

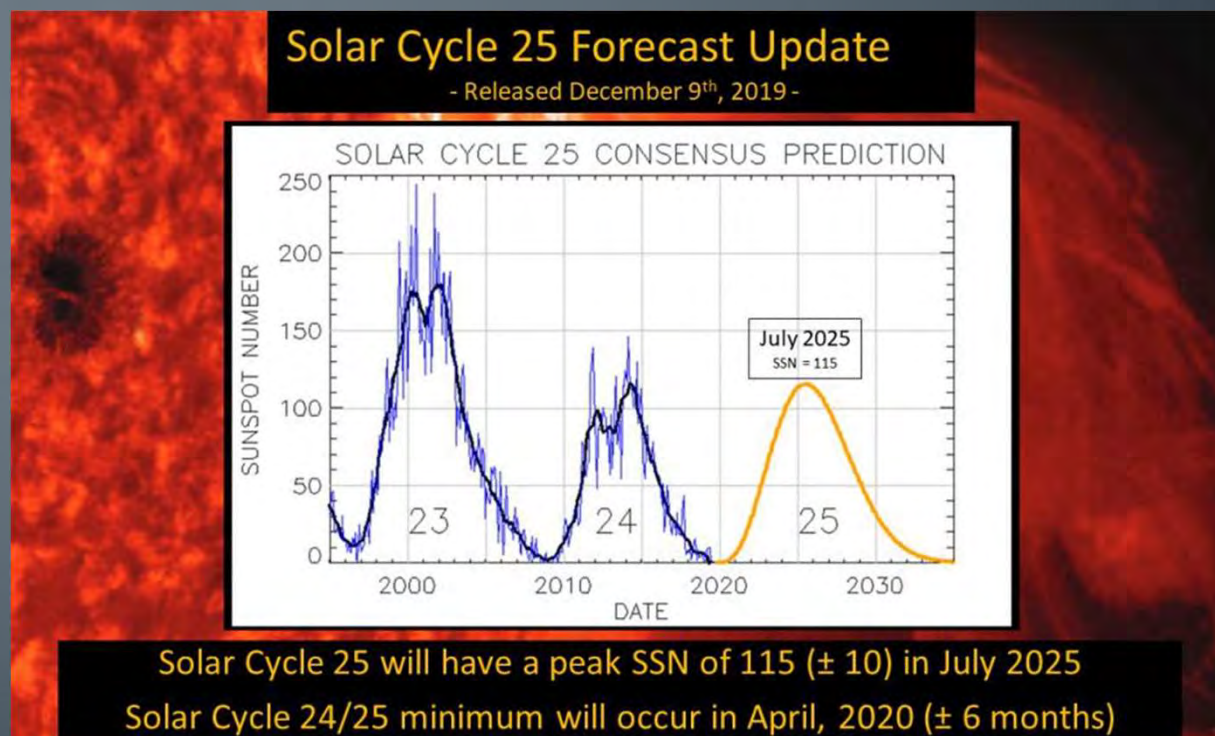
# QRP Presentation – HRU 2022

## John Meade W2XS

- Contact Info:
  - [jm416@optonline.net](mailto:jm416@optonline.net)

# QRP Philosophy

- Operating at 1 to 5 watts can be fun and addictive.
- Operate from the back yard or a park bench.
- The lower the current drain, the longer the batteries will last.
- Put up the best antenna possible.



# W2XS Homebrew QRP and Boat-anchor Switches

[See Handout for more info](#)





# Where do hams operate QRP?





# Where do hams operate QRP?





W1PID.COM





# W6PNG

<https://nomadic.blog/2020/12/11/are-your-laurels-in-the-bloody-mountains/>  
KX2, EFHW





KB4CO – OMG!



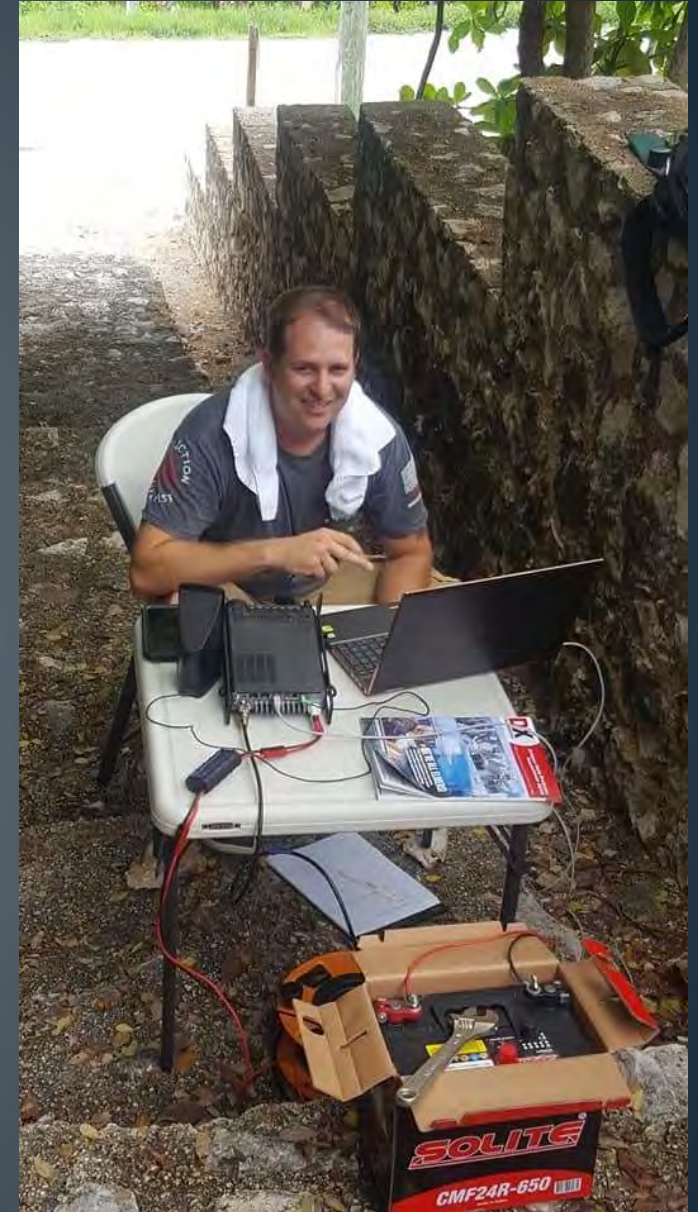


W6NIB (?)





# N3DL





# KN2X





# K4SWL - <https://qrper.com>

Go read everything on his website – categories are on the left side





# K3WWP - <http://k3wwp.com/>

- Has a streak of more than 10k days of QRP QSOs, at least one/day using CW, QRP, and simple wire antennas.
- That's >27 years! I was # 9,994 on 14 Dec, 2021



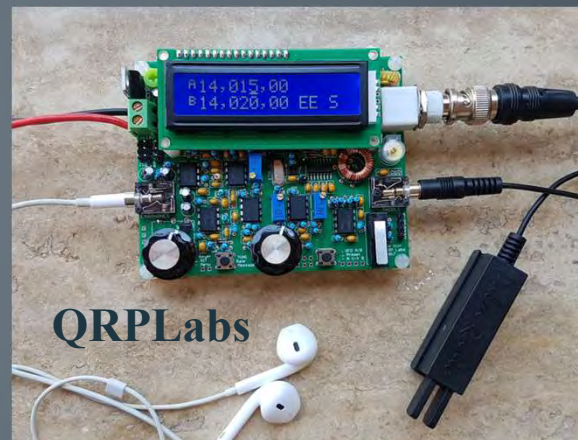
# Rigs





# Rigs

## LNR Precision





# Rigs

## Size Comparison



<http://www.ozqrp.com>

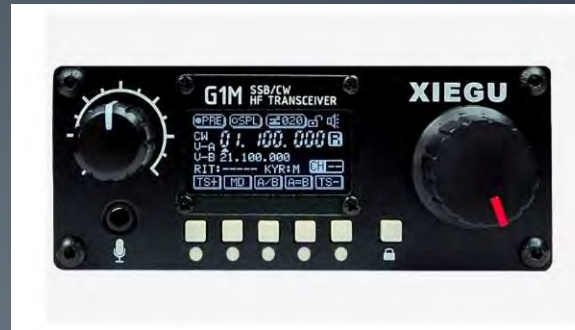


## YouKits





# Rigs



Breadboard Radio



LNR Precision  
MTR-4B ver 2.3  
\$350  
5 to 13 V  
27 mA RX



PastimeProjects.com



WA3RNC



QRPme



# Paddles



American Morse



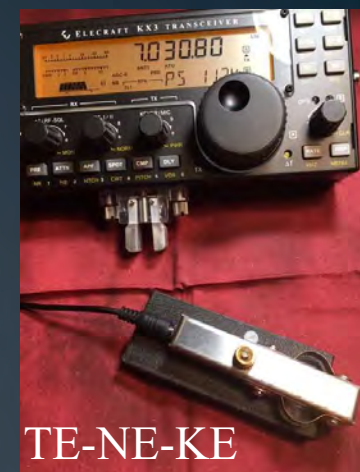
N6ARA



GM0EUL



N0SA



TE-NE-KE

**K4IBZ Tweezer Paddle**



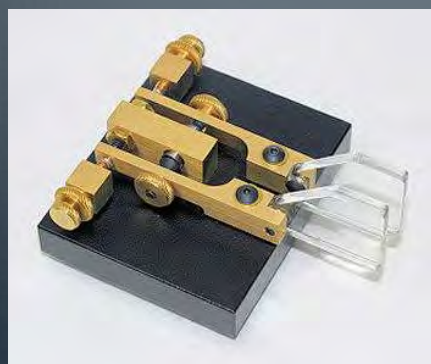
CW MORSE



K9LU Bull Dog



Homebrew



Vibroplex Code Warrior



Paddlette

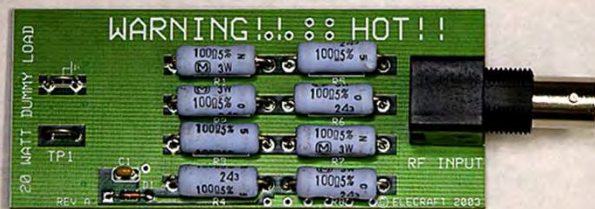


Radio Adventure



# Accessories

The more things that are built-in,  
The less has to be carried around.



Dummy Load



RF Output Watt Meter

Earbuds or Spkr



BNC-to-Binding Posts



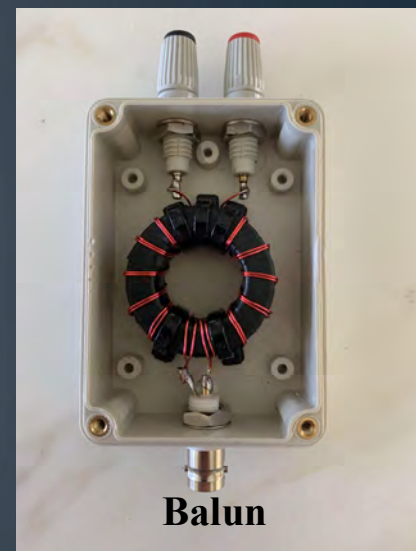
Keyer



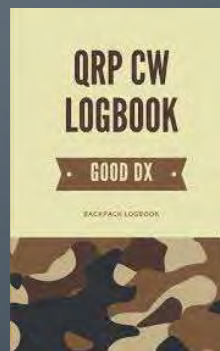
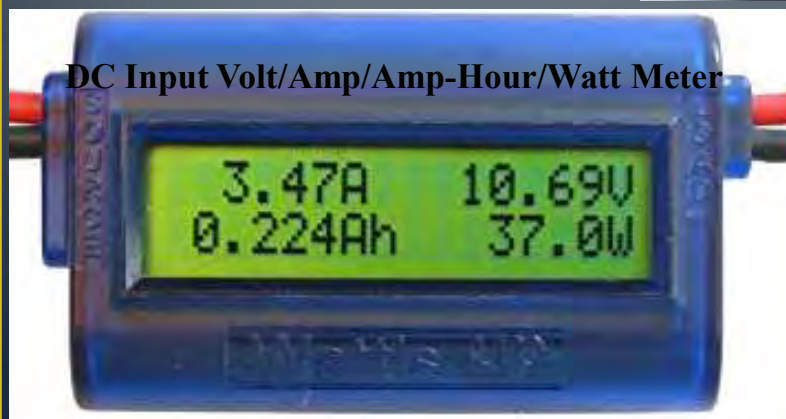
Antenna Tuner



Carrying Case

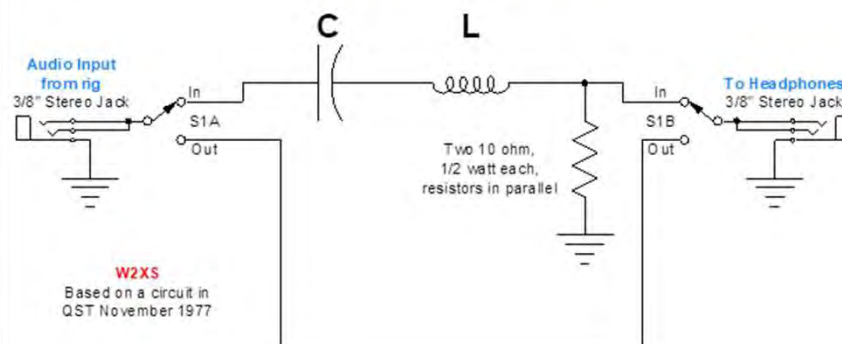


Balun



See Handout

Simple Passive Audio Filter





# Portable Power

- SLA Batteries – 2 V per cell = 12 V typ
  - Heavy but dependable
  - Use the right charger: Battery Tender Plus
    - [www.batterytender.com](http://www.batterytender.com)
- Lithium Ion – 11.1 V (KX2) or LiFePO4 (Lithium Iron Phosphate)
  - Use the right charger
  - 6 AH = (1 lb 10 oz) 5 hrs at 15 W, 12 hrs at 5 W
  - 3 AH = (12 oz) 5 hrs at 5 W
  - <https://www.bioennopower.com/>
- NiMH (used in KX3) – 1.2 V per cell
  - AA sized cells. Charge while in the radio
- Alkaline Batteries – 1.5 V per cell
  - Not Rechargeable



AAA Battery = 1 AH  
AA Battery = 2 AH  
C Battery = 6 AH  
D Battery = 11 AH



# Lithium Iron Phosphate (from K4SWL)

- LiFePo batteries are inherently stable and safe
- They offer a longer cycle life than that of other Li-ion, NiMH, NiCad, or Lead Acid batteries—thousands of charge cycles as opposed to hundreds
- LiFePO batteries have an excellent constant discharge voltage
- LiFePo batteries use phosphates—as opposed to cobalt or nickel, which are supply-constrained and carry heavier environmental concerns
- LiFePo batteries have a lower self-discharge
- LiFePo batteries are very lightweight compared to SLA batteries
- 3.2 V nominal output voltage means that four cells can be placed in series for a nominal voltage of 12.8 V, near ideal for most field radio gear
- Con – more expensive, but cost effective in the long run



# A Word on Power Supplies

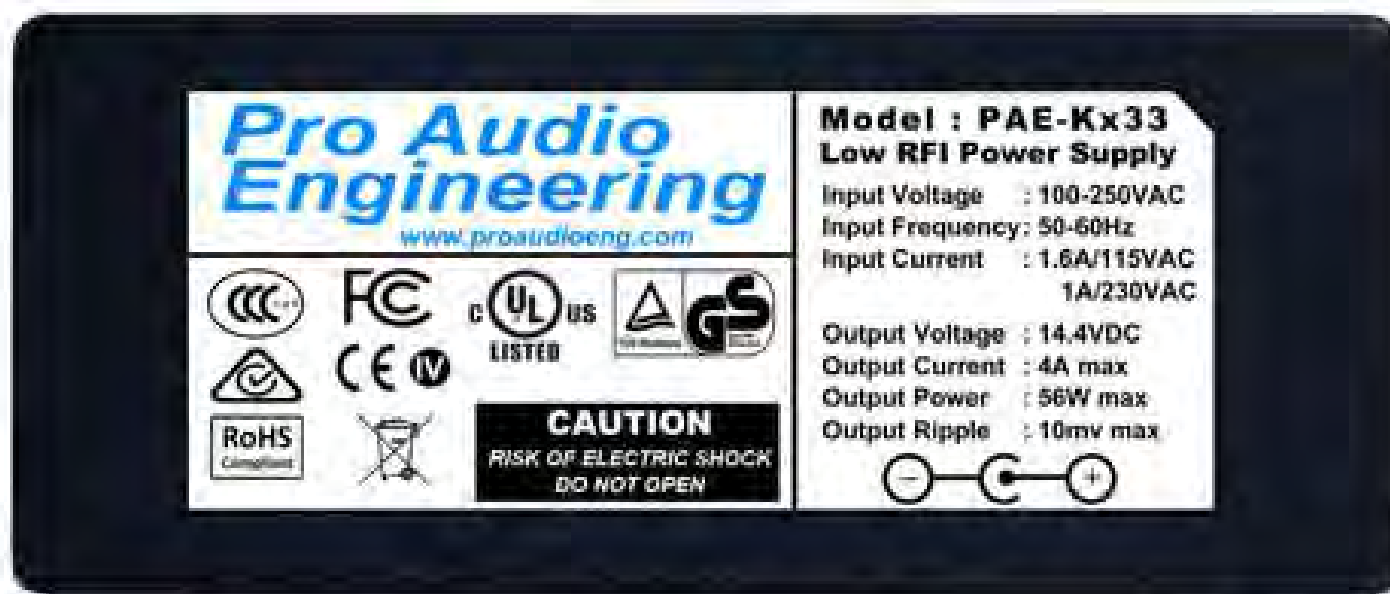
Switchers: Small, Light, but generate RFI

Analog: Big, Heavy, but no RFI





# Recommended for QRP Use





# Noise Example

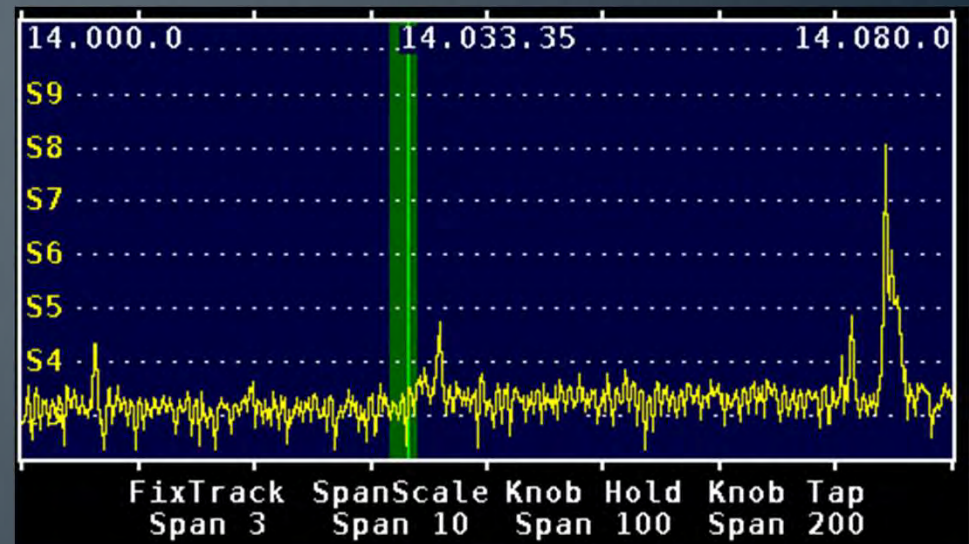
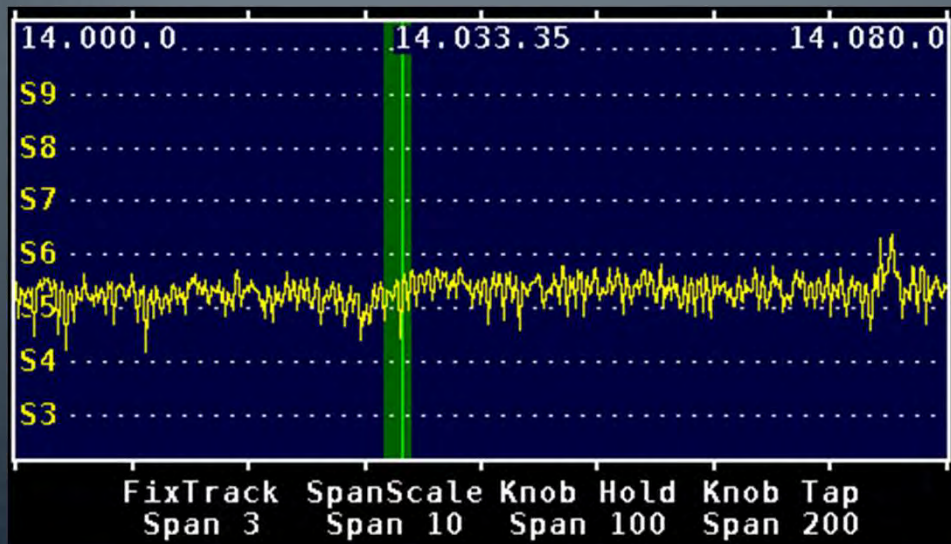
On Left = Printer Plugged In

Noise Floor at S5

On Right = Printer Unplugged

Noise Floor Drops to S3

S4 Signals Revealed!





# What Antenna Should I Use?

- End Fed Half Wave Wire
  - 66' on 40 meters with a 49:1 matching transformer. No tuner needed on 40, 20 and 10 meters (and maybe 15).
  - Can feed a dipole in center, off-center, or at the end.
  - Dipoles can be >95% efficient
- End Fed "Random" Length Wire
  - Uses a 9:1 transformer, tuner and counterpoise. Can work on multiple bands with a tuner.
- Center Fed 40m Dipole With Twin Lead (or Ladder Line)
  - Multiband – Need a tuner and a balun. Works on all bands from 40 to 6 with a tuner.
- Magnetic Loop
- Short, Loaded Whip
  - Very portable but not very efficient
  - (slide 25)



# End-Fed Halfwave Antenna

## See Handout for more info

Works really well! Voted most popular in a QRP poll

The pole supports only the wire, not feedline/insulator

Impedance is very high at the end. The coax is also the counterpoise.

A 49:1 transformer provides matching to 50 ohms



**Rig  
(No Tuner)**

**BNC  
Cable  
10' - 25'**



**Matching Unit  
49:1 Transformer**



**Support Pole  
and  
Base Mount**

**Antenna Wire  
40m = 66'**

**Insulator**

**Rope  
or  
Twine**

**Ground  
Stake**



# End-Fed Wire with 9 to 1 Transformer

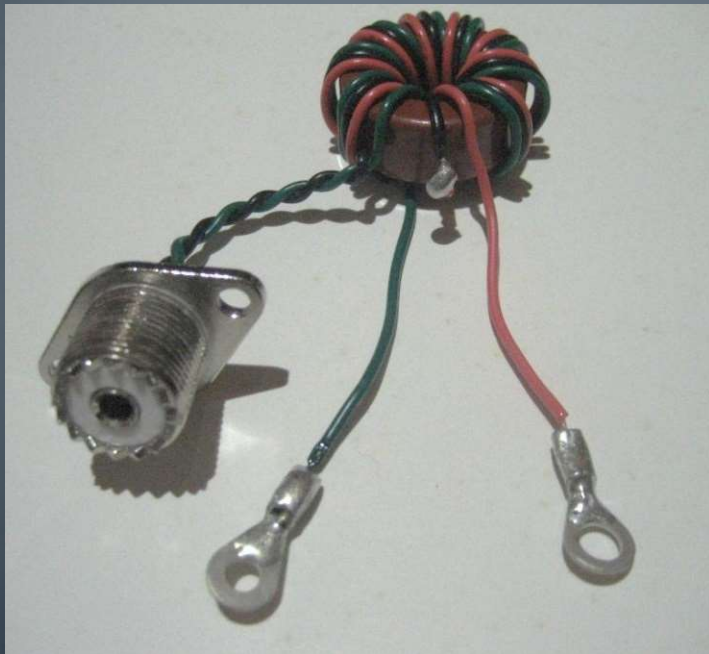
Similar to the EFHW except wire not  $\frac{1}{2}$  wave

Feed impedance changes from band to band

May not radiate as well as  $\frac{1}{2}$  wave

Needs a tuner, transformer, and a counterpoise

Some wire lengths are easier to find a match



<http://www.hamuniverse.com/randomwireantennalengths.html>

Feet: 29 35.5 41 58 71 84 107 119 148



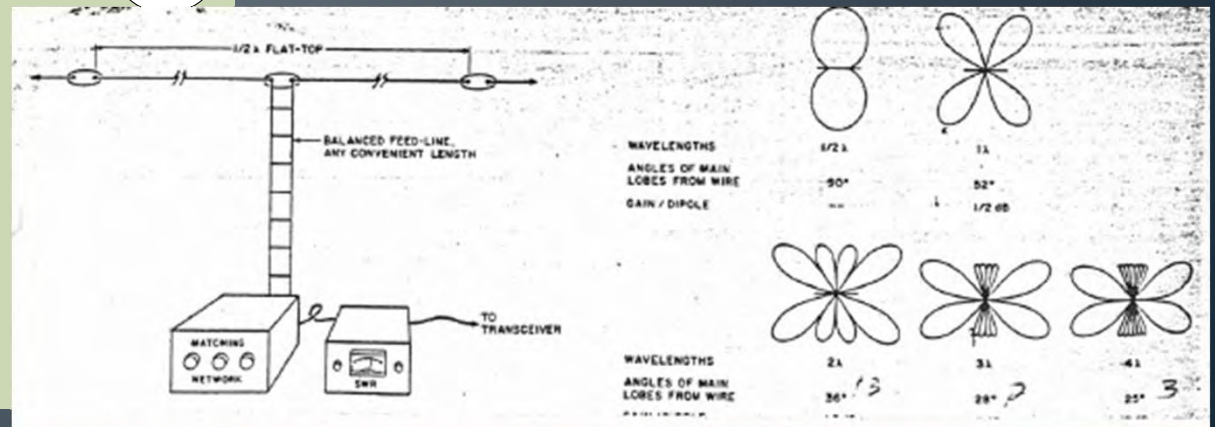
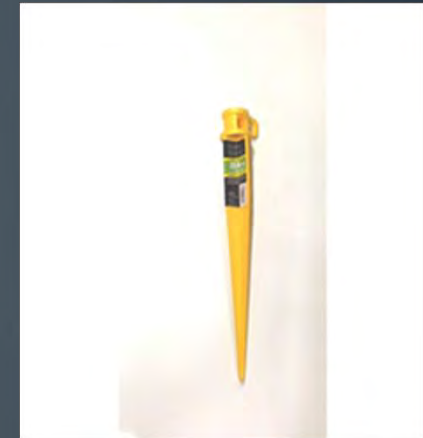
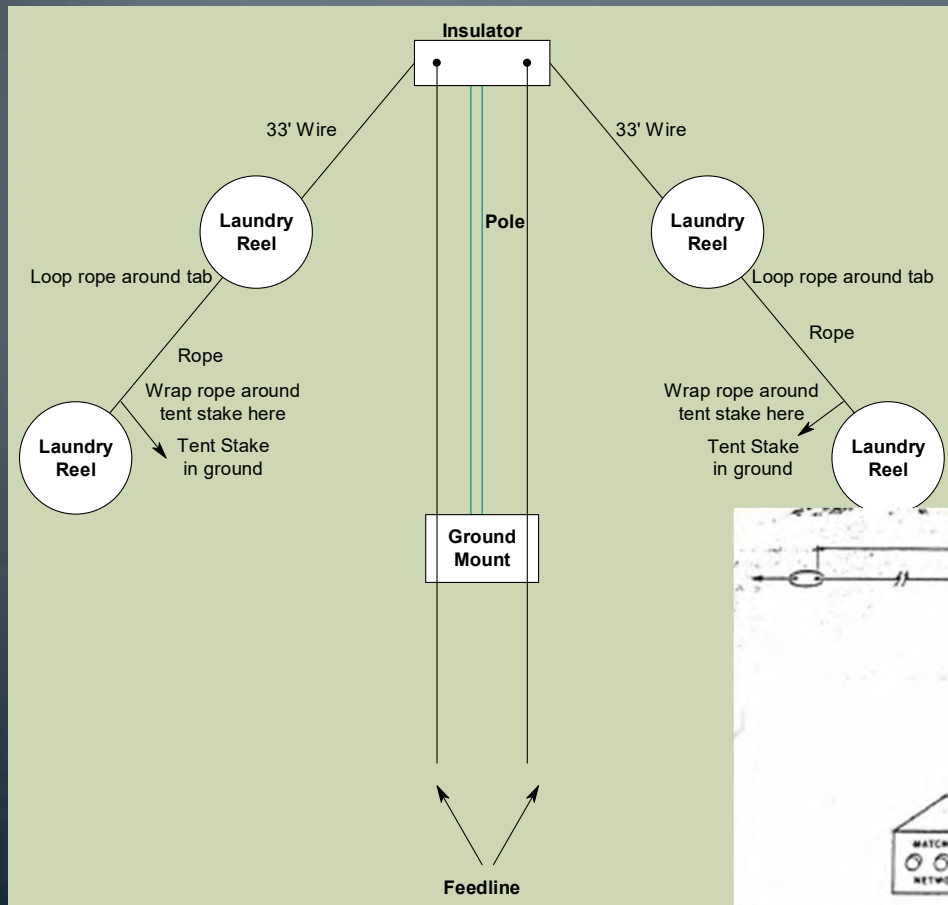
# Portable 40m to 10m Inverted V

See Handout for more info

A 40m doublet with twin-lead or ladder line feeders

My favorite antenna!

Covers all bands from 40m to 6m

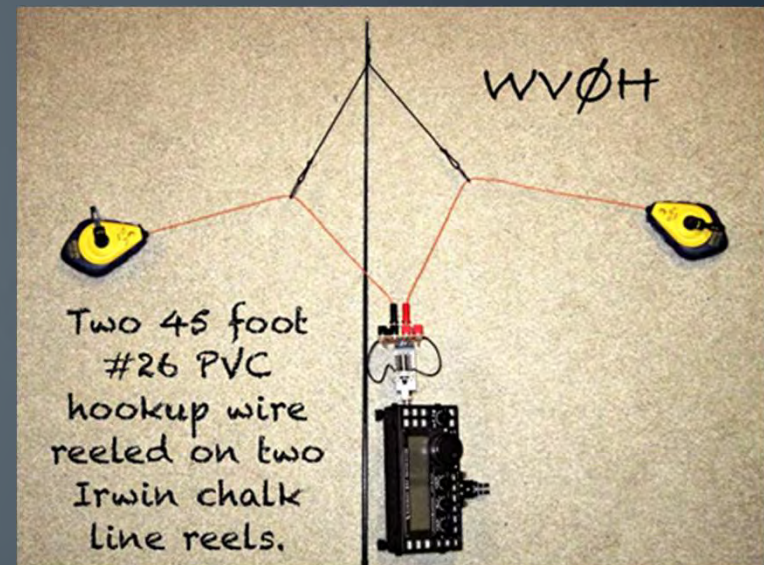




# WVØH – Park Portable Doublet

A nice portable antenna

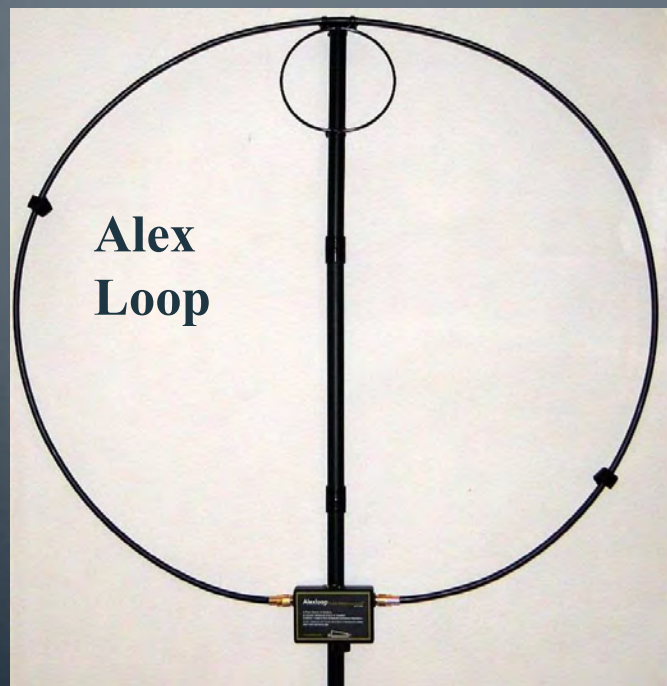
No separate feedline or center insulator



<https://wv0h.blogspot.com/2014/05/the-wvh-park-portable-doublet.html>



# Magnetic Loop



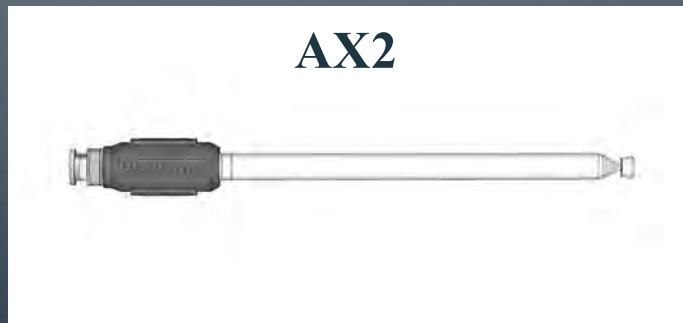
*Photo B. Materials for the loop — not a lot to gather!*





# Loaded Whip

Highly Portable but the poorest radiator.  
Absolutely need a counterpoise.





# Ten Tec QRP History

The picture is the Triton IV – not QRP, but the most beautiful rig ever made!  
The first all solid-state, 100 W output, full-QSK, reasonably-priced transceiver  
(Slide 32)





# The Powermite Series

- The first company to offer QRP modules (1969)
- Then they offered complete rigs
- So-so performance but portable
- Rated at 2 watts “input”
- Started the commercial QRP ball rolling



**to help the beginner**  
**Begin Right!**  
 (on a beginner's budget)

**\$ 7<sup>95</sup> Each!**

**MODEL MX1.** Synchronous detector-converter. Eliminates need of IF strip. Uses dual gate MOSFET for high sensitivity, low noise and effective reduction of overload. Selectivity, 1 KHz. Price \$7.95

**MODEL AA1.** Integrated circuit audio amplifier has 100 db gain, frequency response shaped for optimum intelligibility, 200-2,500 Hz. Drives high impedance headphones. Price \$7.95

**MODEL VO1.** Two stage oscillator - buffer. Drift less than 100 Hz. Covers 7.0-7.3 and 3.5-4 MHz. Output 2 volts R.M.S. For receiving with Novice and transceiving with General or higher class license. Price \$7.95

**MODEL TX1.** Crystal oscillator and power amplifier. 2 watts input. Requires 12 volt, 250 ma. supply. Toroidal coils used in both stages for high efficiency. Covers 7.0-7.3 and 3.5-4 MHz. Price \$7.95

**POWER-MITE MODULES,** consist of modules MX1, AA1, VO1 and TX1. Complete with instructions for assembly. Model MR1 Price \$29.95

The basic modules supply the elements for 40-80 meter reception and transmission. Merely connect them, attach a 12 volt DC supply (such as a lantern battery), headphones and antenna. A crystal will be required for Novice class license. Key not included.

**CONVENIENCE KIT FOR POWER-MITE.** Amplifier current meter, antenna switch, knob and connector. Model AC1 Price \$7.95

**MONITOR FOR KEYS.** Side-tone for normal keying also ideal for code practice. Model AC2 Price \$5.95

**ELECTRONIC KEYS.** with integral paddle. Requires 6 volt DC supply. Model KE5 Price \$34.95

**15 METER CONVERTER.** Covers 21-21.45 MHz. Requires tunable IF 3.5-4.0 MHz such as MR1 or PM1. Model AC3 Price \$8.95

**LOW POWER SWR METER.** Usable from 1/2 watt. Model AC4 Price \$14.95

**LOW POWER ANTENNA TUNER.** matches random length, twin-lead or open-wire line fed antennas. Model AC5 Price \$8.95

FOR FURTHER INFORMATION, WRITE:

**TEN-TEC**  
 INCORPORATED  
 HWY. 41T EAST, SEVIERVILLE, TENN. 37862

129



# The Argonaut Series

- Model 505 – Groundbreaking!
- Model 509 – Broadband transmitter
- Model 515 – Improved 10m dial spread
- Argonaut II – Synthesized
- Argo 556 – The QRP Scout - modules
- Argonaut V – 20 watts, high RX current
- Argonaut VI – No 12m or 60m, has 160m



**Does a 5 watt  
transceiver  
at \$288 make sense?**



You be the judge.  
It opens a whole new world of excitement  
and fun in Amateur Radio. We think you will find QRP a welcome  
change from high power in these days of push-button operation.

Five watts is about 2 1/2 "S"-units below 150 watts for identical conditions. When skip is favorable and QRM light you almost forget you are using low power.

The diminutive size (1/5 cubic foot) makes it ideal for operation in a motel, camp or trailer, or mobile in your car, boat or plane. Power it with any 12 volt battery or optional AC pack. Operate on SSB or CW on any ham band from 3.5 to 30 MHz.

The Argonaut will be a faithful companion for many years to come. This \$288 may be your best investment in Ham Radio in a long time—perhaps ever!

TEN-TEC products are sold by selected dealers. If one is in your trading area, by all means patronize him. It will help you and Amateur Radio. However, if it is more convenient, send your order directly to us. Include \$2.00 for shipping. (Tennessee residents include 5% sales tax). Write for catalog.

Argonaut .....	\$288.00
AC Power Supply .....	24.95
Microphone .....	17.00
KR 5 Electronic Keyer .....	34.95

**TEN-TEC, INC.**  
SEVIERVILLE, TENNESSEE 37862





# 5 W or 50 W

- Argosy – Switch on rear panel
- Century 22 – Direct Conversion RX, 25 W
- Rebel – Open-source
- R4020 – Imported – same as HB1





# The 13XX Series

- Monoband units
- RCA plugs for 12 V !!
- Some problems reported
- 3 watts output
- Built-in speaker
- 1/4" headphones jack
- Kit – 216 parts
- 35 mA RX current





# Ten Tec QRP History

Ad from 1972 predicting that the output transistors would last 25.7 years!! That was 50 years ago! Are they still working today?

## The Argonaut has a stalwart new companion—a Solid State Linear!



**Model 505 Argonaut**  
A Complete Low Power Transceiver,  
10-80 Meters



**Model 405 Linear**  
For Medium Power,  
10-80 Meters

Here is the ultimate in station flexibility—The Argonaut plus the new Model 405 solid state linear amplifier. Now, you can enjoy the fun and extreme portability of QRP yet increase power 25 times by adding the "405" amplifier — simply and easily.

The "405", with less than 2 watts RF input, produces 50 clean sine wave watts to the antenna. Yet, it retains utter simplicity in installation, operation and tuning.

With the "405" there is no "tune-up". Just select the desired band. That's all. Change bands in seconds with no danger to the final amplifier. Even with the wrong antenna.

Two meters constantly monitor the output in RF watts and SWR. No switches or controls to delay band changing.

The antenna changeover is exciter actuated with front panel time delay control. It can be set for nearly instant CW break-in or optimum hold time for SSB.

The portability of the "405" is unequalled. Weight is just 2½ pounds and the size 4½" x 7" x 8". The power supply for 115/230 VAC is about the same size and weighs 8 pounds. It is a separate unit so it need not be included in a mobile installation or where 12 VDC is available.

The "405" will retain its stamina for the years ahead. Computer estimated life of the output transistors is 25.7 years. That's a lot of QSOs, a lot of fun and excitement.

TEN-TEC products are sold by selected dealers. If one is in your trading area, by all means patronize him. It will help you and Amateur Radio. However, if it is more convenient, send your order directly to us. Include \$2.00 for shipping. (Tennessee residents include 5% sales tax.) Write for catalog and specifications.

Argonaut, Model 505 .....	\$288.00
Linear Amplifier, Model 405 ....	149.00
Power Supply, Model 250 .....	
(Will supply both units) .....	49.00
Power Supply, Model 210 (Will	
power Argonaut only) .....	24.95
Microphone, Model 215 .....	17.00
Keyer, Model KR5/605 .....	34.95

**TEN-TEC, INC.**  
SEVIERVILLE, TENNESSEE 37862



# Heathkit QRP History

[https://worldradiohistory.com/Electronics Catalogs.htm](https://worldradiohistory.com/Electronics%20Catalogs.htm)

<https://worldradiohistory.com/> = Best Link Ever





# • The Lunchbox Series

- Not called a QRP rig as such, but ran only 5 watts “input” power
- Very popular at the time
- CB, 10m, 6m, and 2m
- Super-regenerative receiver. Very wide bandwidth.
- Fun in its day



**Benton Harbor Lunch Boxes — Complete Transceivers . . . for 6 and 2 meters.** Feature crystal-controlled transmitters with 5-watt input and tunable super-regenerative receivers with RF stage. Built-in 115 VAC power supply and speaker. Mike included. Less crystal.  
**Kit HW-29A, 6-meter, 9 lbs., no money dn., \$5 mo. \$44.95**  
**Kit HW-30, 2-meter, 9 lbs., no money dn., \$5 mo. \$44.95**  
**Kit GP-11, Mobile Vibrator Power Supply, 6 lbs. . . \$17.95**



# • The HW-7

- Direct conversion receiver with severe overload problems
- Heavily modified by W1FB and others
- 40, 20, and 15m

A photograph of the Heathkit HW-7 advertisement. The top part shows the front view of the transceiver, similar to the one in the previous image. Below the image is a large price tag that reads '69<sup>95</sup> NO MONEY DOWN'. Underneath the price tag is the text 'Heathkit 3-Band QRP CW Transceiver'. At the bottom, there are two bullet points: '• 1  $\mu$ V input sensitivity' and '• Input powers of 3 watts on 40 meters, 2.5 watts on 20 meters, 2 watts on 15 meters'.



# • The HW-8

- Direct conversion receiver but improved circuitry for decent performance
- Wide/Narrow audio selectivity
- Pre-mixed VFO – all bands tuned the same way - like Collins and Drake
- 80m, 40m, 20m, and 15m
- Some people changed 80m to 30m (N6KR wrote how in May 1984 QST)
- Find the “Hot-Water 8 Handbook” if you have one of these radios
- My first QRP rig in the mid 70s!



## great CW kits from Heath

Your best value in Ham radio starts with a do-it-yourself Heathkit rig. Communicate with the world... start yourself on a rewarding Ham radio hobby today!



### Heathkit HW-8 — we've improved the world's most popular QRP Transceiver

#### HW-8 SPECIFICATIONS

**TRANSMITTER:**  
DC Power Input: 3.5 watts (80 M), 3.0 watts (40 M), 2.5 watts (20 M), 2.5 watts (15 M).  
Frequency Control: built-in VFO.  
Output Impedance: 50Ω, unbalanced.  
Spurious & Harmonic Levels: -35 dB or better.  
Offset Frequency: approx. -750 Hz, fixed on all bands.

**RECEIVER:**  
Sensitivity: 0.2 μV for readable signal; 1 μV or less for 10 dB S + N/N.  
Selectivity: wide, -750 Hz @ -6 dB narrow, -375 Hz @ -6 dB.  
Audio Output Impedance: 1000Ω, nominal.

**GENERAL:**  
Frequency Coverage: 3.5-3.75 (80 M); 7.7-25 (40 M); 14-14.25 (20 M); 21-21.25 MHz (15 M).  
Frequency Stability: less than 100 Hz/hour drift after 30 min. warmup.  
Power Requirement: 12-16 VDC, 90 mA, receive; 430 mA, transmit.  
Dimensions: 9 1/4" x 8 1/2" x 4 1/4".  
Net Weight: 4 lbs.

- Improved receiver section
- Better frequency coverage
- Front panel Relative Power Meter

We've made the world's most popular low-power CW transceiver even better! To the Heathkit HW-7 — we have added more bands, more features and a super new receiver section that's the best in its class. The famous HW-7 QRP Transceiver helped thousands of hams work the world on a couple of watts — and on a budget. Now, in the same value-conscious tradition, Heath announces the HW-8. Pushbuttons instantly select any of the four bands — 3.5-3.75; 7.7-25; 14-14.25 and 21-21.25 MHz. Crystal heterodyne circuitry allows easy frequency tuning with a single dial scale for all four bands, excellent stability and fixed CW offset. Other features include adjustable sidetone volume, relative power meter, diode band switching and break-in keying with adjustable T/R delay, and RF gain control. The direct-conversion receiver boasts dramatically improved resistance to overload and reduced microphonics and hum thanks

to a new RF amplifier stage and a two-position active audio filter. Its improved selectivity gives the HW-8 the finest receiver section in its price class. You get solid copy from all over with readable signals from as little as 0.2 μV; 1 μV or less produces 10 dB S + N/N! The HW-8 can be operated from its optional AC power supply or 12 VDC — great for vacationing or emergencies. Has built-in headphone jack, adjustable AF gain, preselector and tune controls.

Now's the time to get into the fun and challenge of low-power CW operation. Order your HW-8 today.

KIT HW-8, Shpg. wt. 7 lbs. .... \$129.95  
KIT HWA-7-1, AC Power Supply, Shpg. wt. 3 lbs. .... \$14.95

**Last Call!** HW-7 3-band QRP CW Transceiver \$89.95



# • The HW-9

- Superhet receiver with wide/narrow audio filter
- Optional WARC band coverage (30m, 17m, 12m) plus 80m to 10m
- Had lots of promise but design problems created instabilities
- There are modifications in ARRL's "QRP Power" and "QRP Classics"
- One of Heathkit's last kits ☹



## 5 The compact HW-9 Deluxe QRP CW Transceiver

**\$249<sup>95</sup>**

- Covers CW in 80, 40, 20 and 15 meter bands — expandable to 30, 17, 12 and 10 meter bands
- Front panel relative signal/power strength meter
- Continuously variable RF output, up to 4 watts
- Receiver Incremental Tuning for more versatility

Superior design of the transmitter and receiver sections sets this transceiver apart from other low-priced transceivers. The HW-9's state-of-the-art performance will be appreciated by avid QRP operators, newcomers and old timers alike. Micro-electronic circuits reduce transceiver weight, while providing a level of performance and features unexpected at this price. Among these features are: broadband



# Elecraft History

- Before Elecraft, N6KR was a busy QRPer

- Slide 43



# Elecraft History

## 1984 – HW8 Modification to 30 meters

edge. If this is done with care, the base will look almost like a solid block of wood. — *Antonio G. O. Gelleneau, W1HHF, Burlington, Vermont*

### 30-METER CONVERSION FOR THE HW-8

□ The Heath HW-8 QRP transceiver can be modified easily to operate on 30 meters if you are willing to sacrifice one of the existing bands. I chose to give up the 80-meter band, since I have found it to be the most demanding one, in terms of antenna size, for QRP operation. Thirty meters seems to be an excellent band for QRP operation, and it offers the side benefit of WWV reception, which I use to calibrate my VFO dial.

Complete details of the modification are summarized in Table 1. The only expensive component is the crystal, which costs around \$10. The other components can be found in your junk box or purchased from a variety of QST advertisers. Five of the original capacitors are reused in other locations.

Remove the control knobs and front panel; then, disconnect the loading capacitor from the front of the chassis. This will make it easier to

get at the components to be changed in the crowded area around SW1 (the 80-meter band switch). Remove the indicated components using a vacuum desoldering tool, solder wick or a piece of flattened braid from coaxial cable.

After the new components have been installed, the rig can be aligned according to the instructions in the HW-8 assembly manual. The only problem I encountered was that I had lost the small tuning tool used to adjust L17 in the heterodyne oscillator. I found that the larger tool or even an Allen wrench can be used. Carefully insert the tool through the top slug and tune the bottom slug for maximum output on 30 meters. Then, back the tool out and readjust the top slug (L18) for maximum output on 40 meters.

The transmitter dc power input should be about 3 W. The VFO will cover 10.0 to 10.25 MHz. Dial accuracy seems to be a problem with the HW-8, so it may be difficult to determine the band edges without a frequency counter. This is where WWV can assist you. Just be sure to stay within the legal segments (10.100-10.109 and 10.115-10.150 MHz). If in doubt, don't transmit.

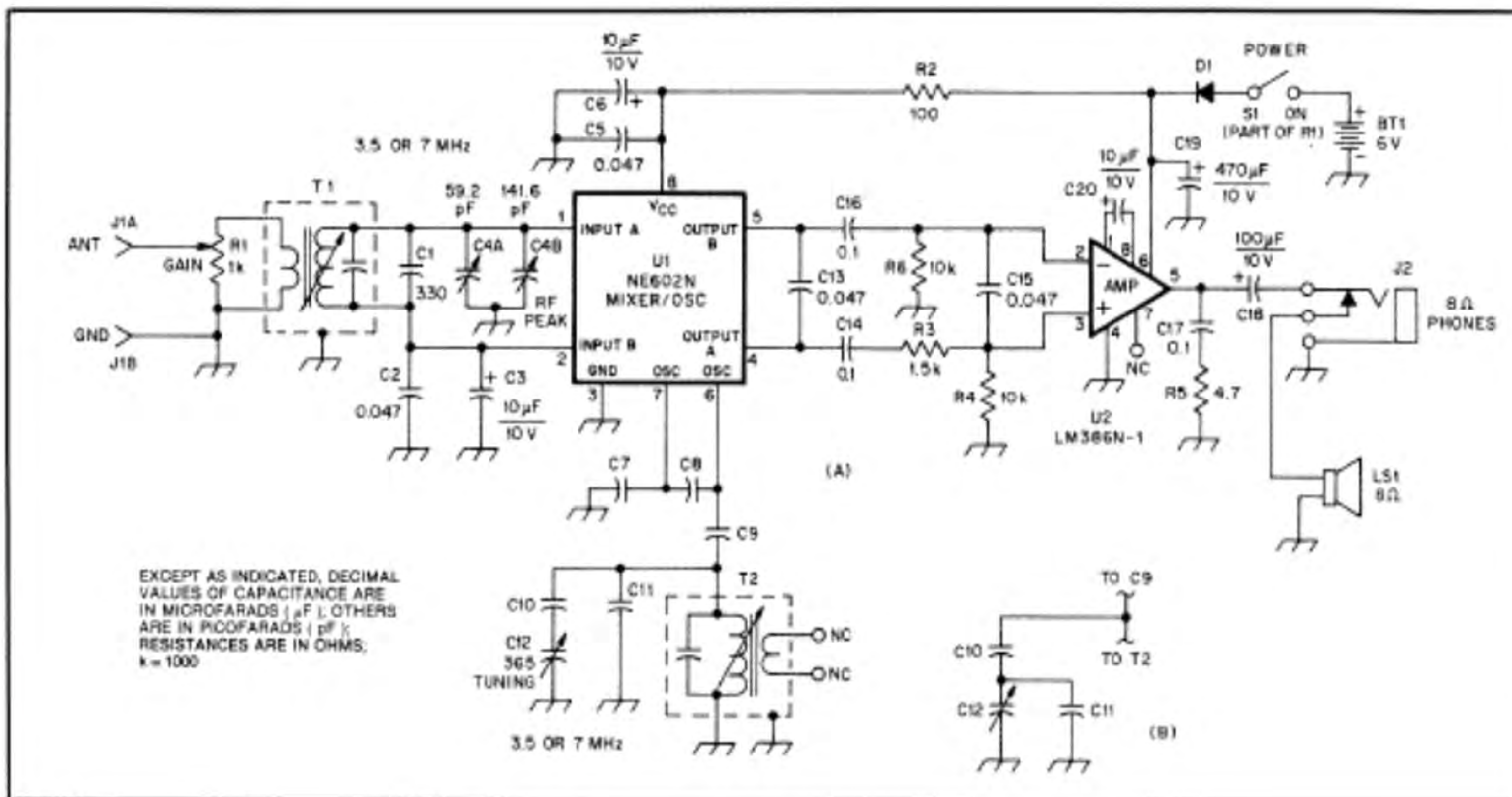
— *Wayne Burdick, N6KR, Santa Barbara, California*

Table 1

### HW-8 30-Meter Modifications†

Part No.	New Value	Description
Y1	18.895 MHz	Fundamental type, 15-pF load, HC-6/U holder, International Crystal Mfg. Co., P.O. Box 26330, Oklahoma City, OK 73126, Part no. 434112.
L1	1.8 $\mu$ H	Secondary — 25 turns no. 24 enameled wire on T37-6 core (Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607). Primary — 2 turns no. 24 wire over C2 end of secondary (use original coil form).
L5	1.8 $\mu$ H	25 turns no. 24 wire on a T37-6 core.
L13	4.0 $\mu$ H	Remove 16 turns from original L13.
L22	2.7 $\mu$ H	23 turns no. 22 wire on a T50-2 core.
L26, L27	3.2 $\mu$ H	25 turns no. 22 wire on a T50-2 core.
C1	100 pF	Silver mica, 5% tolerance (use original C116).
C15, C96	100 pF	Silver mica, 5% tolerance.
C64	68 pF	Silver mica, 5% tolerance (use original C1).
C77	230 pF	Silver mica, 5% tolerance (use original C64).
C78	150 pF	Silver mica, 5% tolerance (use original C96).
C84	47 pF	Silver mica, 5% tolerance (use original C15).
C97	300 pF	Silver mica, 5% tolerance.
C116	30 pF	Silver mica, 5% tolerance.
C301A	—	Disconnect from L1.
R50	—	Remove.
R56	1 k $\Omega$	½ W, 10% tolerance.

†Refer to HW-8 schematic diagram for part locations.





# Elecraft History

## 1991 - N6KR's Neophyte Modification

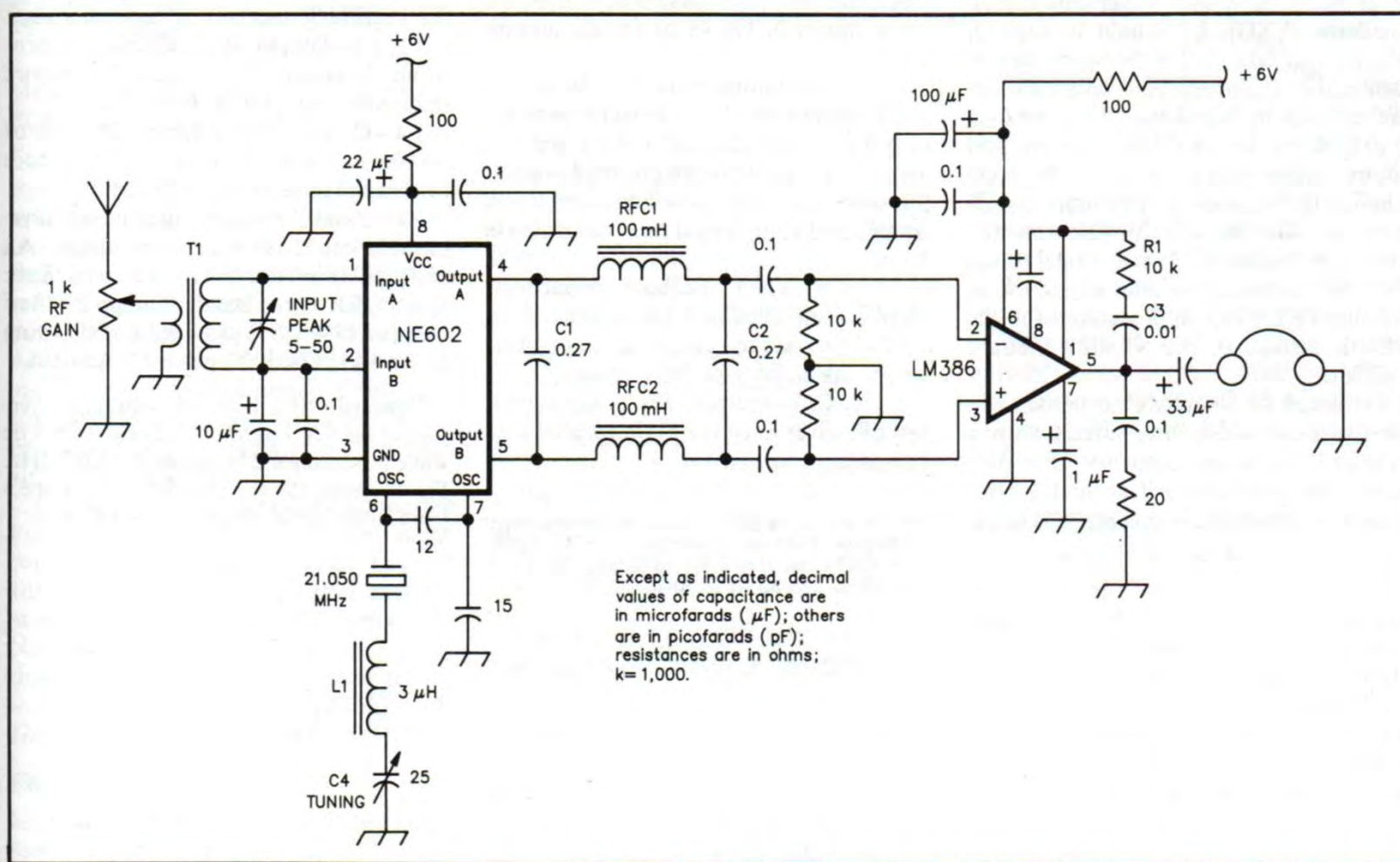


Fig 47—Wayne Burdick put his Neophyte receiver on 15 m and modified its audio response for better CW reception as shown here. The parts associated with U1's pins 6 and 7 serve as frequency-determining and feedback elements in U1's local-oscillator subcircuit; C1, C2, RFC1 and RFC2 reduce the receiver's audio response above 1 kHz; and R1 and C3 reduce hiss by decreasing U2's response at higher audio frequencies.

# Elecraft History

- 1990 - The Safari – 4 bands. Published in QEX magazine.
- Built in tuner, RIT, SWR meter, keyer, paddles, AGC, battery. 1 watt output.



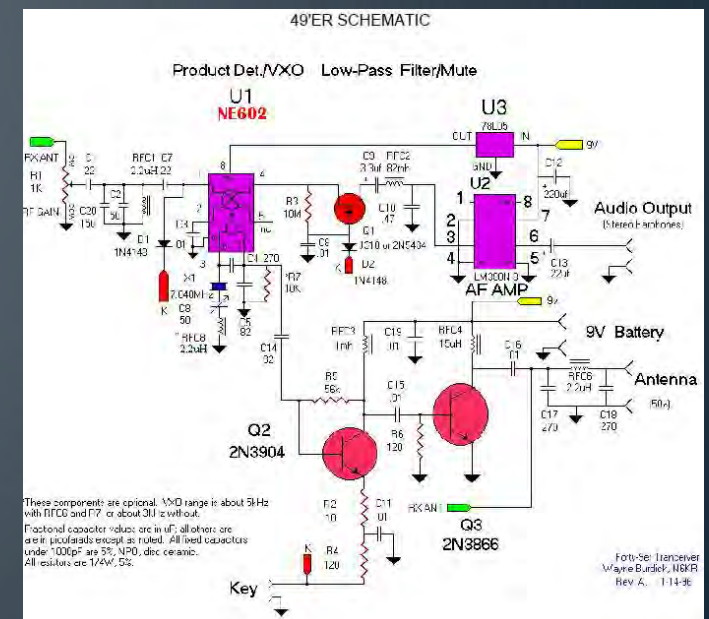
## Biography

*Wayne Burdick was first licensed in 1971, and upgraded to Extra Class in 1975. He was an Electronics Technician in the Coast Guard for four years, then worked as an engineering technician and programmer while completing his bachelor's degree in Cognitive Science at the University of California at San Diego. He's now a firmware engineer and part-time acoustic guitar fanatic.*



# Elecraft History

- Then there were the Nor Cal rigs: NC40A, SST, Sierra, 49er
- Back Issues: [https://www.ncqrpp.org/?fbclid=IwAR3VUVXIZE8jpJi8L-1sxtfHCFw-9wEyF\\_4rBXOjbV78ls7tV4VApl6so6c](https://www.ncqrpp.org/?fbclid=IwAR3VUVXIZE8jpJi8L-1sxtfHCFw-9wEyF_4rBXOjbV78ls7tV4VApl6so6c)





# Elecraft History – Starting in 1998

**“I can’t believe it’s a kit!”**



## ELECRAFT K2

### 160-10m SSB/CW Transceiver

The K2 is an all-band SSB/CW transceiver with world-class performance and styling—that you can build. Features include synthesized dual VFOs with split and RIT/XIT, back-lit LCD, memory keyer, smooth QSK, and multiple crystal filter bandwidths. The K2 is also the ideal portable rig (size 3x8x8", weight 3.4 pounds, and a low 100-mA receive current drain setting). You can even add a variety of internal options, including 2.9-AH battery and zero-current-drain automatic antenna tuner.

Unlike traditional kits, the K2 uses modular, “no-wires” construction, simplifying assembly. And there are no surface-mount parts. To top it off, all the test equipment you need is built in, including frequency counter and digital voltmeter.

The CW, 10-W (QRP) version of the K2 starts at only \$549.  
(SSB adapter and 160-m module w/ant. switch optional.)



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www.elecraft.com Aptos, CA 95001-0069 radios@elecraft.com



**NEW!**

- ✦ 4-Band Module (K1)
- ✦ Internal Battery (K1)
- ✦ Heil Hand Mic (K2)
- ✦ Audio Filter plus Real-Time Clock (K2)

## ELECRAFT HF Transceiver Kits

**K1 Multi-band QRP CW Transceiver:** Ideal for first-time builders, the K1 is now available with up to 4 bands on one module (40/30/20 and 17 or 15 m). 5 W+ output, keyer, variable-bandwidth xtal filter, RIT/XIT, digital display. Internal options: ATU, noise blanker, and battery. Only 2.2x5.2x5.6"...a backpacker's dream! Starts at \$279.

**K2 160-10 m SSB/CW Transceiver:** The K2's superior receive performance has made it a favorite for home station use (see QST review, March 2000). But its small size and low current drain make it an ideal portable station. Options include internal ATU, 2.9-Ah battery, and RS-232 control port. Starts at \$599.



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## NEW! 100-watt HF Transceiver Kit



## ELECRAFT K2/100 Transceiver

Our 160-10 m, SSB/CW transceiver kit is now available in a 100-watt model! The K2/100 is based on the K2 - same features, same chart-topping receiver performance. **This isn't your dad's 100-watt transceiver kit...** Our modular, wireless construction simplifies assembly, and all the test equipment you need is built-in. The K2/100's small size (3.0" H x 7.9" W x 8.3" D), light weight (5 pounds) and low current drain make it a great choice for business trips, camping, or DXpeditions. Includes rugged output stage; silent, diode-switched T/R; RS-232 control port; and a wide range of options, including the new KAT100 high-power automatic antenna tuner. K2 base pricing starts at \$599.

**K1 Multi-Band QRP CW Transceiver:** Ideal for first-time builders, 2-band or 4-band module; internal battery and ATU options. Starts at \$289.



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## K2 Transceiver Now with DSP!

- New **KDSP2** internal DSP unit for the K2
- New **XV Series** transverters for 50, 144, and 222 MHz
- New **KRC2** Programmable Band Decoder



**Elecraft K2 and K2/100 Transceivers.** Our 160-10 m, SSB/CW transceiver kit is available in 10 and 100-watt models, which share the same chart-topping receiver performance. Add the new KDSP2 option for versatile notch and bandpass filtering, plus noise reduction. K2 pricing starts at \$599.

**Our KX1 4-watt, 3-band CW transceiver is the new featherweight champ!**

Pocket-size and with controls on top, it's ideal for trail-side, beach chair, sleeping bag, or picnic table operation. DDS VFO covers both ham and SWL bands; the receiver handles CW, SSB, and AM. Features memory keyer, RIT, logbook lamp, and internal battery. Optional internal ATU and attached paddle. Basic KX1 kit covers 20 & 40 m (\$279). KXB30 option adds 30 m (\$29).

Visit our web site for details on the K1, XV Series, KRC2, and mini-module Kits.

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www.elecraft.com Aptos, CA 95001-0069 sales@elecraft.com

## New! T1 Automatic Antenna Tuner



- Only 4.4 x 2.5 x 0.9 inches
- 160-6 meters, 20 watts max
- FT-817 band-tracking option
- Factory assembled or kit

The pocket-size Elecraft T1 ATU is the perfect match for all low-power rigs. Wide range 7-inductor, 7-capacitor network tunes in any mode. Features re-tune memories, LED meter, internal battery, \$159 assembled, \$135 kit. Yaesu FT-817 adapter recalls ATU settings on every band change (\$49).

## K2 Transceiver Now with DSP!



Our 160-10 m, SSB/CW transceiver is available in 10 and 100-W models. The K2's chart-topping receiver performance can be further enhanced by adding the KDSP2 option. Advanced yet easy to build, the K2 starts at \$599.

## KX1 Ultra-Portable CW Transceiver

Elecraft's 4-W, 3-band CW rig is the new featherweight champ! Pocket-size and with controls on top, it's ideal for trail-side or picnic table operation. DDS VFO covers ham and SWL bands; receiver handles CW, SSB, AM. Features keyer, RIT, logbook lamp, and internal battery. Optional internal ATU, attached paddle. Starts at \$279.

Please visit our web site for full details on all of our products, including the K1 transceiver, XV transverters, heavy KRC2 band decoder and repeater kits.

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# Elecraft KX History

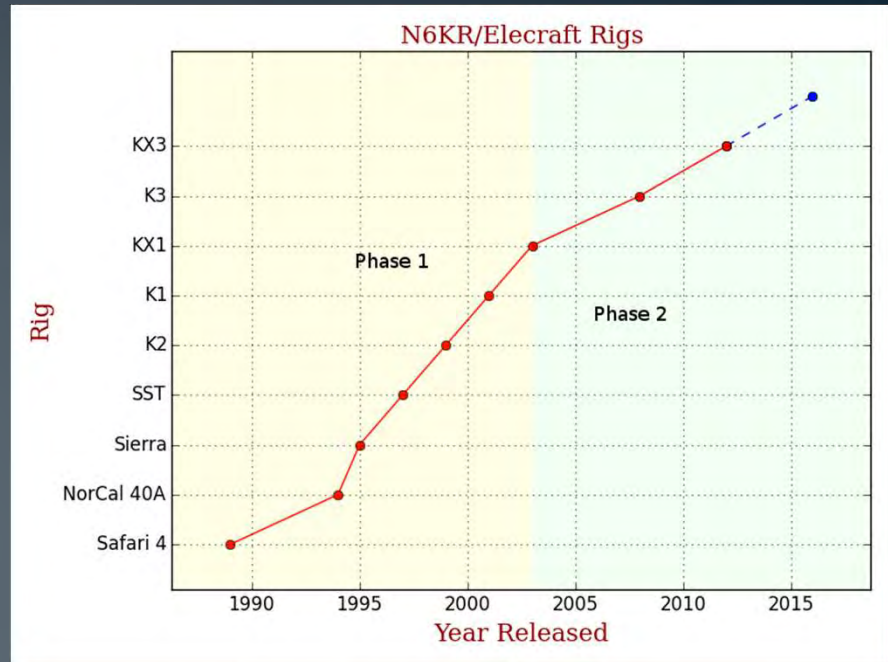




# Elecraft History

<http://udel.edu/~mm/ham/elecraft/history/>

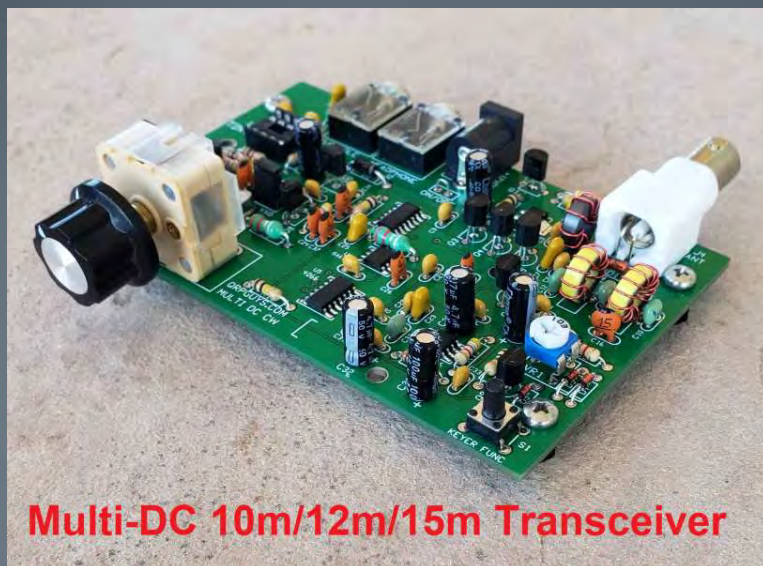
## Down-conversion analog + SDR architecture



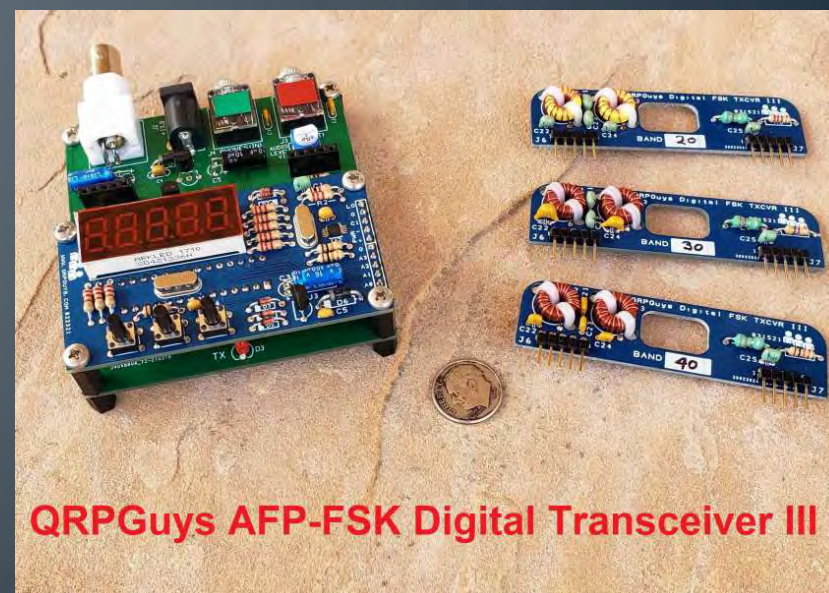
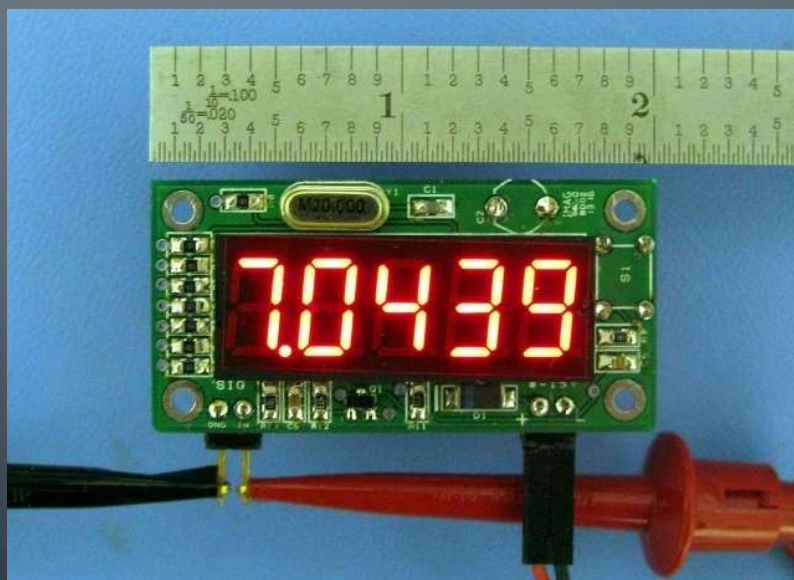
## Direct-sampling SDR



# Qrpguys.com sells nice stuff



**Multi-DC 10m/12m/15m Transceiver**



**QRPGuys AFP-FSK Digital Transceiver III**

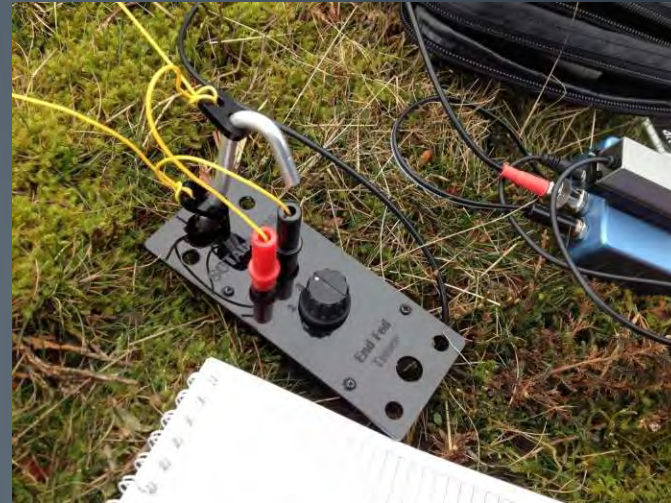
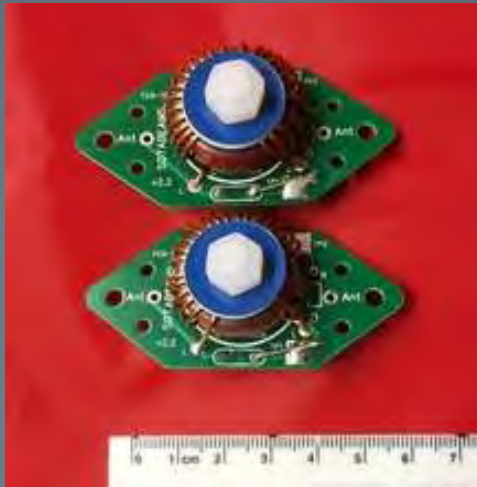


# Qrpkits.com does too





# Sotabeams.co.uk does too



# QRP Calling Frequencies

<b>Table 11-5 North American QRP Calling Frequencies</b>		
<i>Band (Meters)</i>	<i>Morse Code (MHz)</i>	<i>Voice (MHz)</i>
160	1.810	1.910
80	3.560	3.985
	3.710	
40	7.040	7.285
	7.110	
30	10.106	
20	14.060	14.285
17	18.096	
15	21.060	21.385
	21.110	
12	24.906	
10	28.060	28.885
	28.110	28.385
6	50.060	50.885
2	144.060	144.285 (SSB)
		144.585 (FM)



# Summary

- Don't skimp on the antenna. Let the entire wave get radiated.
- Choose a CW or an SSB rig.
- Have fun. That's what this hobby is all about.

# Keep it simple? Even QRP Guys Collect Stuff



**Jim Cates, WA6GER**



**Any Questions?**

**Thank you! CUL  
73,**

**John W2XS**