

# Porter County ARC Presentation 3/19/2021



Homebrewing: The Fine Art of Smoking Parts

Presented By "The Melt Solder Brothers": Bill, N2CQR and Pete, N6QW



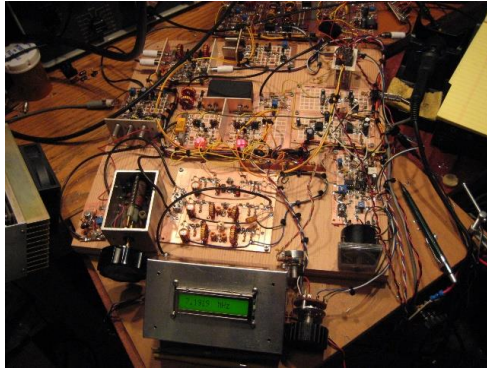
The Secret to Nerd Style Homebrewing:  
Tri-Color Pens and a Pocket Protector

1950's	1960's	1970's	1980's	1990's	2000's	2010-2020's
Transistors CK722	Swan 100 Series 240/350/500	Heathkit Hot Water Rigs	Collins KWM-380	Digital VFO Microprocessors Digital Display Computer Control Hi Power SS Amps	Microcontrollers Digital Integration Computer Interface	SDR Offshore Reigns Rigs from China Cheap Technology Computer Inside HDR Shrinking
KWM-1 KWM-2/2A	SBE 33/34	ICOM IC701	Drake TR-7		Ten Tec Omni VII /Orion	
begin.ssb();	National NCX-3	Ten Tec Triton II	Ten Tec Triton IV Omni C Corsair	Kachina 505	Yaesu FT2000	ICOM 7850
Simple CW Homebrew	Hallicrafters SR-150/160 SR-5400/500	Drake TR-4	Kenwood TS820 TS520 TS180	Ten Tec Pegasus Omni VI Plus	Kenwood TSS2000	Yaesu FTdx5000
Heathkit AT1		Atlas 180/210X		ICOM IC 755	ICOM IC706	Kenwood TS890
Bought Receivers	Heathkit	Yaesu FT-101	ICOM IC730/745	Kenwood TS950	FLEX Radio	FLEX 6700
Collins Hallicrafters National Hammarlund Heathkit Eldico Eico Knight Kit Drake	Drake TR-3	Trio (Kenwood) TS-520	Yaesu FT-102	Yaesu FT900 CAT	Apache ANON	uBitx
	Collins KWM-2/2A			Trinket Homebrew	Bitx20	Homebrew Rigs On the Rise Impact of .io Groups and user Groups.
	Eico 753	Homebrew SSB LM373	Atlas 350-XL		GONE! Drake Collins National Hallicrafters Hammarlund Heathkit	Podcasts
	Yaesu FTdx100	Hallicrafters FPM300	Less Homebrew		Some Homebrew	
	Some Homebrew CW/SSB					

A 60 Year Snapshot of Homebrew Radio ~ N6QW 2/2021

# N6QW's Ten Commandments of Homebrewing

1. Noodle First, Solder Last
2. Design and Then Build
3. Build A Requirements List
4. The Final Enclosure is 1<sup>st</sup> on the list of Determinations (The photo below is not at the point where you start to think what kind of box should I use)



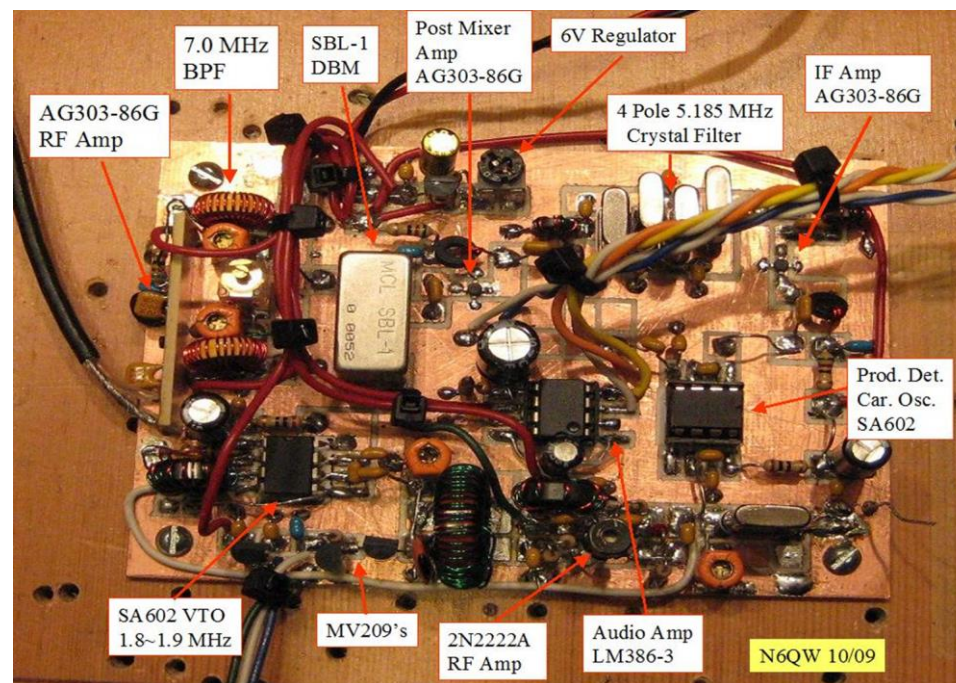
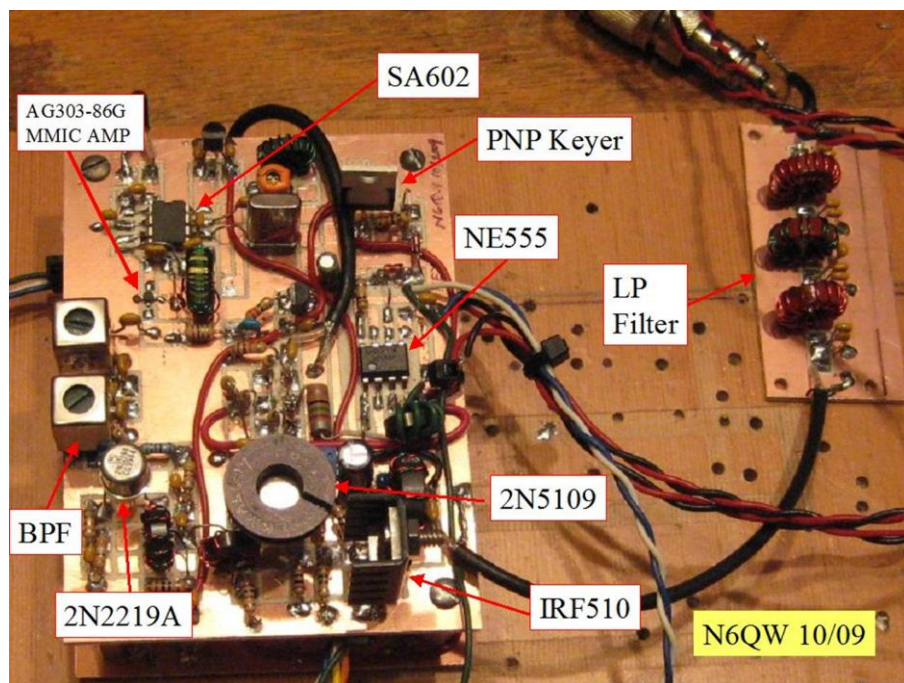
5. Collect Data, Resource Documents, Information
6. Plan the Build ~ Start at the End
7. Build circuit elements in Modules
8. Don't Apply Power Until Verification (right parts, right place, no solder bridges, no shorts and all connections are made, power to all circuit elements)
9. Test Modules and Document Results (photos, notes)
10. Sequential Testing of Modules (built work is a part of the test system ala Heathkit)

Document, Document, Document what you do!

Final = ½ Cubic Foot  
Weight = 10 Pounds  
Fab Time = 8 Weeks

[www.jessystems.com](http://www.jessystems.com)





Advanced SOTA CW Transceiver using Four MMIC Devices, VTO, HB Crystal Filter  
 Keying Shaping and Break-in. [https://www.jessystems.com/40M\\_MMIC.html](https://www.jessystems.com/40M_MMIC.html)  
 (Complete build schematics are shown on the link above.)

<https://www.youtube.com/watch?v=al6EzO-JQ3w>



20M CW Transreceiver



"Roll Your Own CW Transceiver"

Discrete Audio Amp

Receiver Board  
W/3 Pole Filter  
DBM, BFO, PD  
12MHz IF

Ext Amp SW

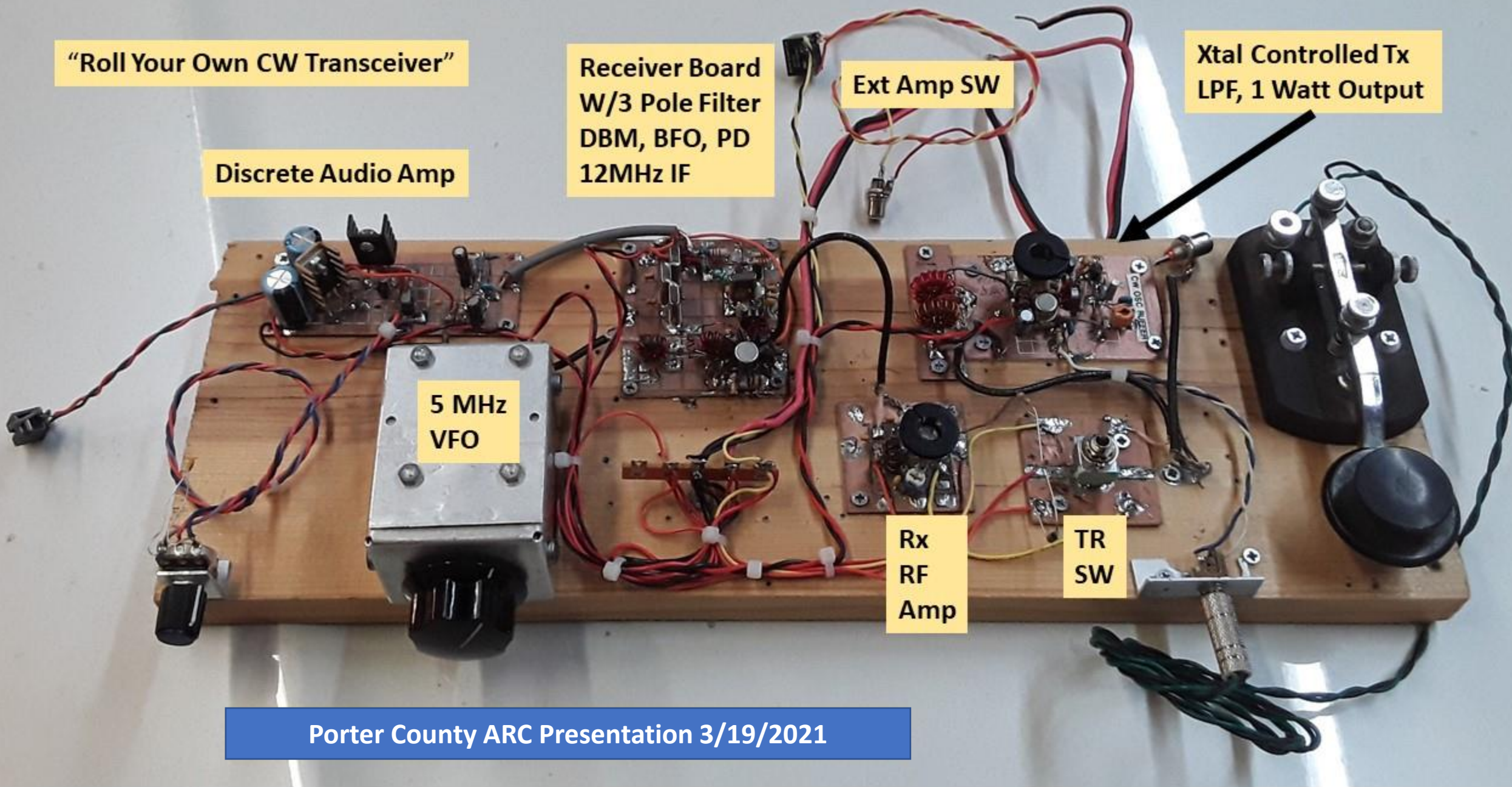
Xtal Controlled Tx  
LPF, 1 Watt Output

5 MHz  
VFO

Rx  
RF  
Amp

TR  
SW

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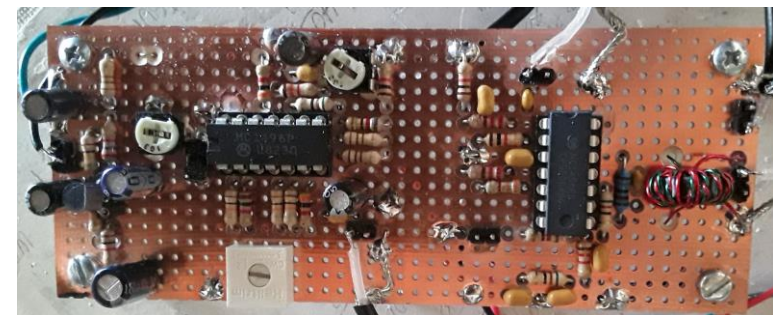
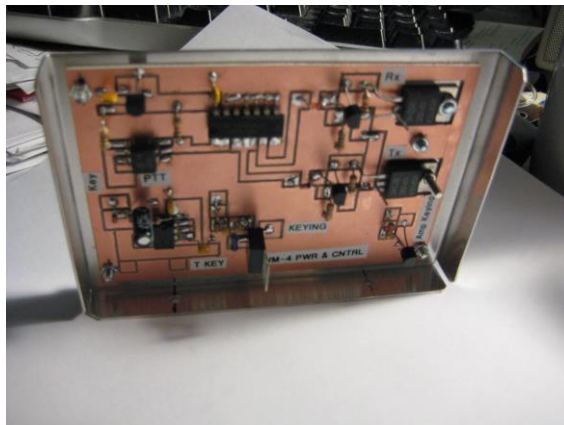
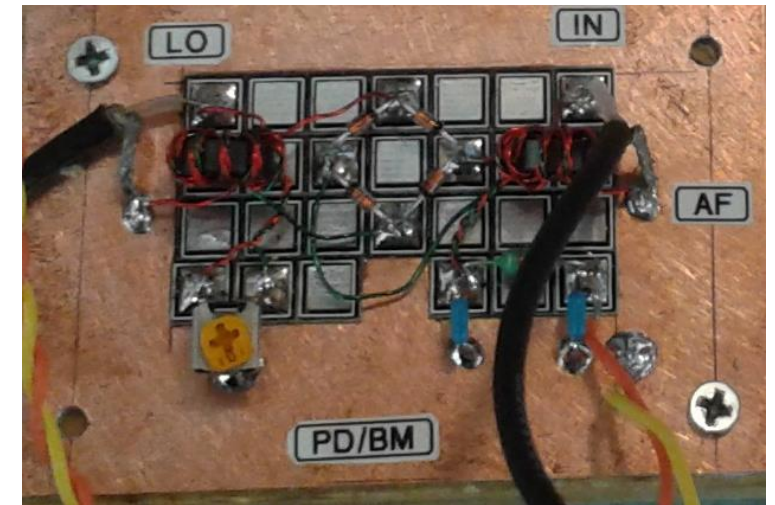
# **Key Homebrewing Concepts!**

- 1. Start with small projects ~ one or two transistor transmitters**
- 2. Learn how the circuits actually work ~ just building teaches nothing**
- 3. Extensive use of simulation – One Transistor Mic Amp example**
- 4. Document the simulation and validate with measurements**
- 5. Modularity ~ The living experimenter's platform.**



# Explore Building Concepts .

1. Ugly is just that Ugly and prone to shorts and errors
2. **Manhattan Squares (MePads)**
3. **Single sided Copper Vector board**
4. PC Boards made in China
5. **CNC Mill**



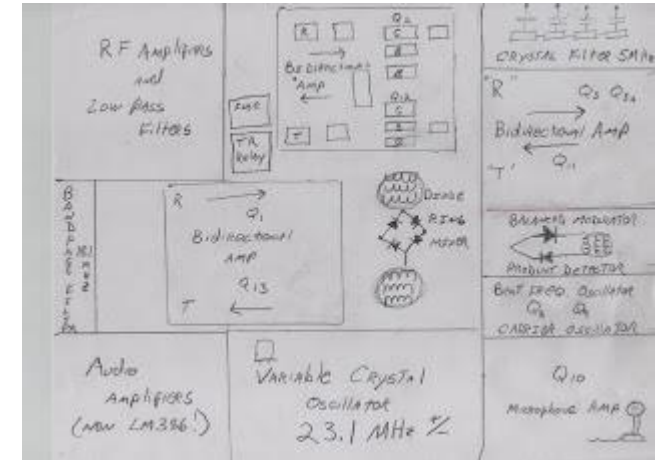
# N2CQR's Scratch Built Bitx17



Bitx17 in a Wooden Box (Michael's)



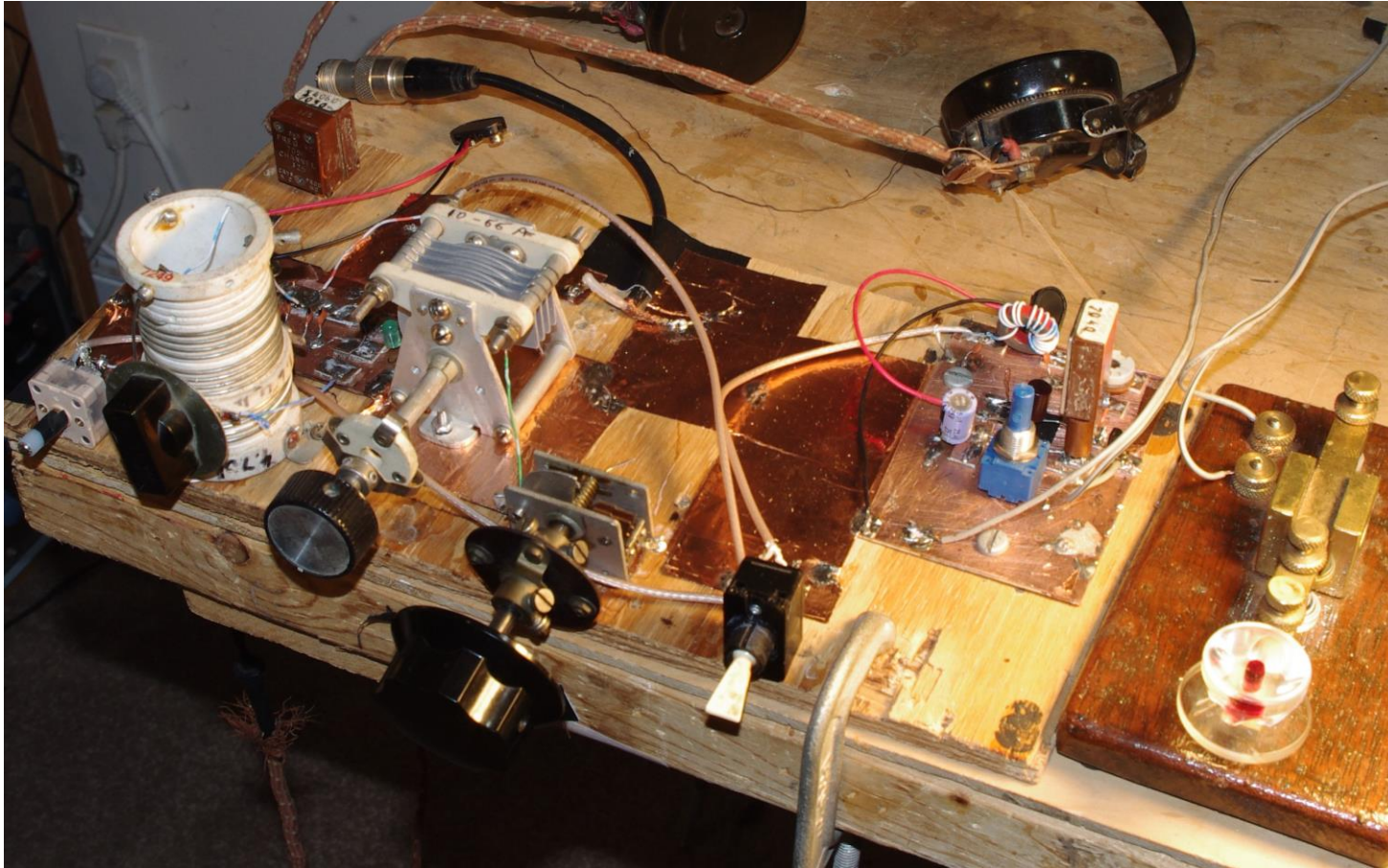
Bitx17 Built in 15 Seconds!



Noodling the Layout ~ 1<sup>st</sup>!

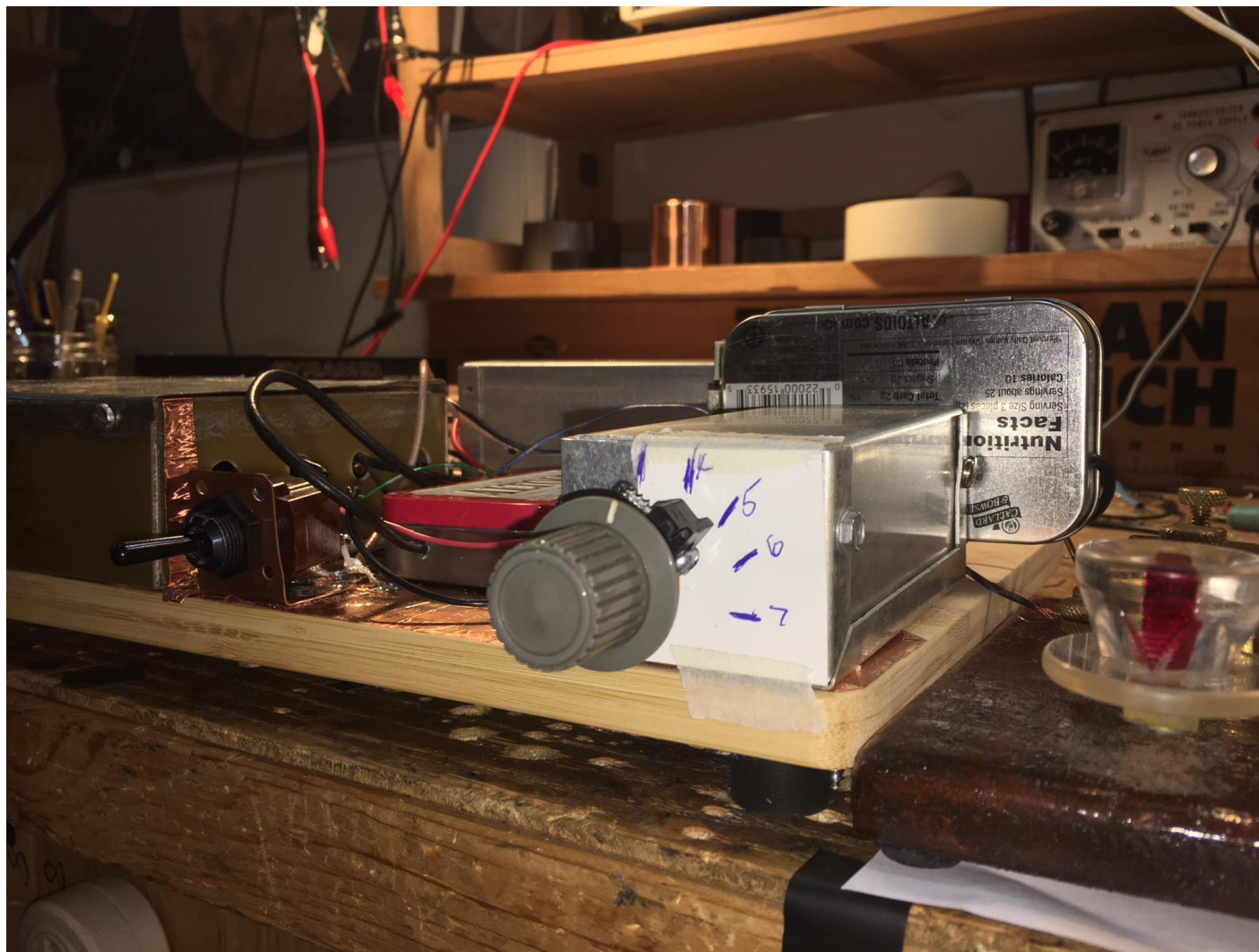


## More of the “Good Stuff” From N2CQR



**The ET2 ~ A Two Transistor (J310) CW Transceiver!**





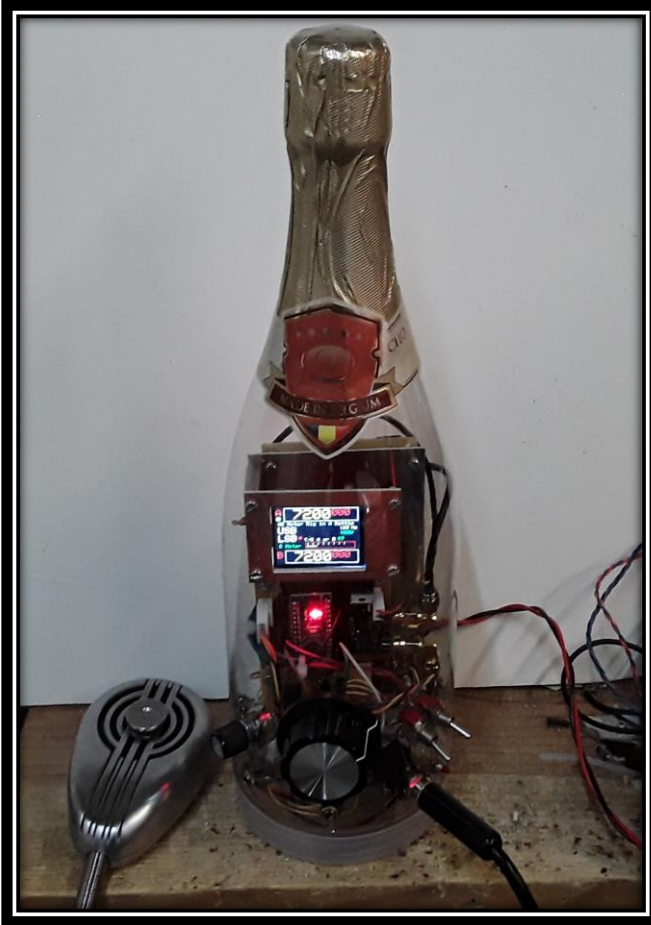
A High Precision N2CQR Approach for Frequency Readout ~ No Expense Spared! Guys/Gals –It Does Work Well!



**The Fish Soup Ten From N2CQR = Tuna Tin Two + Herring Aid Five + VFO**



# Imagination: The Key to Homebrewing!



Thinking out of the Bottle!



A Solid State Version of the KWM-2



A 9 Transistor SSB Transceiver!



A 16 Cu In. SSB XCVR



## **Recapitulation of Key Elements**

- **Get a Pocket Protector & Tri-Color Pens ~ you must look the part.**
- **Noodle First, Solder Second!**
- **Don't just build ~ Learn the why!**
- **Acquire decent test equipment (Nano VNA is \$50)**
- **Use Simulation Programs like LT Spice and Elsie**
- **You Tube and Google are your friends**
- **Start small with simple projects ~ Michigan Mighty Mite**
- **Build Circuits in Modules ~ Experimenter's Platform**
- **Document using your smart phone!**

# Reference Links

- **soldersmoke.blogspot.com**
- **n6qw.blogspot.com**
- **[www.jessystems.com](http://www.jessystems.com)**
- **[www.n6qw.com](http://www.n6qw.com)**
- **[www.n6qwradiogenius.us](http://www.n6qwradiogenius.us)**
- **[www.pastapete.com](http://www.pastapete.com)**

Thanks for the invite to speak to your Club: Bill, N2CQR and Pete, N6QW