

QRP Operating

“Doing More with Less”

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What is QRP?

- ▶ In the beginning a CW Q-signal for reducing power
 - QRP Please reduce power.
 - QRO Please increase power.
 - QRP? Can you/should I reduce power?
 - QRO? Can you/should I increase power
- ▶ In 1960, K6JSS started the QRP Amateur Radio Club (QRP ACI)
 - ▶ Low power: < 100 watts input (200 watts PEP)
 - ▶ Medium power: 100-500 watts input
 - ▶ High Power: > 500 watts input
 - ▶ Many formerly high-power hams dropped below 100 watts (input power), to the 5- and 10-watt levels and found they could do surprisingly well.
- ▶ In 1979, the QRP ARCI defined the QRP limit as 5 watts output power (after a big internal battle)

Power Definitions Today

High	> 500 watts input
Medium	100-500 watts input
Low	< 100 watts input (200 watts PEP)
QRP	5 watts or less CW or Digital output
	10 watts or less PEP SSB output
QRP _p	Milliwatters - Less than one watt output power

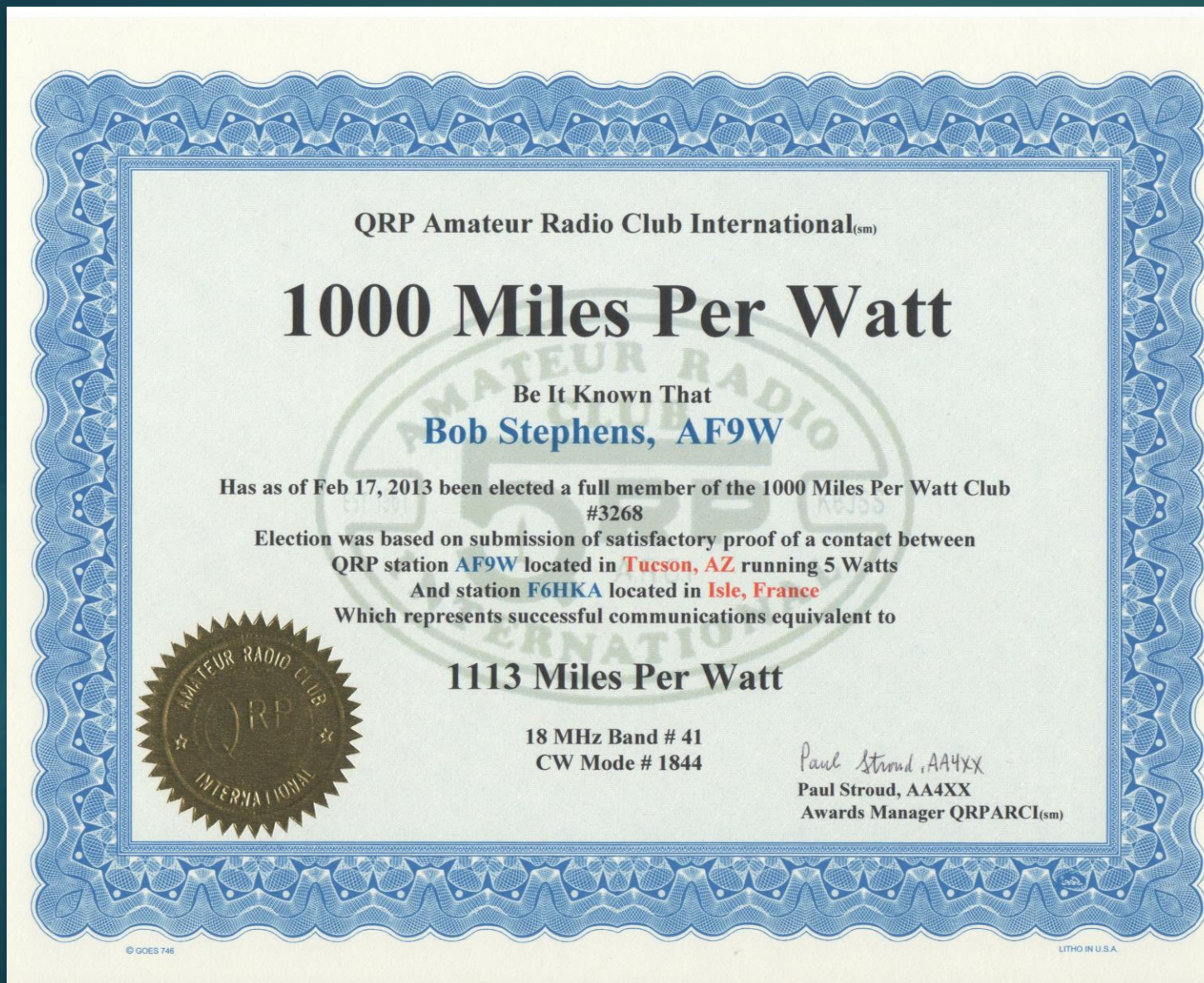
Why QRP?





The Challenge – Working the World with 5 watts

- ▶ Equipment Efficiency and Effectiveness
 - ▶ Low loss antennas and feed lines
 - ▶ Low weight and power consumption
- ▶ Operating Proficiency
 - ▶ Understanding propagation
 - ▶ Upgrading operating skills



How far
can you
go?

W2LJ's QSO Map

- ▶ These QSO's were accomplished using 5 watts to wire antennas and Butternut vertical
- ▶ W2LJ has achieved QRP DXCC and QRP WAS. CW is the primary mode.



QRP Modes

- ▶ The most common mode used for QRP is CW
 - ▶ A good weak signal mode
 - ▶ Only requires simple transceivers
- ▶ SSB is used by many QRP operators
 - ▶ CW has a 12db advantage over SSB when the receiving station has narrow receive filters
 - ▶ Based on SSB bandwidth of 2.5 kHz and CW bandwidth of 20 Hz
- ▶ Digital modes are awesome for QRP
 - ▶ Many digital operators run QRP but don't consider themselves QRP ops
 - ▶ Modes like JT65 make contacts using milliwatts of power
 - ▶ FT8 is not specifically a QRP mode but can be fun to operate QRP

QRP Equipment

- ▶ Turn down the power on your normal 100 watt rig to QRP 5 watts (10 watts PEP)
- ▶ New and Used Commercial QRP Equipment
- ▶ Kit Radios
- ▶ Check out eHam.net Reviews of QRP Radios (5 watts or less) for more ideas



LNR Precision - MTR5b, MTR3b, and MTR4b



Youkits HB-1B 2018



MFJ Single Band XCVR
Available for 40M,30M, 20M,
17M, 15M

Commercial CW Radios



Yaesu FT-818 and FT-817ND



Elecraft KX2 and KX3



Elecraft K2



MFJ Single Band XCVR



MFJ-Xiegu 5105

Commercial SSB/CW Portable Radios

Popular Used Commercial Radios

No longer manufactured



ICOM IC-703



Ten-Tec Scout 555



Elecraft K-1 Kit



Heathkit HW-8
Also HW-7 & HW-9



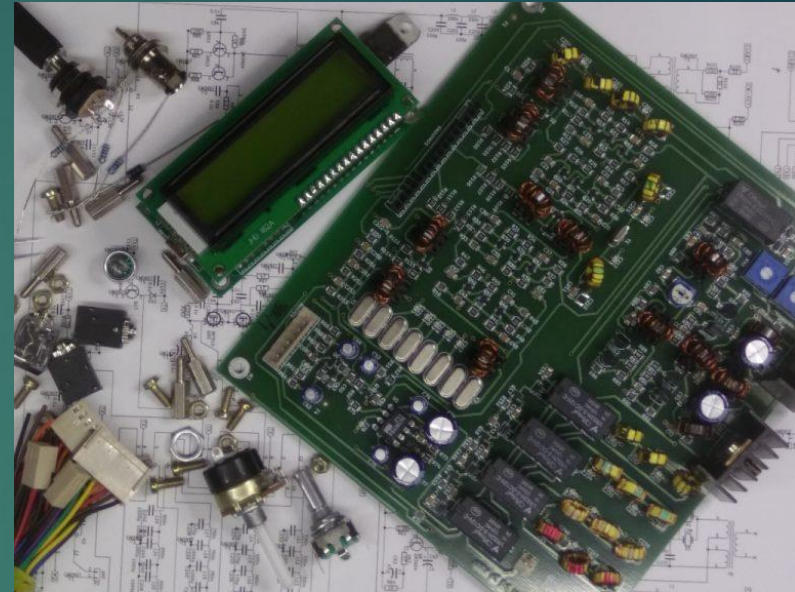
Ten-Tec Argonaut VI



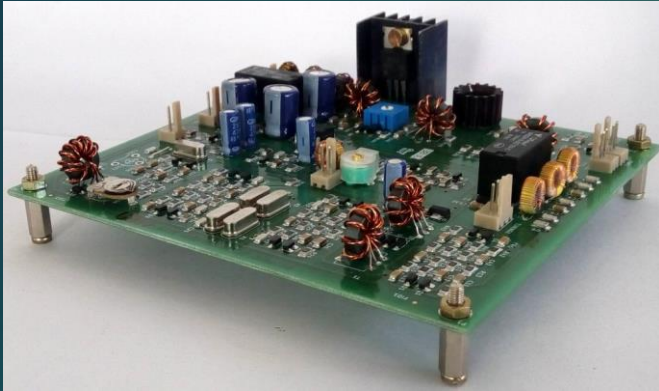
Elecraft KX-1

Popular Kit Radio - μ BITX

- ▶ Up to 10 watts pep on lower HF bands, dips to 5 watts on 28 MHz
- ▶ SSB and CW
- ▶ Simple to build and align
- ▶ Minimal controls
- ▶ Based on Arduino Nano controller and a Si5351 for all local oscillators
- ▶ Double conversion, superhet architecture
- ▶ Uses Raduino Open Source software so builder can add features



Other Kits



BITX40 40M
SSB Transceiver



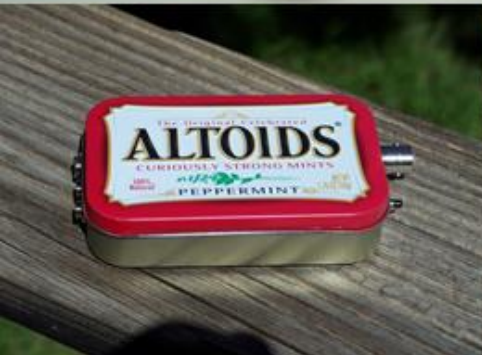
Ultimate3S QRSS/WSPR
Transmitter



Rockmite II 40M
CW Transceiver



Tuna Tin II
CW Transmitter



Homebrewing Your Own Equipment

- ▶ QRP rigs can be simple or complex
- ▶ Lots of kits available that range from 350mw Rockmite to 10w Elecraft K2
- ▶ Kits with PCB's
- ▶ Rigs from scratch with ugly construction
- ▶ Elecraft KX3 that is finished board assembly
- ▶ QRP'ers home brew station accessories too, like antenna tuners, antennas, watt meters, and test equipment



A Complete
Home Brew
Station @
WD9F

QRP'rs Like to Operate



Contests

Run for the Bacon

Peanut Power QRP Sprint

NAQCC Sprint

QRPARCI Summer Homebrew Sprint

All Major RadioSport Contests Have QRP Entries



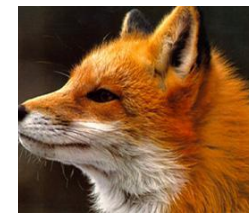
Operating Awards

QRP WAS

QRP DXCC

QRP WAC

1000 Miles Per Watt Award



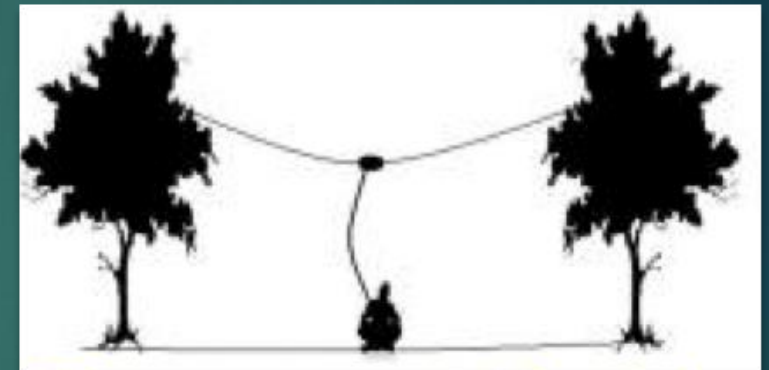
Other Events

QRP Fox Hunt

QRP Portable Operating

- ▶ Portable Operating Is Fun
 - ▶ Fresh air
 - ▶ Great scenery
 - ▶ Mini-Field Day
 - ▶ Opportunity to try different setups
- ▶ QRP rigs are great for portable operating
 - ▶ Usually small and light - easy to pack
 - ▶ Battery operated or solar powered
 - ▶ Simple antennas
 - ▶ Most times less expensive than higher powered rigs

QRP



When you care to send the very least.



QRP Portable Operating Activities

- ▶ SOTA – Summits on the Air
 - ▶ Operating from mountain tops
 - ▶ Daily operation
- ▶ POTA – Parks on the Air
 - ▶ Operating from local, State, and National parks
- ▶ Pedestrian Portable
 - ▶ Operating while walking
- ▶ Bicycle Mobile
- ▶ Backpacking and Camping
- ▶ Hanging out at the park or backyard

QRP Portable Outdoor Operating Events

FYBO – Freeze Your Butt Off

- Sponsored by the AZ ScQRPions QRP Club
- Score based on temperature at operating position



QRPTTF - QRP To The Field

- Theme contest – 2018 "***A River Runs Through It***", 2019 "***Any Ole Park***"
- Joint contest with SOTA Summit to Summit

Adventure Radio Society Flight of the Bumblebees – FOBB

- Bumblebees operate in the wild
- Portable and Fixed stations try to work them

NJQRP Skeeter Hunt



and many more...

160 Meters	1810 kHz	CW	1843 kHz	LSB Europe
160 Meters	1818 kHz	CW	1910 kHz	LSB
80 Meters	3560 kHz	CW	3690 kHz	LSB Europe
80 Meters	3710 kHz (Novice)	CW	3985 kHz	LSB
80 Meters	3711 kHz (Novice)	CW		
40 Meters	7040 kHz	CW	7090 kHz	LSB Europe
40 Meters	7110 kHz (Novice)	CW	7285 kHz	LSB
30 Meters	10106 kHz	CW		
30 Meters	10116 kHz	CW		
20 Meters	14060 kHz	CW	14285 kHz	USB
17 Meters	18069 kHz	CW	18130 kHz	USB
17 Meters	18096 kHz	CW		
15 Meters	21060 kHz	CW	21285 kHz	SSB Europe
15 Meters	21110 kHz (Novice)	CW	21385 kHz	USB
12 Meters	24906 kHz	CW	24956 kHz	USB
10 Meters	28060 kHz	CW	28360 kHz	SSB Europe
10 Meters	28110 kHz (Novice)	CW	28885 kHz	USB

QRP Calling Frequencies By Band

Portable QRP Antennas

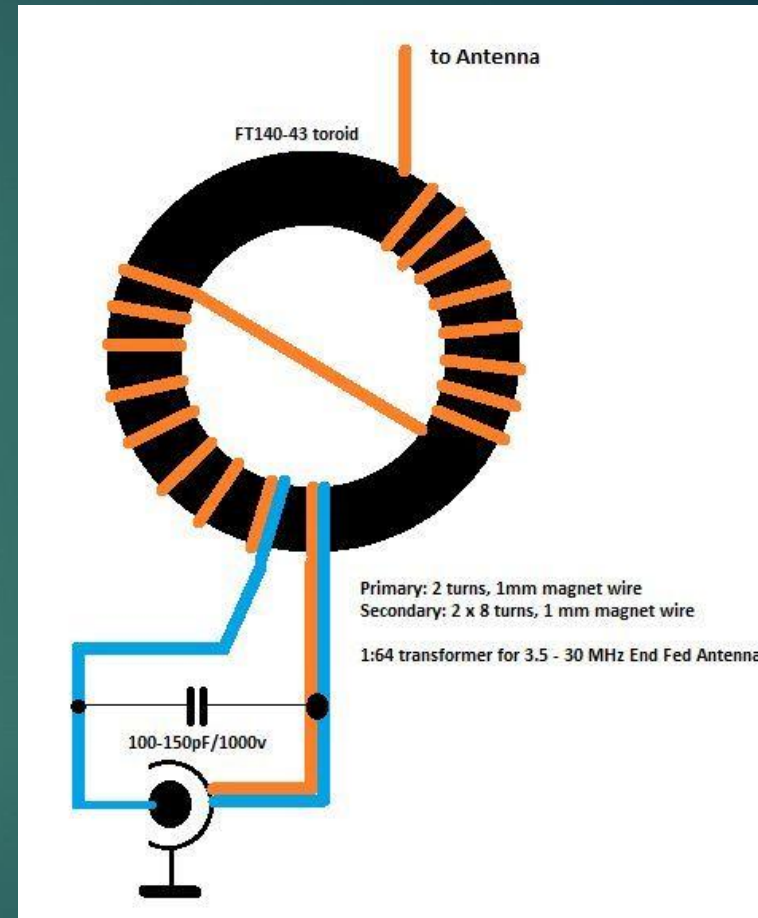
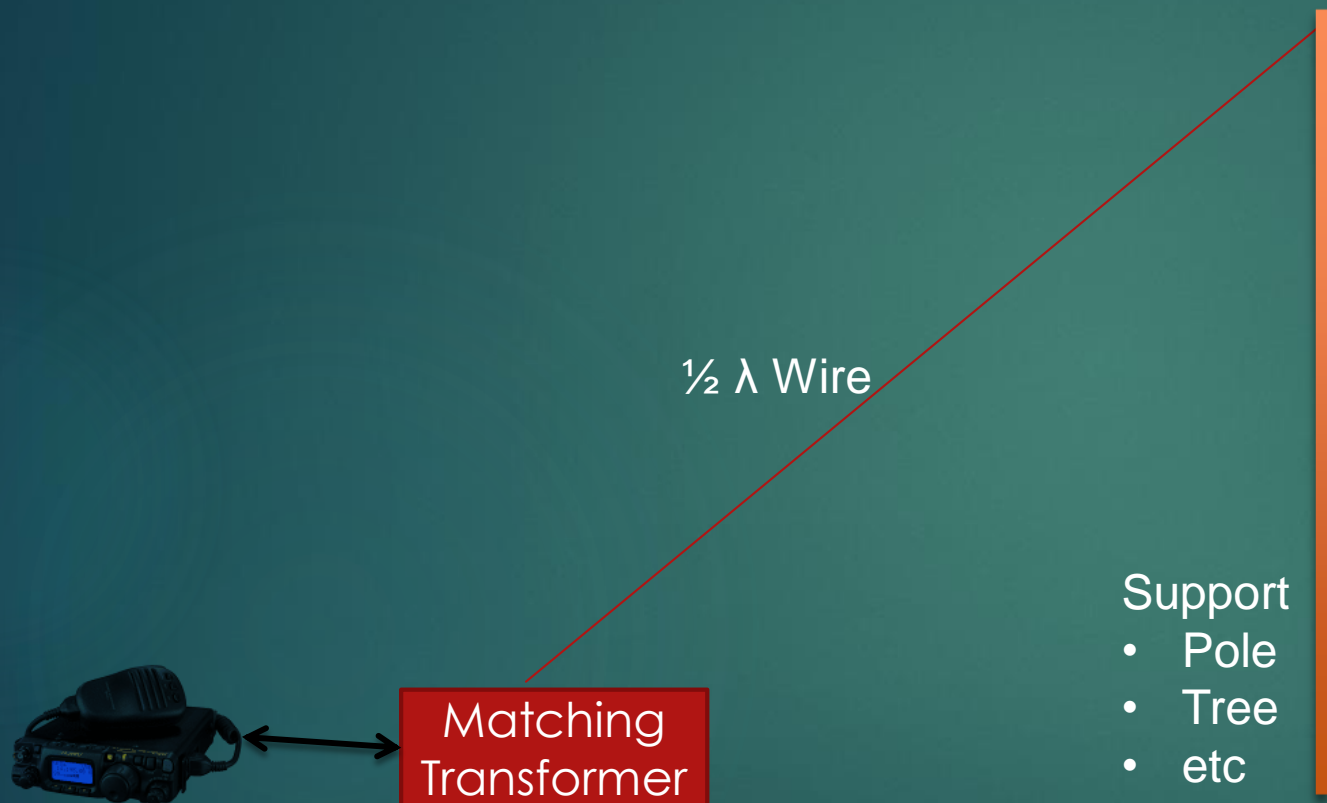
Requirements

- ▶ Easy to set up
- ▶ Multi-band (usually)
- ▶ Easy to tune
- ▶ Lightweight (usually)

Options

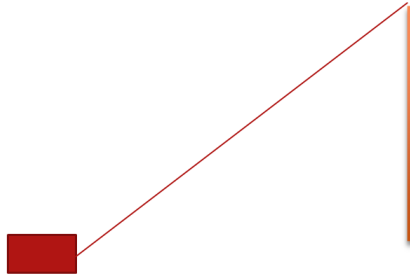
- ▶ Dipole
- ▶ End Fed Half Wave
- ▶ Random Length Wire antennas
- ▶ Vertical Antennas
- ▶ Magnetic Loop

End Fed Half Wave (EFHW)



Matching Transformer

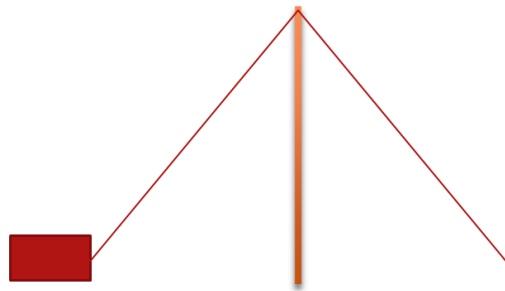
Sloper



Inverted L



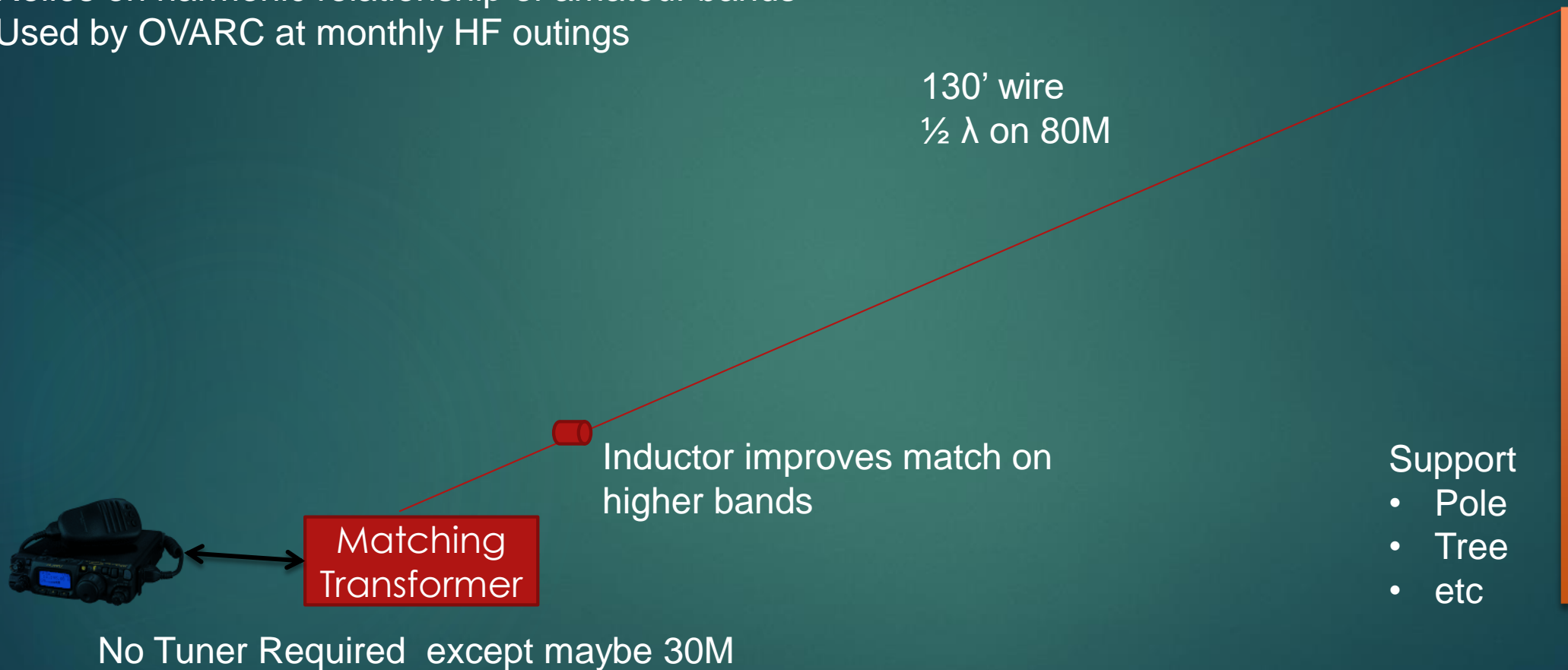
Inverted Vee



EFHW Installation Options

MyAntennas 8010 Multiband EFHW

Relies on harmonic relationship of amateur bands
Used by OVARC at monthly HF outings



Random Length End Fed Antenna

Random Length Wire
Avoid resonant lengths
Best lengths 53' or 124.5'



9:1 Unun

Tuner Required

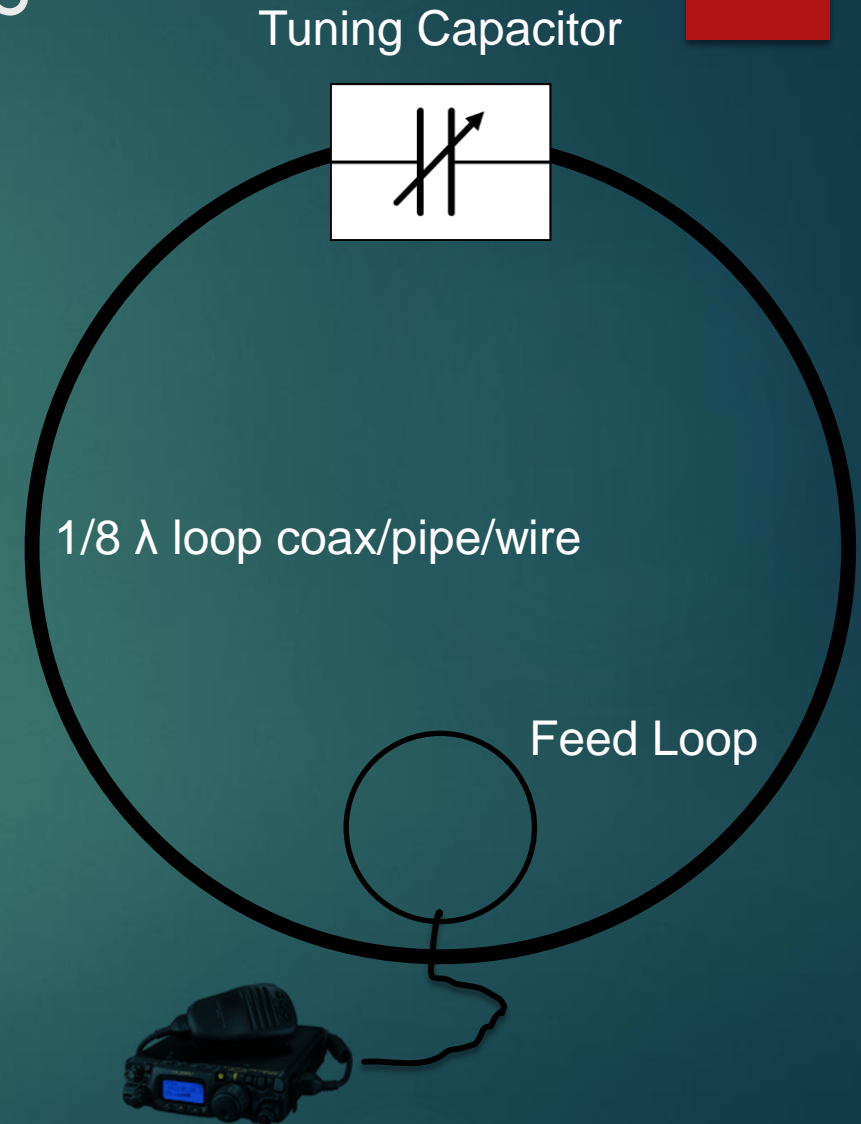
Support

- Pole
- Tree
- etc

- 9:1 Unun reduces end fed impedance to near 3:1
- Tunable on all HF bands
- No counterpoise required if coax > 25'
- Requires antenna tuner
- Excellent portable antenna for Elecraft KX2 or KX3 with internal tuner
- Works well with LDG and MFG tuners also

Magnetic Loop Antennas

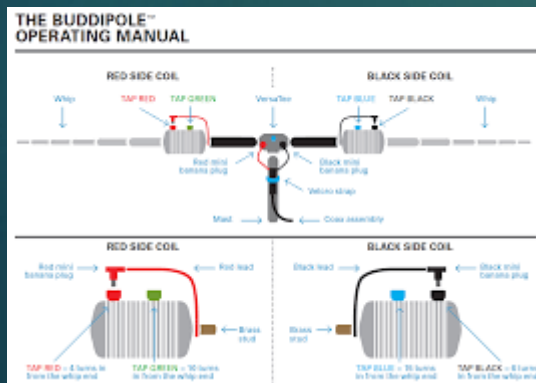
- ▶ Portable versions are lightweight and easy to setup
- ▶ Capacitor tunes antenna to resonance
- ▶ Height above ground not critical
- ▶ Can null local noise
- ▶ Downside
 - ▶ Lower frequencies are less efficient
 - ▶ Narrow tuning range
 - ▶ Expensive capacitor required for high power, i.e. >20w



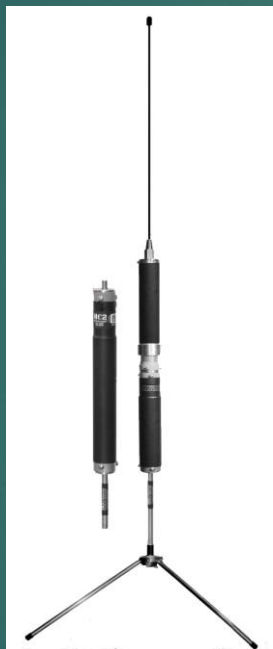
Commercial Portable QRP Antennas



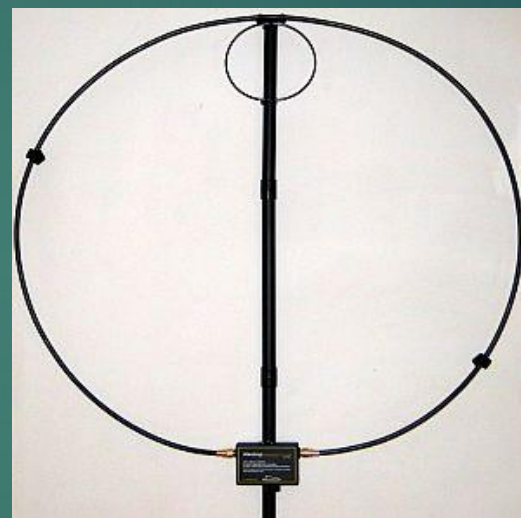
LNR Precision EFHW
10/20/40 Trail-Friendly



Buddipole/Buddistick



SuperAntenna
MP1



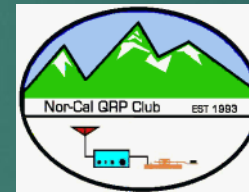
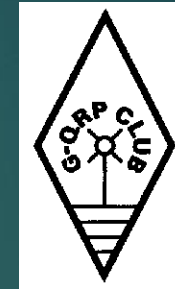
AlexLoop 40m-10m



LNR Precision
W4OP Loop 40m-10m

Hanging out with other QRP'ers

- ▶ Many QRP Groups
 - ▶ Many have no dues or rules
 - ▶ Held together by common interest
- ▶ Annual Gatherings
 - ▶ Lobstercon
 - ▶ Salmoncon
 - ▶ Big Brutus
- ▶ Breakfast / Lunch / Dinner
- ▶ Lots of Technical Discussions
 - ▶ Antennas
 - ▶ Homebrew Equipment
- ▶ Nets
- ▶ Awards
- ▶ Camaraderie



Pacific Northwest
QRP Group



QRP ARCI – FDIM (Four Days In May)

- ▶ The Big Daddy of QRP gatherings
 - ▶ annual convention of the QRP Amateur Radio Club International
- ▶ Starts Wednesday before Dayton Hamvention in Fairborn, OH
- ▶ Seminars
- ▶ QRP Club Night
- ▶ Buildathon
- ▶ Homebrew Contest / Show & Tell
- ▶ Vendor Night
- ▶ Grand Banquet



Never been there but it's on my bucket list

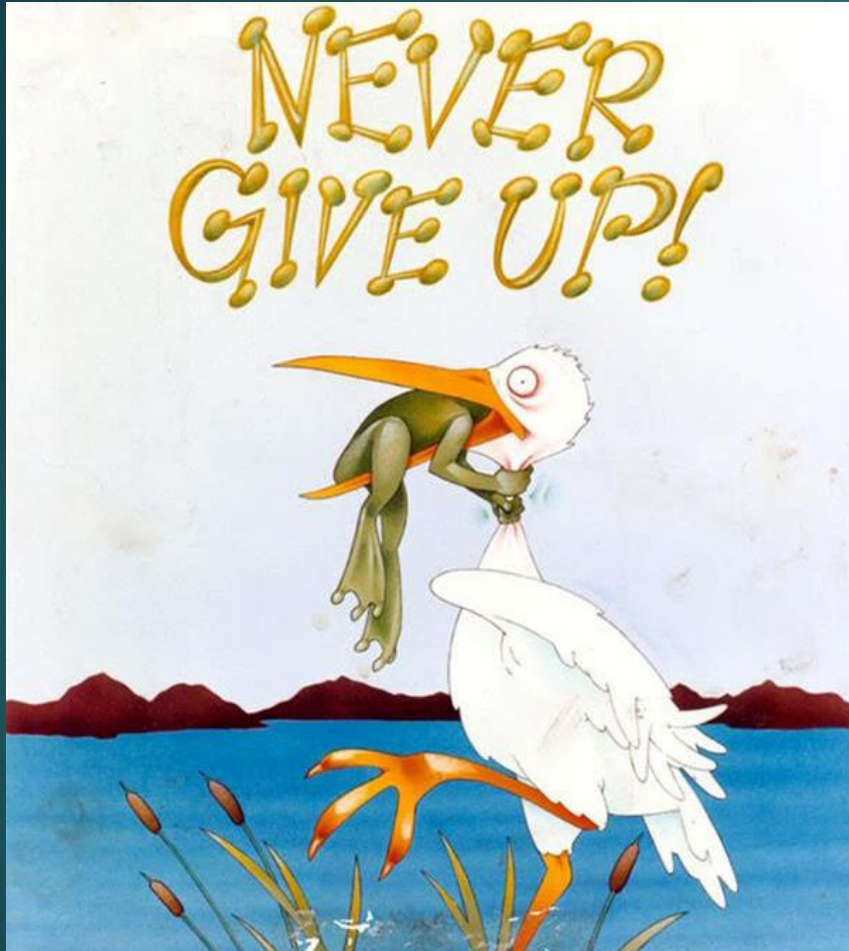


QRP Operating Tips

1. Use the best antenna you can
2. Don't call CQ except to check your signal with the Reverse Beacon Network (RBN)
3. Use CW or digital modes
4. "Tail-end" QSO's, after the final sign-off
5. Work strong stations
6. Work the nets
7. Work the contests
8. Use propagation tools like PropNet, RBN, and others to understand propagation
9. Be patient
10. Use the best antenna you can



Working the World with 5 watts



The Rules of QRP DX'ing

- ▶ You can't just yell
- ▶ You need finesse
- ▶ You need to understand how the DX is operating
- ▶ You need to understand how the pile-up is operating
- ▶ You need to understand the current propagation
- ▶ And above all you need patience

Last but not least

QRP may make your neighbors happy
– Less RFI reduces HOA headaches

The primary mode of operating QRP is still CW. If you want to learn, check out the CWOPS.ORG CW Academy

In Conclusion

If you are running QRP-
You have done so much,
With so little,
For so long,
You will now try anything
with nothing!



Thanks!
Questions?