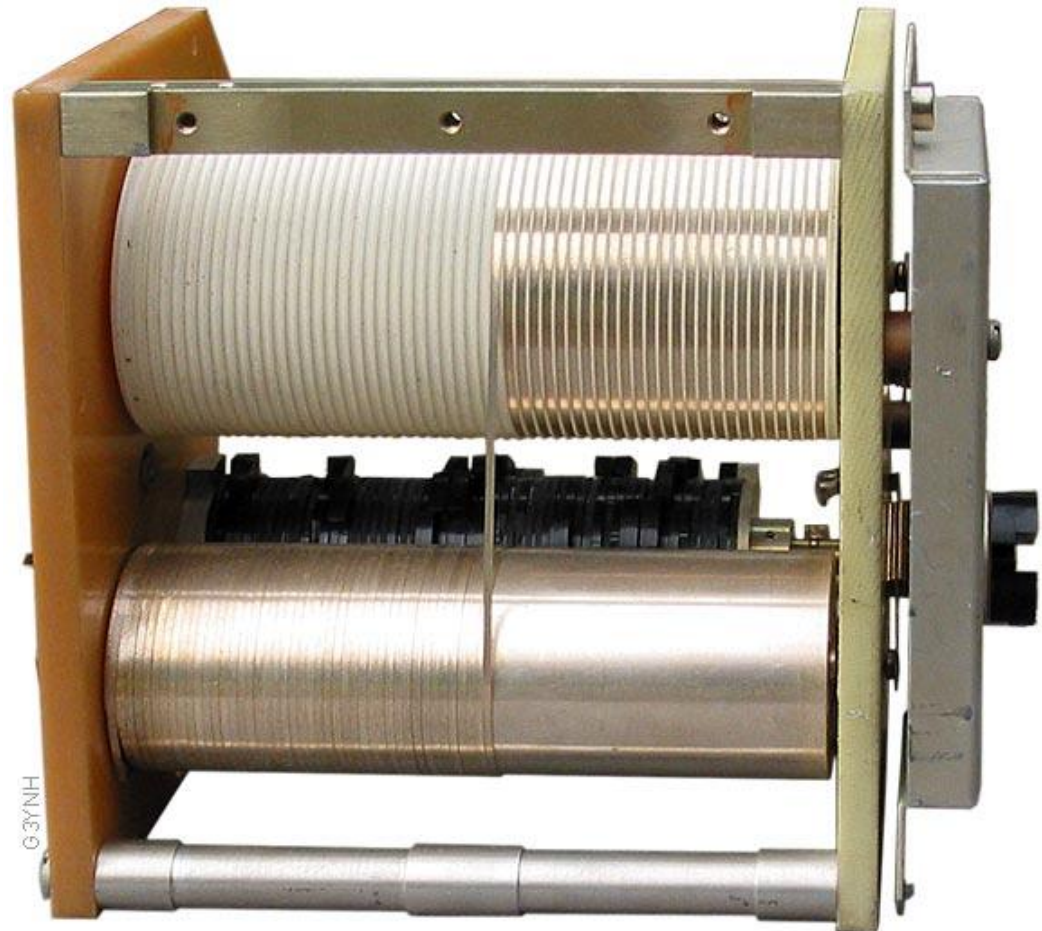
BAND	Approximate Loading Inductance
137kHz	3mH
472-479kHz	500uH
1840kHz	9.6uH + 2200pF capacitor

- Matching to transmitter/receiver
- VK1DSH – excellent article on 160, 630, 2200m – AR March 2013

Antenna Tuning (2)



Antenna Tuning (3)



Antenna Tuning (4)



Antenna Tuning (5)



Safety

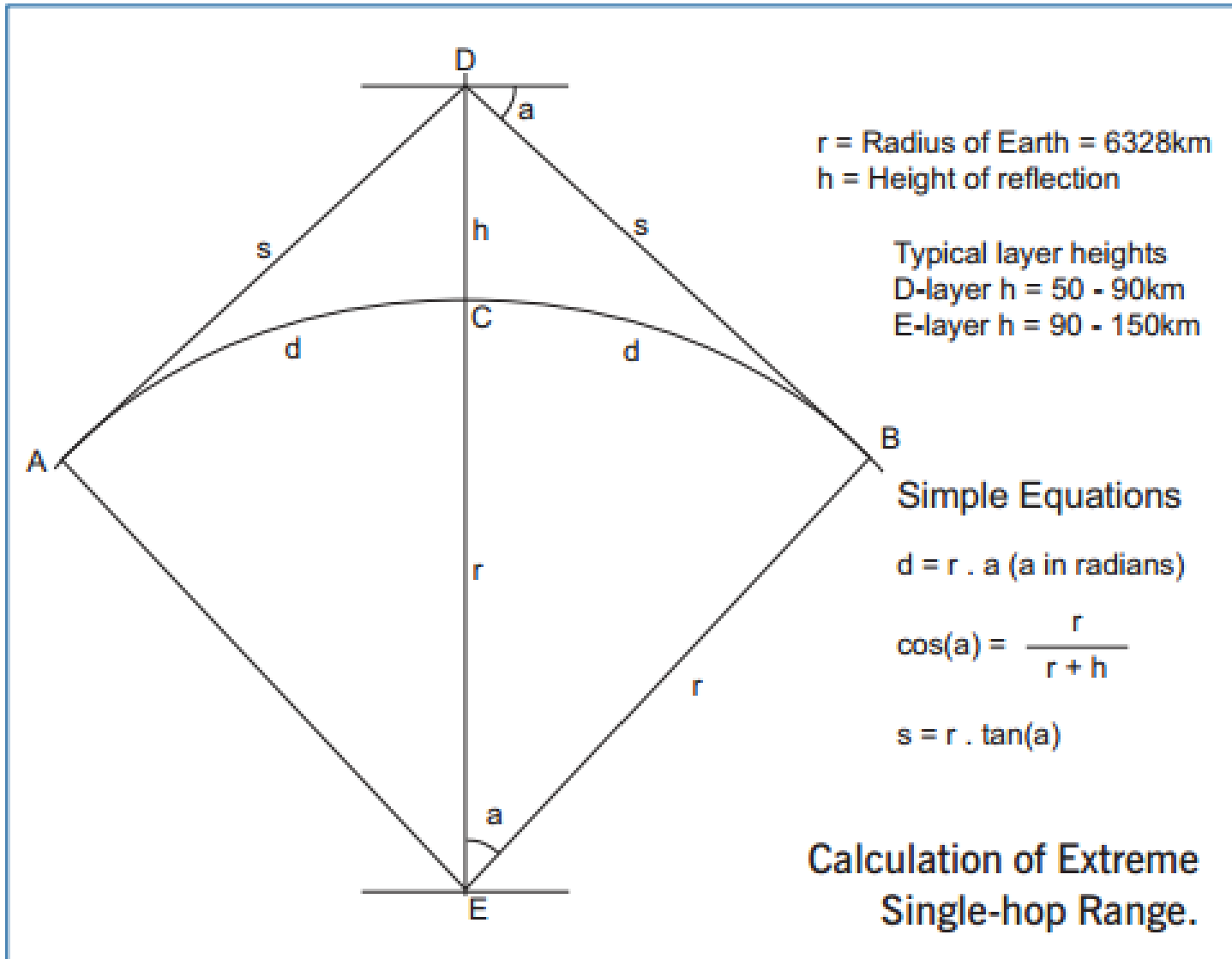


Propagation (1)

- Think AM broadcasting stations – day/night
- Ground wave propagation can be >2000 km
- Not greatly affected by D layer absorption during day like HF (80, 40, 20m)
- Sky wave propagation – refraction + multihop

Layer (Height km)	Day Distance (km)	Night Distance (km)
D (~50km)	~1000km	
E (~100km)		~2000km

Propagation (2)



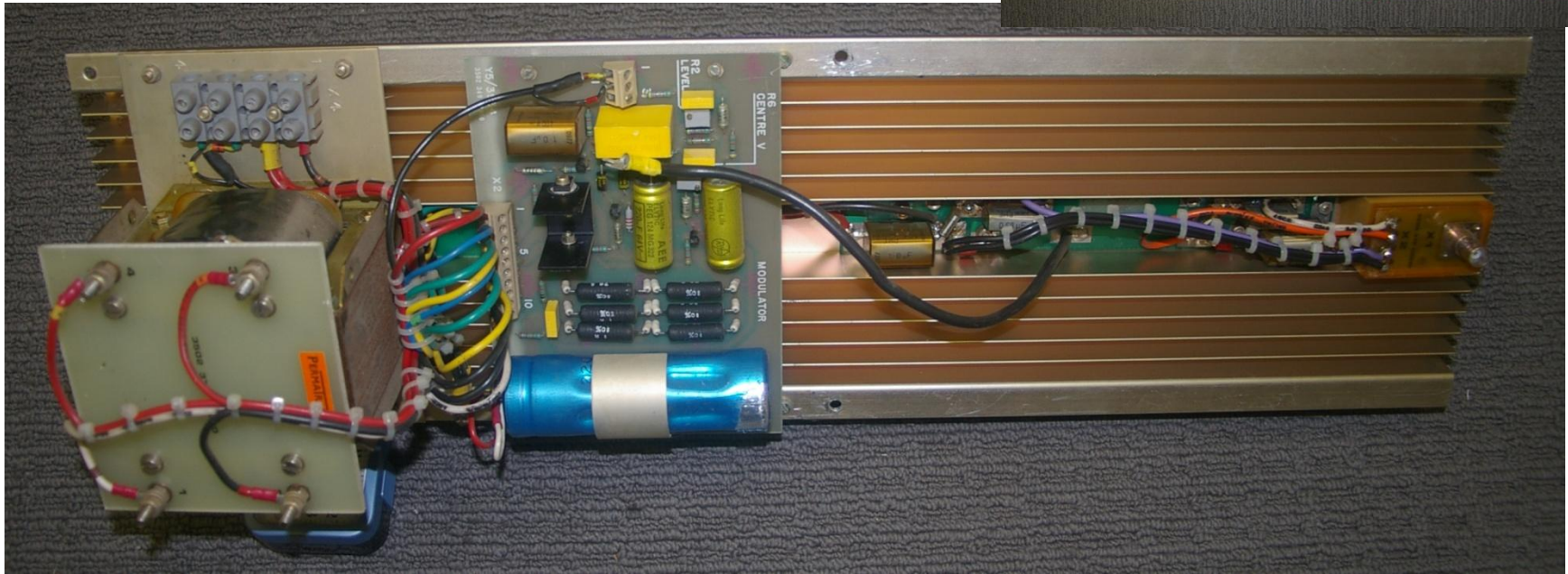
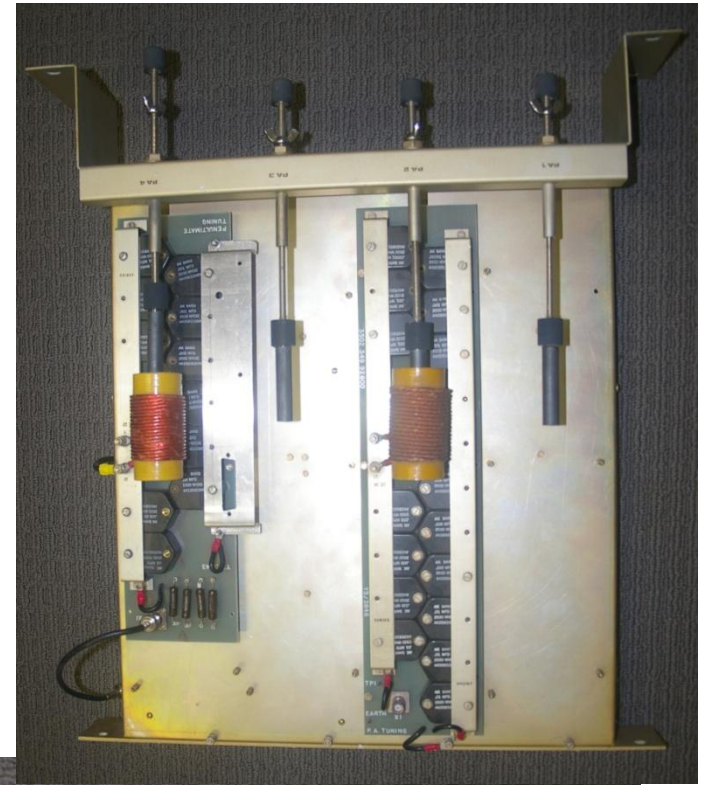
VK Grabbers Abound

- Matt, VK2DAG - <http://vk2dag.com/grabber>
- David, VK2DDI. Berry Mountain Grabber - <http://goo.gl/Dnjmk>
- Bob VK7ZL - <http://www.users.on.net/~bobw/vlf/>
- VK2DX: <http://genesisradio.com.au/VK2DX/137/>

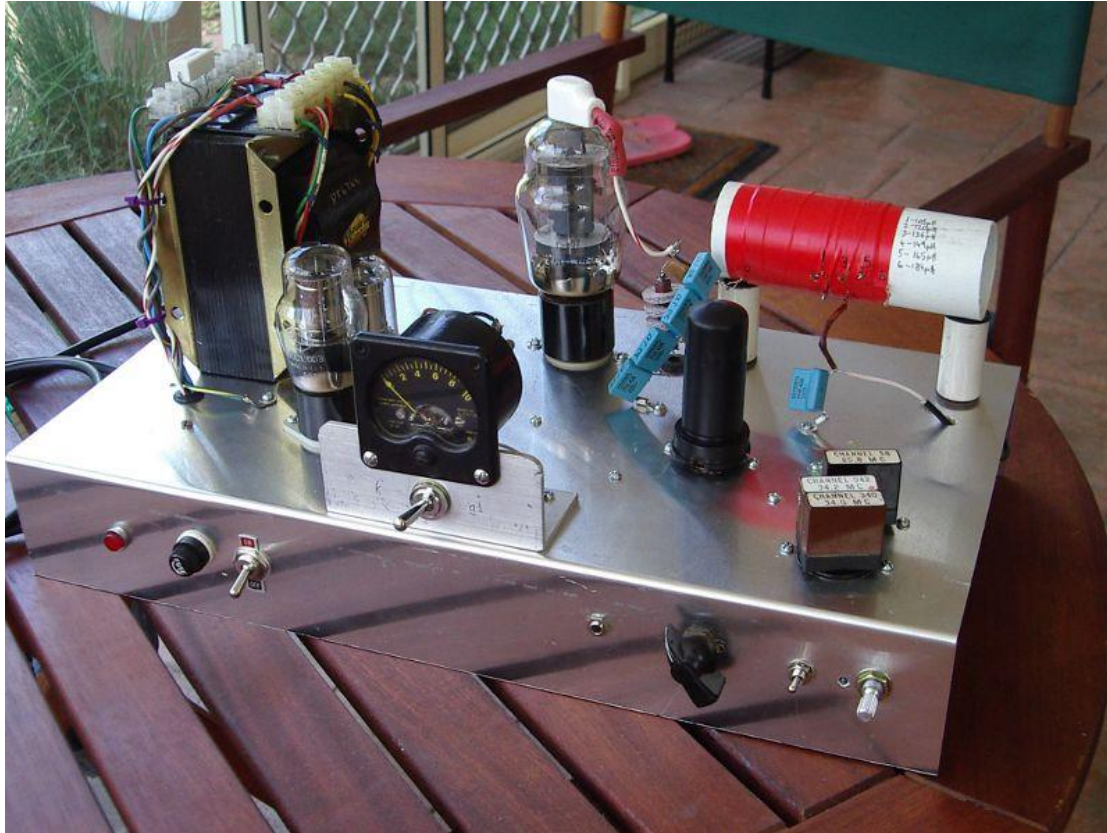
Transmitters (1)

- Many different designs available
- Drew Diamond – 100W CW 472kHz – AR 4/14
- GW3UEP – 100W Class D
- W1FR/N1FBZ – 100W Class D
- 100W HF Linear modules with suitable LPF
- Hafler (& other) Audio Amplifiers modified
- Ex-NDB Transmitters – currently shutting them down

Philips NDB



Transmitters (3)



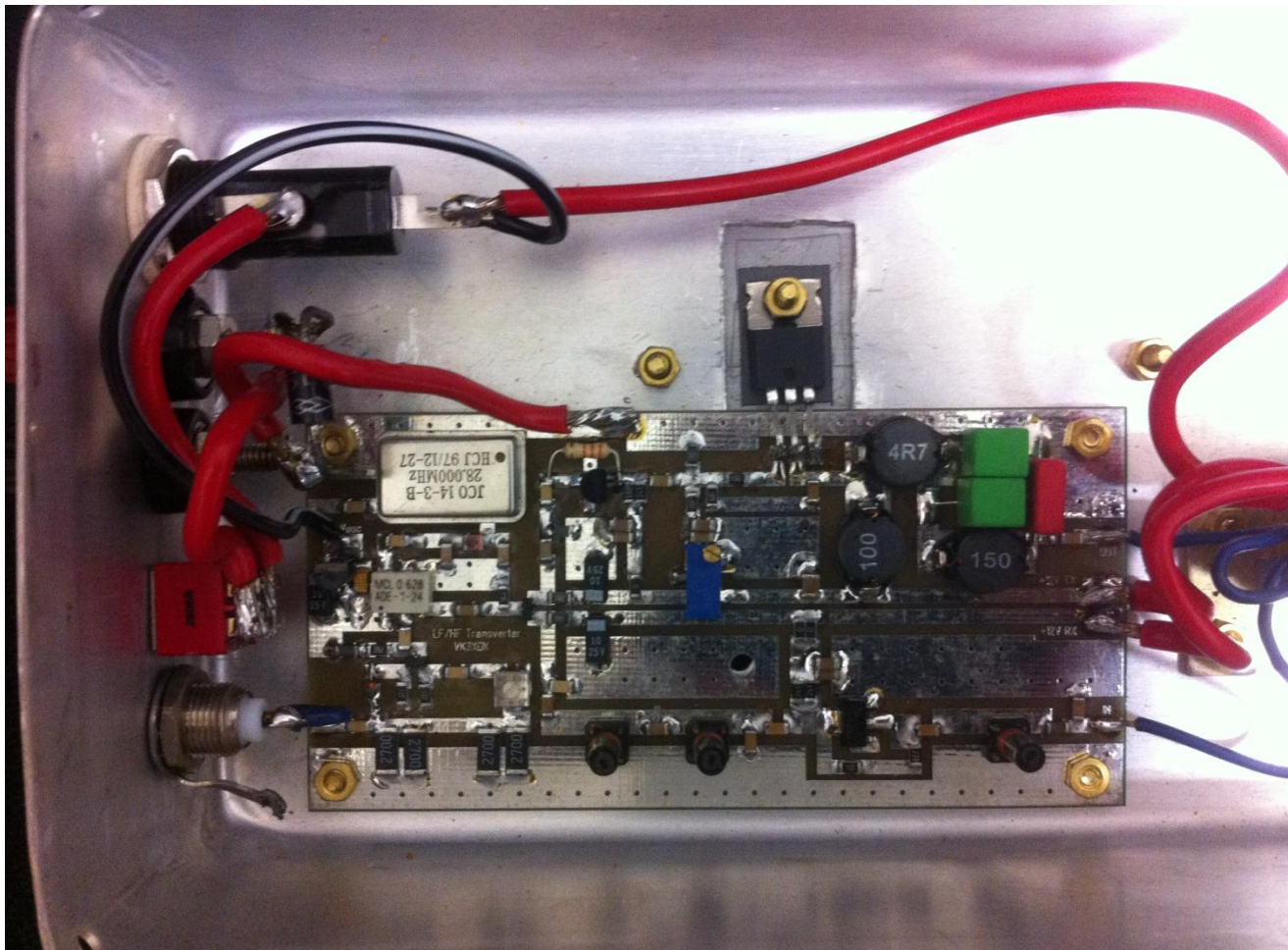
VK1SV 6AG7/807 transmitter for 472 kHz (630 m)

Receivers

- HPSDR
- SDRs – softrock, Genesis, SDR-IQ, Perseus, Elecraft K3
- Many modern HF rigs have general coverage receivers these days – transvert for other rigs
- Rohde & Schwarz ESH3 9Khz~30MHZ Test Receiver !
- Telco level meters – eg. Wandel & Goltermann SPM-19 Selective Level Meter (50Hz to 25MHz)
- Many other options
- Where receivers don't tune low enough – transvert up to an freq the rx can receive on – VK3YE

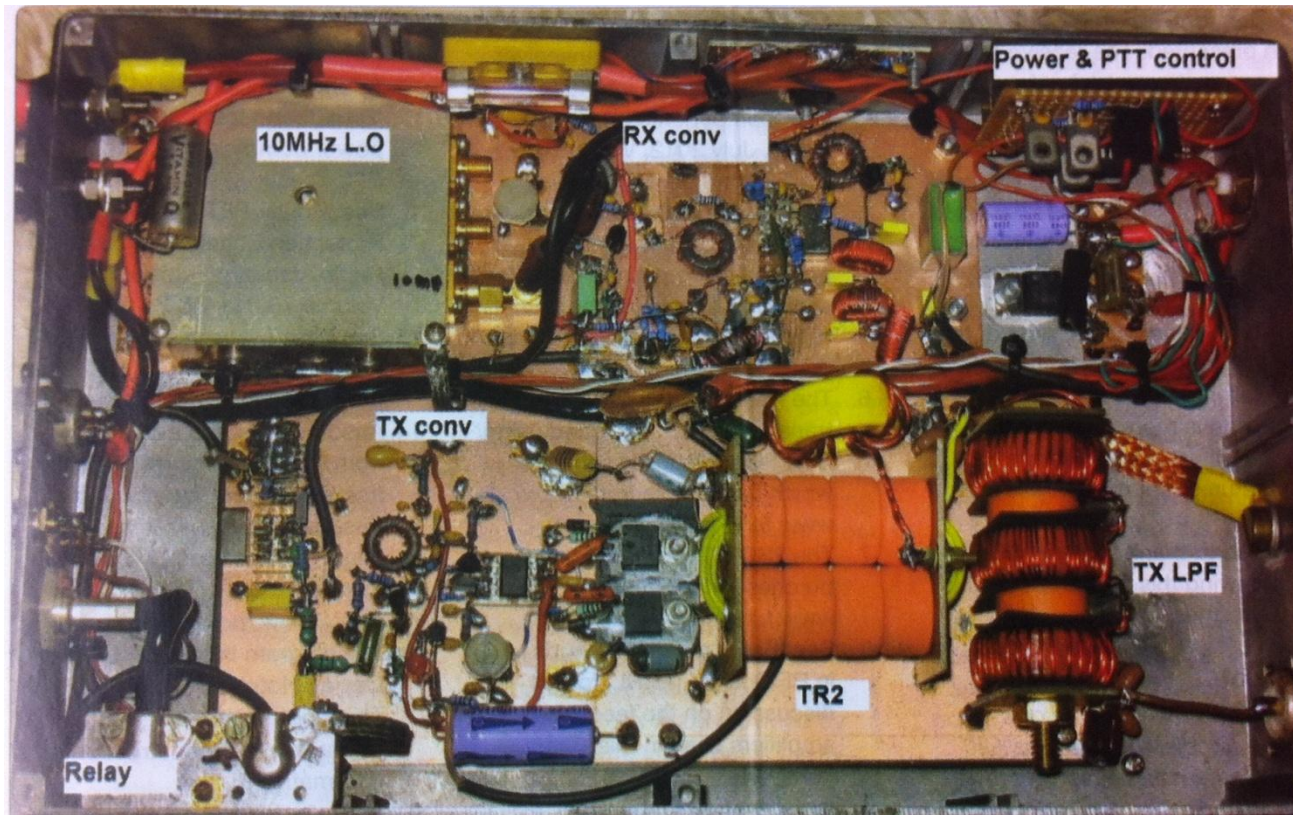
Transverters (1)

- VK3XDK Transverter Kit – 10 or 30m \leftrightarrow 630m



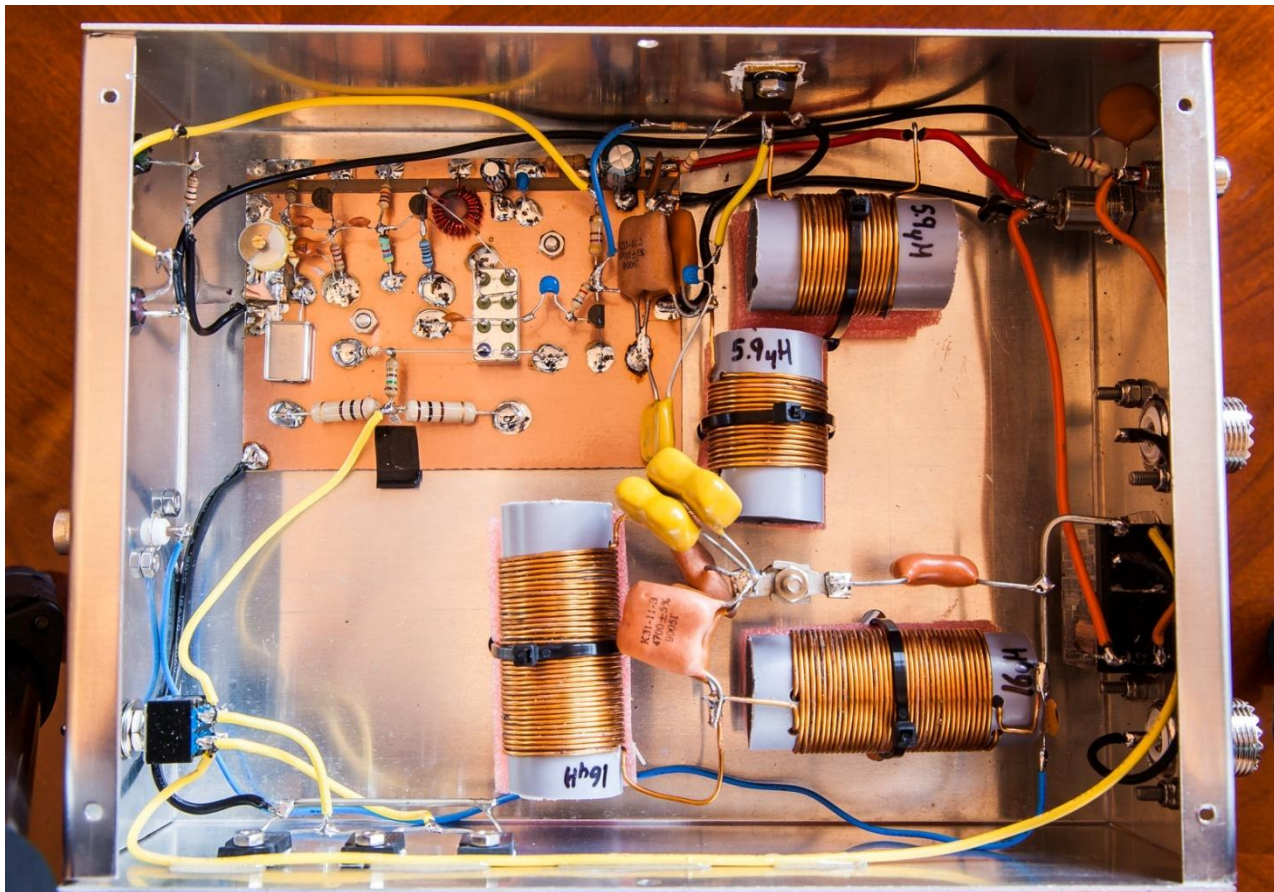
Transverters (2)

- VK1DSH Transverter design – 472-479kHz to 10.472-10.479MHz

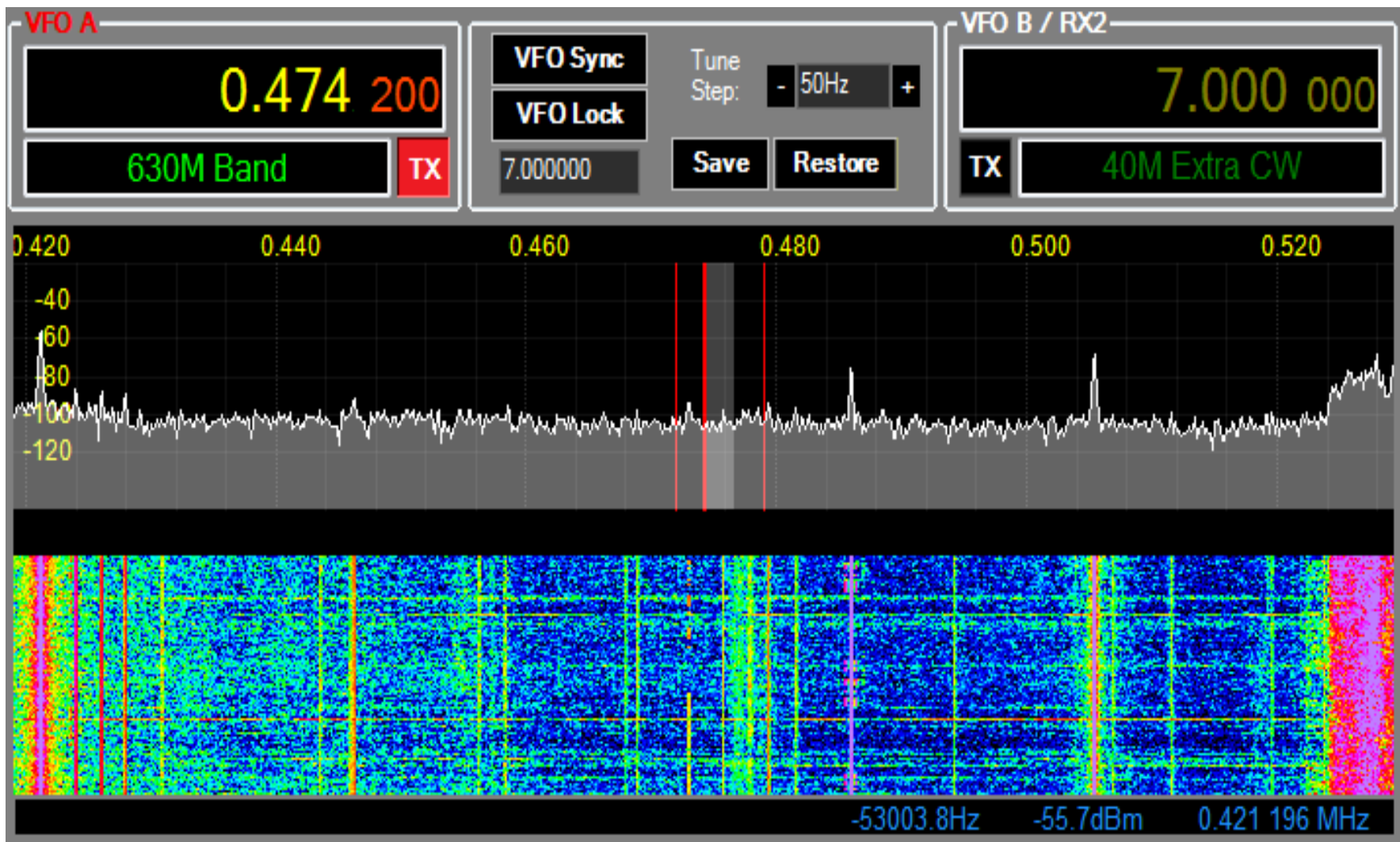


Transverters (3)

- G3XBM Transverter design – 80m <> 630m



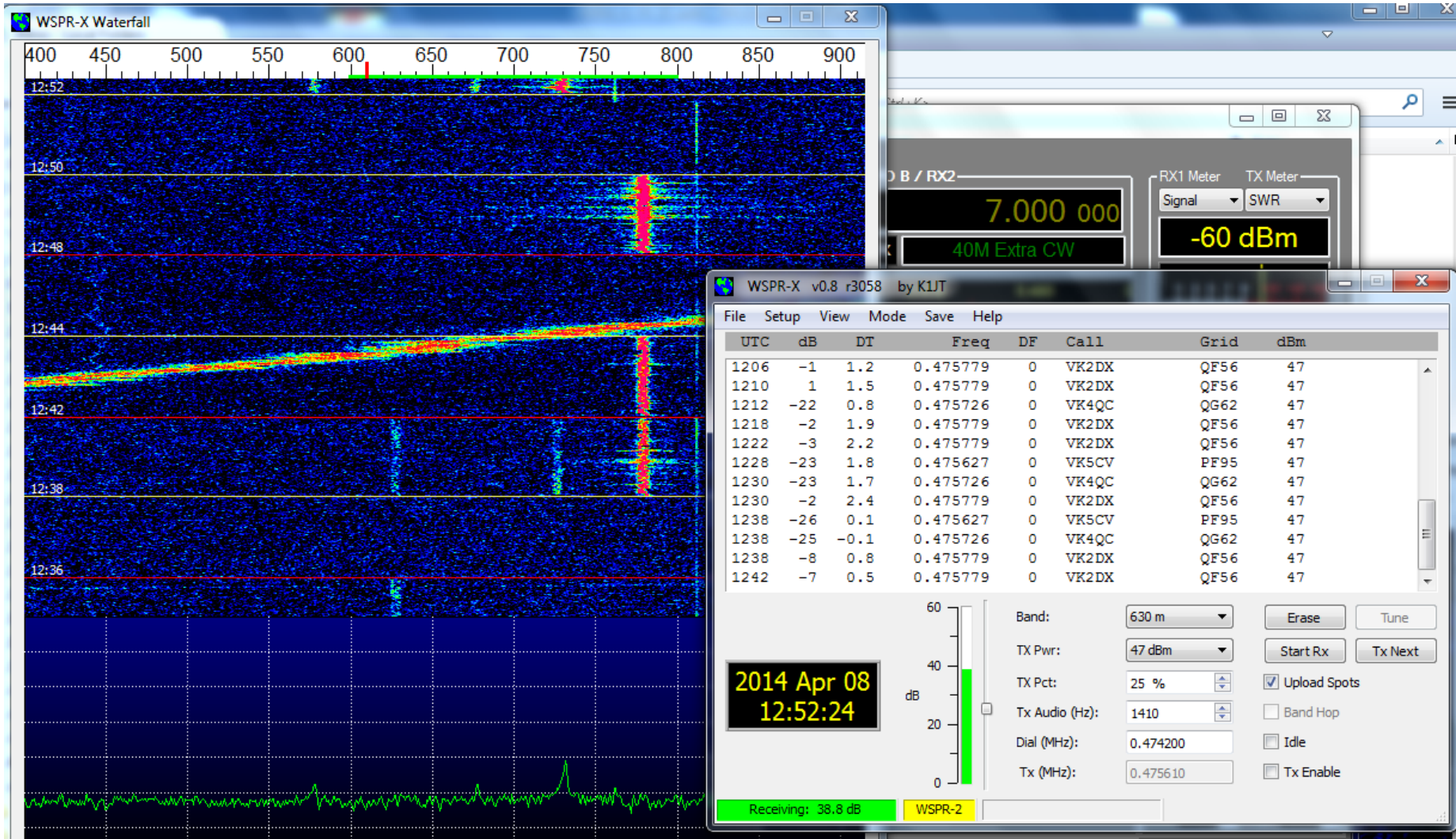
630m



Software used on 630m

- Spectrum Lab – Sophisticated Audio Analyser
- Spectran – More basic Audio Analyser
- Argo – Spectrum and modes in one
- Fldigi – Multi mode
- WSPR/WSJT – K1JT Weak Signal
- HDSDR/HPSDR – Open Source Software
Defined Radio – PowerSDR/VAC/Com2Com
- AADE & VK1OD – Filter Design

WSPR on 630m



Modes

- CW
- QRSS – (extremely slow CW)
- DFCW (Dual Frequency CW)
- WSPR – K1JT
 - <http://physics.princeton.edu/pulsar/K1JT/wspr.html>
- WSQ - Con ZL2AFP and Murray ZL1BPU
- Narrow SSB <2.1kHz
- Plus more

630m Activities

- Nightly contacts - WSPR, CW, QRSS, WSQ, etc
- Essential membership – VK 600m Yahoo Grp - <https://groups.yahoo.com/neo/groups/600m/info>
- Activity weekends – distance and km/watt
- VK3FI Beacon – Mildura – Thanks Noel
- Aiming for Regular AR articles
- Learning and experimenting!

Net Resources

- VK1SV :
 - <http://people.physics.anu.edu.au/~dxt103/136/>
 - <http://people.physics.anu.edu.au/~dxt103/472/>
 - <http://people.physics.anu.edu.au/~dxt103/500/>
- VK1DSH:
 - <https://groups.yahoo.com/neo/groups/600m/files/VK1DSH/>
- VK1DDI:
 - <https://groups.yahoo.com/neo/groups/600m/files/VK2DDI/>
- ZL1BPU/ZL1EE:
 - <https://groups.yahoo.com/neo/groups/600m/files/ZL1EE/>
 - <http://www.qsl.net/zl1bpu/>
- <http://www.500kc.com/>
- <http://www.w1vd.com/>
- <http://630m.net/dev/>
- <http://pa3abk.blogspot.com.au/>

Thanks for listening

- 73, Justin, VK7TW

