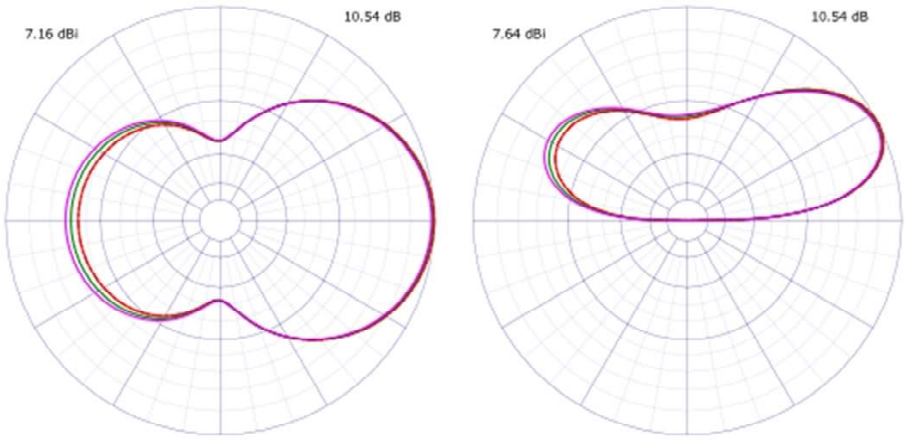
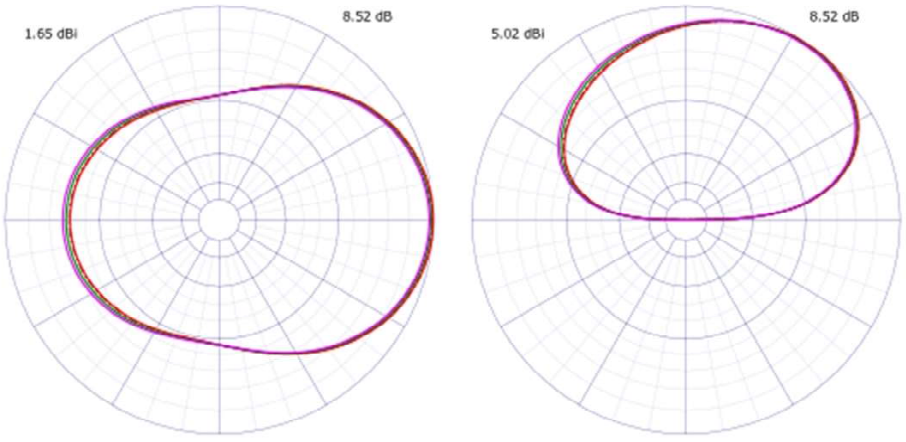


--------- 2016-09-04 19:31 ---- (nec2c) -----

Frequency 14.000 MHz
Frequency 14.150 MHz
Frequency 14.300 MHz
Feedpoint(1) - Z: (57.427 - i 19.014) I: (0.0157 + i 0.0052) VSWR(Zo=50 Ω): 1.5:1
Feedpoint(1) - Z: (62.023 - i 2.250) I: (0.0161 + i 0.0006) VSWR(Zo=50 Ω): 1.2:1
Feedpoint(1) - Z: (65.907 + i 14.643) I: (0.0145 - i 0.0032) VSWR(Zo=50 Ω): 1.5:1
Ground - Rel. dielectric constant 3.000, conductivity: 0.00100 mhos/meter. (NEC-2 ground)
Directivity: 10.54 dB
Max gain: 7.64 dBi (azimuth 0 deg., elevation 27 deg.)
Front-to-back ratio: 4.90 dB (elevation 31 deg)
Front-to-back ratio: 5.07 dB (elevation of front lobe)
Front-to-rear ratio: 4.90 dB
Average Gain: 0.5174 (2.862 dB)
Compute time: 0.06 sec

Figure 4: Driven element tilted 30 degrees down

Fig. 4 Antenna with driven element tilted 30 degrees down



--------- 2016-09-04 19:08 ---- (nec2c) -----

Frequency 14.000 MHz
Frequency 14.150 MHz
Frequency 14.300 MHz
Feedpoint(1) - Z: (41.733 - i 15.124) I: (0.0212 + i 0.0077) VSWR(Zo=50 Ω): 1.5:1
Feedpoint(1) - Z: (46.054 + i 3.934) I: (0.0216 - i 0.0018) VSWR(Zo=50 Ω): 1.1:1
Feedpoint(1) - Z: (49.997 + i 22.862) I: (0.0165 - i 0.0076) VSWR(Zo=50 Ω): 1.6:1
Ground - Rel. dielectric constant 3.000, conductivity: 0.00100 mhos/meter. (NEC-2 ground)
Directivity: 8.52 dB
Max gain: 5.02 dBi (azimuth 0 deg., elevation 53 deg.)
Front-to-back ratio: 1.49 dB (elevation 89 deg)
Front-to-back ratio: 3.80 dB (elevation of front lobe)
Front-to-rear ratio: 1.49 dB
Average Gain: 0.4504 (3.464 dB)
Compute time: 0.06 sec

Figure 5: Antenna at 3 meters

Fig. 5 Antenna at a height of 3 meters

Construction

The elements are made from #26 copper clad steel wire, Wireman #534. The ends are looped back on themselves making a loop for tying the nylon cord bridle. Heavier gage wire can be used, and works well in the version of this antenna permanently set up at my home. With #12 wire, modeling results show better SWR with a driven element length shortened to 10.1 meters. The feed point is protected with a 3/4" schedule 40 plastic pipe cap which contains the common mode choke. The choke consists of 7 bifilar turns wound on a FT50B-43 core. The length of the driven element determined by during tuning is 70 cm shorter than that suggested by modeling results. I think this discrepancy is due to the common mode choke. If you change the choke, the length needed for the

driven element may change. Experiment is in order. A feed line of RG-58U is permanently attached to the antenna and supported by a wire bolted to the plastic pipe cap. The feed line should be long enough to reach the ground in normal deployments to avoid supporting feed line with the RF connectors. To build the feed point, first drill two holes near the closed end of the cap to pass the antenna wires. Also drill a hole for an attachment screw for feed line strain relief. Attach a short piece of wire to the screw which will be wrapped around the feed line to provide strain relief. Cut two pieces of wire at least 2 feet longer than is needed for the driven elements. Tie overhand stopper knots in these pieces of wire about 1 foot from the end. Use the 1 foot ends to wind the common mode choke. Feed the other ends through the holes in the cap and draw the choke into the cap. Solder the feed line to the two short ends from the choke insulating with shrink wrap tubing. See photo 3. Push the feed line end into the cap and fasten the strain relief wire to it fixing it in place with shrink wrap. See photo 4. After testing, fill the cap with Shoe Goo.

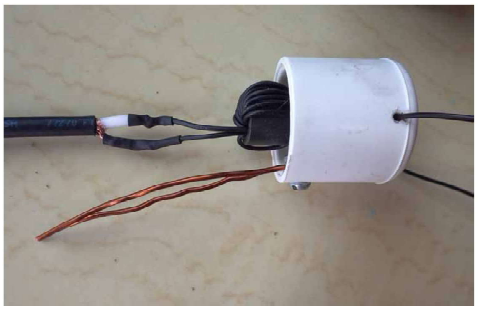


Photo 3

Photo 4

Photo 5

Photo 6

The spreaders are made from 1/2” and 3/4” fiberglass pipe from DX Engineering (parts DXEFT0500-8 and DXE-FT0750-8). These pipes are cut into 2 foot sections for portability. Small pieces of the 3/4” pipe are epoxied to the 1/2” pipe to act as stops and then 3 sections of the 1/2” pipe are alternated with 2

sections of the 3/4” pipe to make the spreader. See photo 5. Because, when in use, the joints are under compression, they need no additional fastening. They have show good reliability in winds up to 40 MPH. The end of each spreader is slotted so the antenna wire can slip into the slot to hold the spreader to the antenna. See photo 6. If I had it to do over again, I would make the spreaders from 1/2” fiberglass pipe, joined with joints made from about 5-10 cm of the 3/4” fiberglass tubing. I would epoxy the joint to one of the spreader pieces and slip the other spreader piece into the resulting socket during assembly. These spreaders would be smaller and lighter than the ones I actually built. The bridles are tied from 7.5 (25’) meter lengths of thin nylon cord. Dacron antenna rope should work just as well. The leg lengths I use are 3.11 meters (10.2’) to the reflector and 4.05 meters (13.28’) to the driven element. The total length isn’t critical, but the placement of the support loop is. The support loops in both bridles should be moved until the antenna hangs more or less level. Once the correct location has been located, the loops should not need to be re-tied when deployments are changed.

The whole antenna winds onto a bobbin which keeps the wires, coax, and cords from becoming tangled, making deployment and decommissioning quick and easy. The bobbin is made from slats of wood and wood doweling. See photos 7 and 8.

Photo 7

Photo 8

The Color-Burst Liberation Army
by Doug Hendricks, KI6DS

(Note: The following article is written for fun! It is not meant to put down or embarrass anyone. Think "tongue in cheek".)

Several years ago, Every TV set had a crystal that was on the ham bands. Of course, I am talking about the color-burst crystal on 3.579 MHz. Hams were quick to realize that they were free for the taking, and several radios were designed for communication on the color burst frequency as it quickly became known. Then, disaster struck. The digital hams moved in and took over the frequency. Steve "Snort Resin" Smith decided to fight back. He formed the Color-Burst Liberation Army, CBLA for short, and issued a statement about the purpose of the group. Here it is:

OUR MISSION STATEMENT:

There is a vast army mobilising whose aim is to re-take territory abandoned by the National Television System Committee.

Why is an army needed for something already abandoned? Because of the squatters and the carpet-baggers are legion and of a most bovine, stubborn, and obnoxiously LOUD sort.

We intend to retake 3579.545455 KiloCycles from the blaring, bleeping, and warbling robots, with their Windows hive-minds, their "push F1 through F5" QSO's, and their "rig-blaster-nomics," whatever diabolical appliance those might be.

This territory is the Colorburst Frequency, and we are the Color-Burst

Liberation Army. We are the true believers of “CW Forever,” and the few who remain that endeavour to construct instruments of transmission and reception from the donated organs of the political football known as “electronic waste.”

We will re-take, restore and DEFEND CW to this slice of spectrum. We will create a sanctuary for those tinkerers who “Liberate” 3579.545455 quartz crystals from defunct machines found on our neighbour’s curbside on trash day.

We shall vanquish the robotic horde, and will attain Ultimate Victory!

73 and 3579,

Generalissimo Stephen Smith CBLA #1

Forward, march!

CBLA Yahoo Group: <https://groups.yahoo.com/neo/groups/cbla/info>

Request CBLA “Number”: email <sigcom@juno.com> (issued consecutively)

(you do not need to be a Group member to request a CBLA Number and CBLA Numbers are not automatically assigned with Group membership) .

Steve issued the proclamation and even enlisted the help of Bill Meara, of Solder Smoke Fame. In fact, Bill had a program to give away Color-Burst crystals at one time. How is it going? Slow. I read about it online, and contacted Steve for a number and received Number 55. Holy cow, that is not

very many soldiers. I asked Steve about it and he said that it was going slow, but he was still in the fight. I asked him what I could to do help. He said get on the frequency and call CQ. I suggested that what we need is a Color-Burst Liberation Army rig, and it needed to be homebrew to keep in the spirit of things.He agreed and since he is Generalissimo Steve “Snort Resin” Smith, he gets to delegate. So he charged me with finding a suitable radio, which would be known as “The Color-Burst Liberation Army Agent Radio”. Don’t you just love how Generalissamo’s work. We hadn’t even found the radio and he already had a name for it. Being a loyal soldier, CBLA soldier #55 to be exact, I set out on a mission to find the perfect radio (ok it didn’t have to be perfect, but it had to be simple and easy to build.)

I looked through my back issue CD of Sprat and didn’t really find what I wanted, but I did find a lot of neat articles. If you don’t have the Sprat back issues CD, you should. The G-QRP club is very active. You can find them on the web. But I am digressing. I had just about given up hope when it happened. I was reading the QRP-L Digest, and saw a mention that a guy wanted a Steve Weber MAS 80 board or kit. What the heck was a MAS 80? I looked it up and found that Steve had designed it for the Minimal Art Session contest started by Dr. Hamut Weber, DJ7ST. The idea was to design a rig using the fewest parts possible. Steve designed his rig in 2006 and called it the MAS 80.

I checked it out on Steve’s site, and wow. It was just what the CBLA was looking for. Simple, easy to build and 2 Watts out, on 3579.545455 KHz. It has easy to find parts, is cheap, and Steve even has a parts placement diagram and artwork for the pcb. The next thing to do was get Steve’s permission to reprint his article from his website. This was needed in order to disseminate information to the cadre of Liberation Army members. So, now we have the information needed to produce our own Color-Burst Liberation Army Agent Radios!!

There is one other thing that I must mention. When the other side discovered that we were using crystals from TV sets, they did the unthinkable. They changed the TV’s from analog to digital, and poof, just like that free crystals dried up. But not to worry. Generalissamo Smith has discovered a cache of brand new, never used crystals. If you want to build your own Agent Radio and join the fight, now you can. All that you have to do get your own crystal for free is to send Generalissamo Smith a Self Addressed Stamped Envelope to:

Generalissamo Steve “Snort Resin” Smith
1810 McLoughlin Ave.
Oxnard, CA 93035-3441

The Generalissamo will be happy to send your envelope back with a crystal inside. Then, all that you have to do is build your Color-Burst Liberation Army Agent radio (actually its called a KD1JV MAS 80). If you need a

polyvaricon, check on Ebay, or go to qrpkits.com. They sell them for $5 each. If you find a polyvaricon without mounting hardware, the screws are metric, 2.5 x 4mm for the mounting screws and 2.6 x 16mm for the shaft. Use a 1/2” by #4 quarter inch in diameter nylon spacer for the shaft.

If you are so inclined, dont forget to send the Generalissamo an email asking for your CBLA number. The Generalissamo says that we will continue the fight to liberate the frequency. Next month, Steve Smith will write an article on building the MAS 80 (CBLA Agent Radio). The Generalissamo wants his troops to know that he leads by example. You don’t have to wait for his article, though. The construction article that follows was kindly provided by the designer, Steve Weber, KD1JV. He is owed a debt of gratitude by the CBLA.

The MAS 80, A Rig for the MAS Contest by KD1JV
by Steve Weber, KD1JV

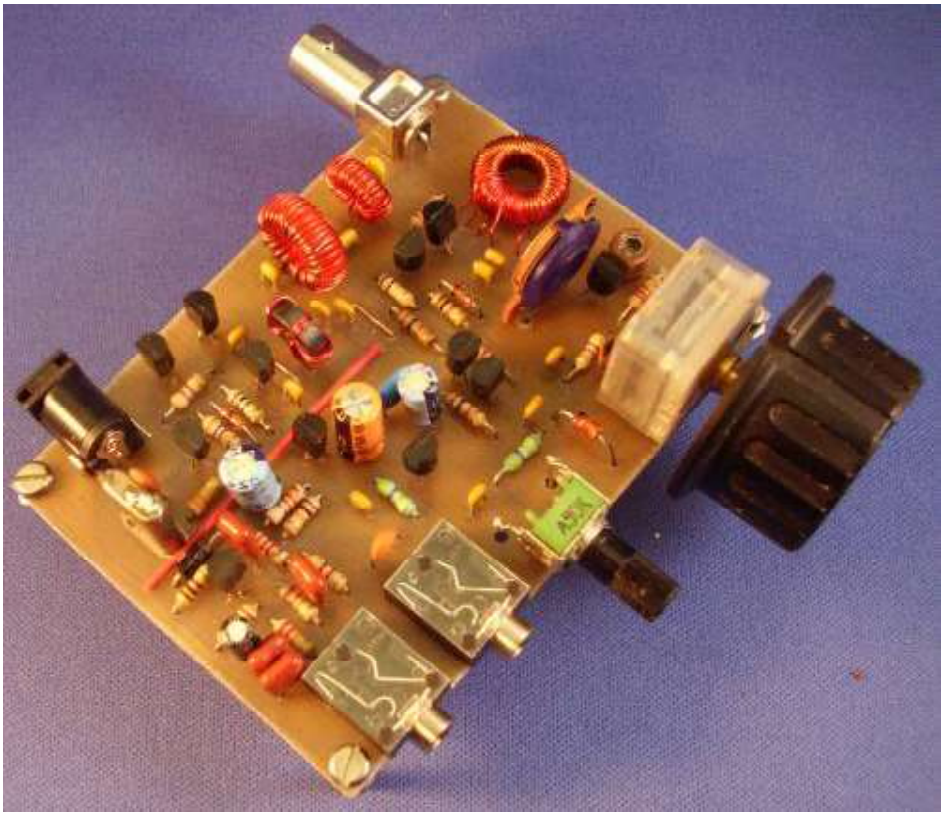


Fig. 1 Mas 80 Transceiver Actual size is 3.5" wide and 2.5" deep.

The M.A.S., (Minimal Art Session) is a contest started by Dr. Harmut “Hal” Weber, DJ7ST. (Now a SK)The idea behind this contest is to encourage

Hams to build and operate a rig using a minimal number of parts. To be eligible, a transmitter must use no more than 50 parts (pretty easy to do) and a transceiver must use no more than 100 parts (a bit harder to do). To encourage the use of a very small number of parts, bonus points are awarded by the percentage of the actual number of parts used less than the maximum allowed number. Thankfully, things like hardware, knobs, connectors, headphones, key and the like are not counted as parts. Also, the transmitter low pass filter is considered to use 3 parts, even if in actual fact it uses more parts to ensure spectral purity of the transmitted signal.

However, if you use any IC's, the number of parts integrated into the IC must be counted. It is impossible to determine how many resistors, transistors and diodes (capacitors are usually not integrated onto a chip, but sometimes there can be) are inside a chip since the manufacture usually does not bother to tell you and if there is a simplified diagram of the insides, it does not show all the parts. And even if this number can be determined, even a simple IC can have dozens of parts integrated. So, this effectively eliminates the use of any modern IC's in a rig designed for the MAS contest. Not being able to design with op-amps, audio amps like the LM386, mixers like the SA612 or CMOS logic gates, is a definite handicap to designing a simple, but effective rig which is actually capable of making contacts.

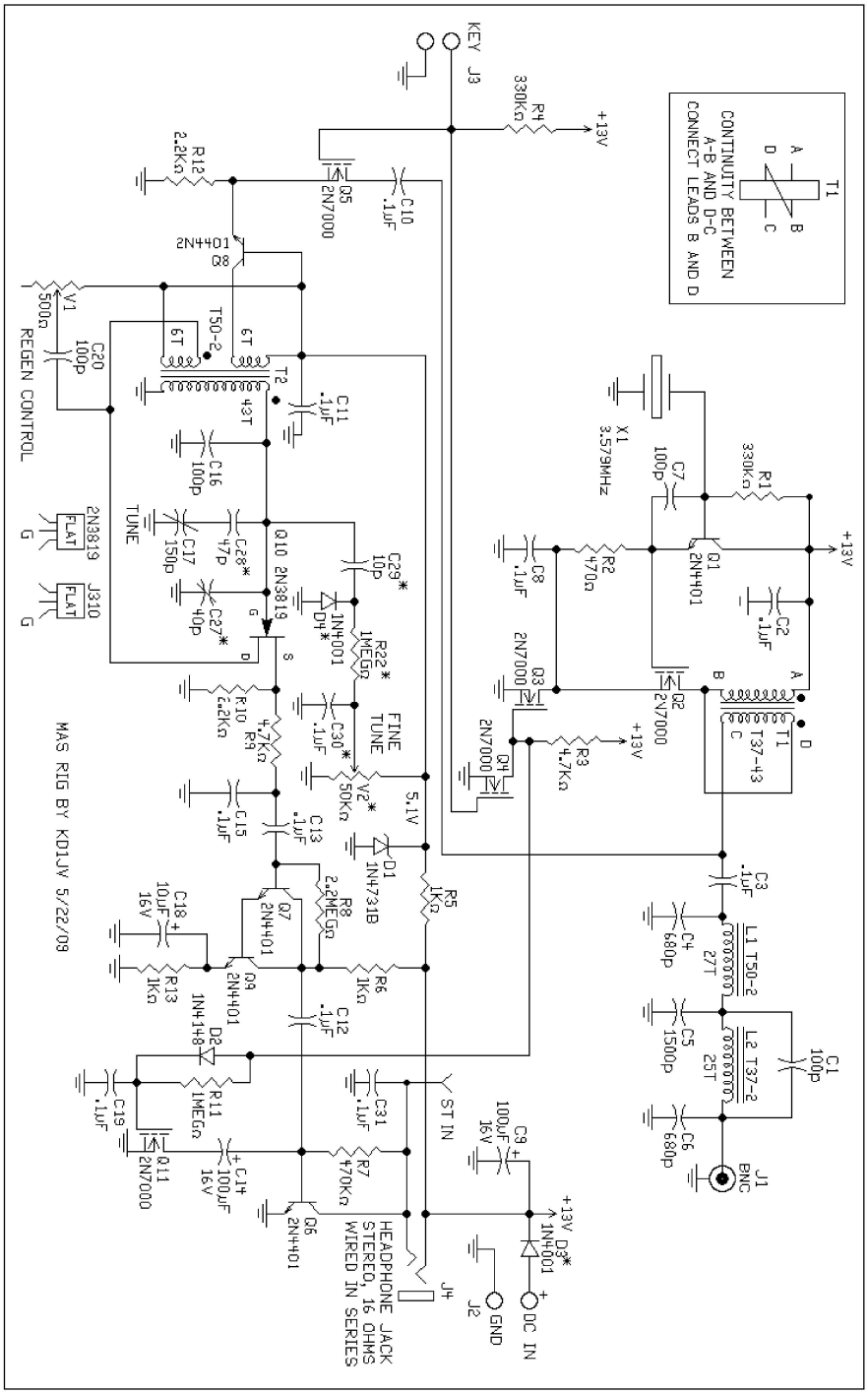
Despite the limitations of not using IC's as noted above, I decided to give it a try. Some very simple and very low parts count rigs have been devised over the years, one of the most well known is the "Pixie". The problem with these overly simplistic designs is they simply do not work very well. The chances of actually making a contact with one of these rigs is slim to none. In my opinion, they are a waste of time and of natural resources. What good is a extreamly low parts count rig if you can't make contacts with it? If I am to spend time and effort to design and build a rig, I want something which at least has a good chance of actually talking to someone! If your gonna work a contest, you got to be able to hear people coming back to you!

The rig I came up with uses 51 parts for a complete transceiver, giving a 50% bonus. The transmitter puts out about 2 watts, the only supr is -50dBc at the second harmonic, and uses just 16 parts. The receiver is a regenerative type detector, with a RF pre-amp and two stage, high gain audio amp, for a total of 35 parts in its minimual configuration. MDS is about 0.5 uV if you have good hearing. Since the MAS contest is an 80 meter event, this rig is designed for 80.

Optional Parts:

Parts marked with a "*" on the schematic below are optional parts. These are D3, a reverse polarity protection diode and a fine tuning control. Since the rig does not produce a side tone on its own, an optional side tone generator is also described. These parts are included in the printed circuit board layout to make the rig more useable in general use.

The Schematic:


T1
A
B
C
D
CONTINUITY BETWEEN
A-B AND D-C
CONNECT LEADS B AND D
KEY J3
R4
330KΩ
+13V
R12
2.2KΩ
2N4401
Q8
Q5
2N7000
C10
.1µF
V1
500Ω
REGEN CONTROL
C20
100p
T50-2
6T
6T
4ST
T2
C11
.1µF
C16
100p
TUNE
2N3819
FLAT
G
J310
FLAT
G
C17
150p
C28*
47p
C27*
40p
Q10 2N3819
G
D
S
C29*
10p
D4*
1N4001
R22*
1MEGΩ
R10
2.2KΩ
R9
4.7KΩ
C30*
.1µF
V2*
50KΩ
FINE
TUNE
5.1V
C15
.1µF
C13
.1µF
D1
1N4731B
R5
1KΩ
C18
10µF
16V
R13
1KΩ
Q7
2N4401
Q9
2N4401
R8
2.2MEGΩ
R6
1KΩ
C12
.1µF
D2
1N4148
C19
.1µF
R11
1MEGΩ
Q11
2N7000
C14
100µF
16V
Q6
2N4401
R7
470KΩ
C31
.1µF
ST IN
J4
HEADPHONE JACK
STEREO, 16 OHMS
WIRED IN SERIES
C9
100µF
16V
+13V
D3*
1N4001
J2
GND
DC IN
MAS RIG BY KD1JV 5/22/09
X1
3.579MHz
C7
100p
R1
330KΩ
+13V
R2
470Ω
C8
.1µF
Q1
2N4401
C2
.1µF
Q3
2N7000
Q2
2N7000
T1
T37-43
A
B
C
D
Q4
2N7000
R3
4.7KΩ
+13V
C3
.1µF
C4
680p
L1 T50-2
27T
C5
1500p
L2 T37-2
25T
C6
680p
C1
100p
J1
BNC

The transmitter:

The transmitter is a simple crystal oscillator using a 3.579 MHz color burst crystal. A 2N7000 MOSFET is directly coupled to the output of the oscillator for the PA. Q3 is used to key the oscillator and PA on and off. Q4 is used as an inverter so that normal, active low keying can be used. Rise and fall time wave shaping is not included to reduce parts count, so this circuit will produce key clicks. C7 provides feedback so the circuit will oscillate. Normally, a second capacitor would be used from the emitter to ground, but the 2N7000 has enough gate capacitance to eliminate the need for that additional cap. Instead of the normal sine waves one would expect from a crystal oscillator, this oscillator was made to produce fairly narrow pulses. This improves the efficiency of the PA so that even though the 2N7000 is in a plastic TO-92 package, it does does not get alarmingly hot producing 2 watts of output. It is advisable the antenna load be preset to a low SWR before transmitting, as the 2N7000 has a 60V break down voltage and a high SWR can easily exceed this, causing the part to fail. The output low pass filter provides some impedance matching between the output of the PA and the antenna load. C1 in combination with L2 forms a trap at the second harmonic, other wise an additional filter stage would be required to meet FCC spectral purity regulations. Instead of buying a single 1500 pfd cap for C5 in the LPF, two 680 pfd caps could be used instead.

T1 is a bifilar wound transformer, which means two wires are wound around the core at the same time. (5 turns). Use an ohm meter to determine the ends of the wires A-B and C-D, then connect the ends B and D together to form the center tap, as shown in the diagram in the schematic.

The Receiver:

The receiver is a regenerative type and is a slightly modified version of the QRPKITS “Scout” regen designed by Charles Kitchen. See http://www.qrpkits.com Q5 is the QSK switching transistor. During transmit, this transistor is turned off to isolate the receiver input from the low pass filter. Q8 is a common base RF pre-amp to keep the oscillations from the regenerative detector from being transmitted and reduce pulling effects from the antenna. The resonant circuit made up of the secondary of T2 and C16 determines the operating frequency of the receiver. Ideally, the tuning cap C17 should be an air variable with vernier drive. If you don’t mind adding a few additional parts, a pot tuned varactor diode can be added for fine tuning and a small value trimmer cap (C27) used to help set the tuning range. Making C16 150 pfd and using a 50 pfd tuning cap (jumper out C28) allows for pretty much full coverage of the 80 meter band, so a vernier dial is needed or the tuning is very touchy. The schematic is drawn showing the use of a polyvariable capacitor with the varactor fine tuning. Polyvariable caps are also available from qrpkits.com.

Stability of the receiver is directly related to the stability of the input tuned circuit. NPO or C0G type caps should be used and an air variable for tuning. Using a powdered iron core for the inductor is a liability, but an air core

coil would be much larger and more difficult to manage physically.
In order to receive CW or SSB signals, the regenerative detector must oscillate. A feedback winding on T2 turns the circuit into an oscillator. V1 in combination with C20 is used to control the amount of feedback. Polarity of the feedback winding is important. If you can not get the detector to oscillate, reverse the feedback winding connections. When winding T2, wind the 43 turn primary first and leave as much of a gap as possible between the start and finish of the winding to have a place for the two 6 turn winding to fit onto. Then wind the two 6 turn windings next, continuing in the same direction as the primary turns. Now, pick on end of the 43 turn primary winding as the “hot end” connected to the tuning caps. The start of the 6 turn winding next to the end of the 43 turn winding should go to the j-fet and the other end to the 5.1V supply. The polarity of the winding going to the RF pre-amp does not matter, so you can pick either end for those connections.

Ideally, the regen control is set so that the detector just starts to break into oscillation. This gives the best selectivity and sensitivity. However, this point will change when returning the frequency for receiving, so in practice, set the control so oscillation is sustained over the tuning range.
R9 and C15 form a low pass filter to eliminate high frequency audio and any RF which is present on R10. Note that the drain and source terminals of a J-FET are symmetrical, so they can be interchanged. That is why the schematic looks different from the way it might normally be drawn. Q7 and Q9 form a high gain darlington amplifier. Q6 further amplifies the audio and has the headphones connected in series with the collector, so it is acting as a Class A amp. Doing it this way eliminates the need to make an amplifier which can drive a low impedance load and saves a significant number of parts. NOTE: The mounting sleeve of the headphone jack is connected to the power supply, so must be insulated from a metal front panel!

Keying the transmitter without any kind of audio muting circuit resulted in very loud clicks in the headphones. This was clearly not acceptable, so a mute circuit had to be devised. This resulted in adding R11, C19, C14, Q11 and D2. When the transmitter is keyed, Q4 is turned off allowing R3 to pull the gate of Q3 high, enabling the transmitter. D2 allows the gate of Q11 to also be pulled high, turning Q11 on and connecting C14 to ground, which by-passes the base of Q6 to ground. When the transmitter is un-keyed, the RC time constant of R11 and C19 delays the turn off time of Q11 to allow any voltage transits to dampen out and eliminates serious clicks from being heard. Some minor clicking is still audible, but it is of reasonable level and not at all annoying.

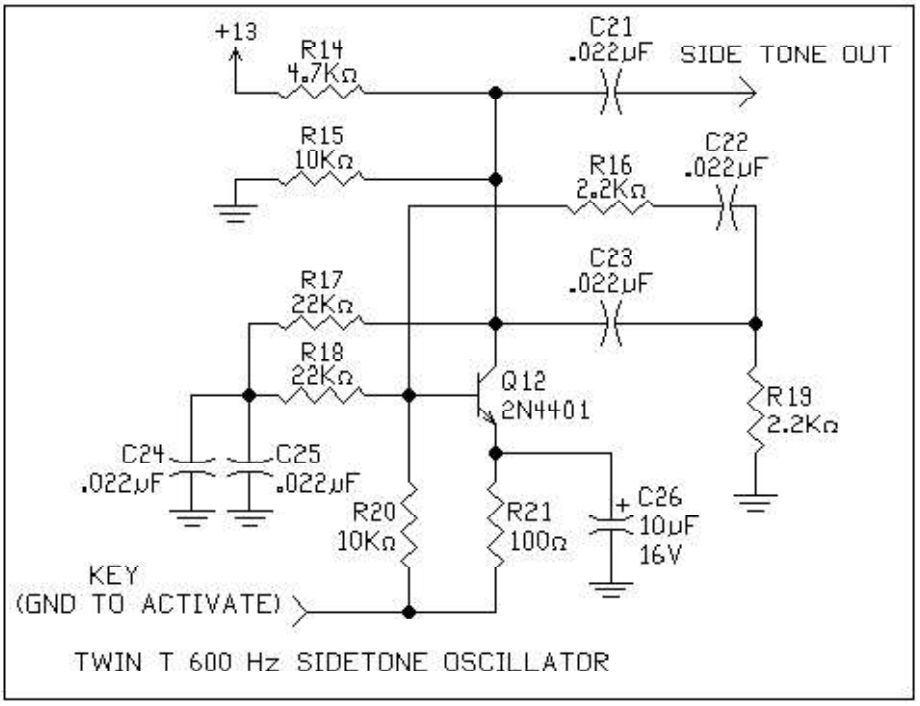
A 5.1V zener, D1 stabilizes the voltage to the RF pre-amp and regen detector. If no reverse polarity diode is used to save a part, one must be careful to observe correct polarity when connecting up power. Powering the rig with a regulated 13.8V supply is recommended, although a 12V gell-cell can also be used, though that might result in chirp, as the supply to the oscillator is not regulated. Minimum operating voltage is about 10 volts, with the power output

dropping off to about 500 mw.
Note that a regenerative receiver is effectively a direct conversion receiver, so signals on both sidebands will be detected.

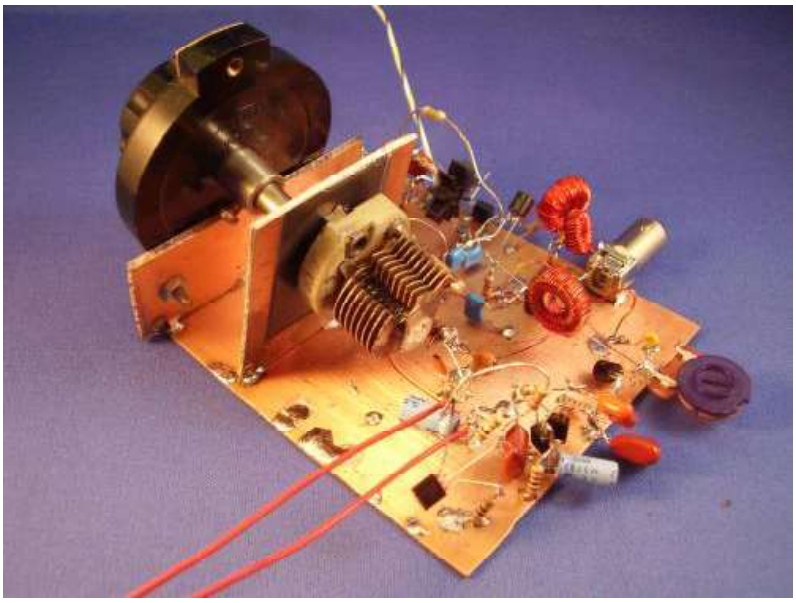
Since one will normally be using the receiver for CW or SSB it will be in the oscillating detector mode. There is enough RF signal present on R10 to add a sensitive frequency counter for a digital readout. This fact could also be handy in initially getting the receiver to tune in the desired frequency range. A frequency counter or a general coverage receiver can be used to help set the tuning range. I tried to make the crystal oscillator act as a “Spot” so you could tune to the transmitter frequency. However, the signal is too strong and blocks the receiver. A separate, outboard oscillator maybe made to provide a spot frequency.
DSB transceiver possibility! It could very well be possible to buffer the carrier signal produced by the regen detector and use it to drive a balanced modulator to produce DSB (Double Side Band). The output of the modulator would then be amplified by some linear amps for transmit. This could result in a very low parts count DSB phone rig!

Sidetone Generator:

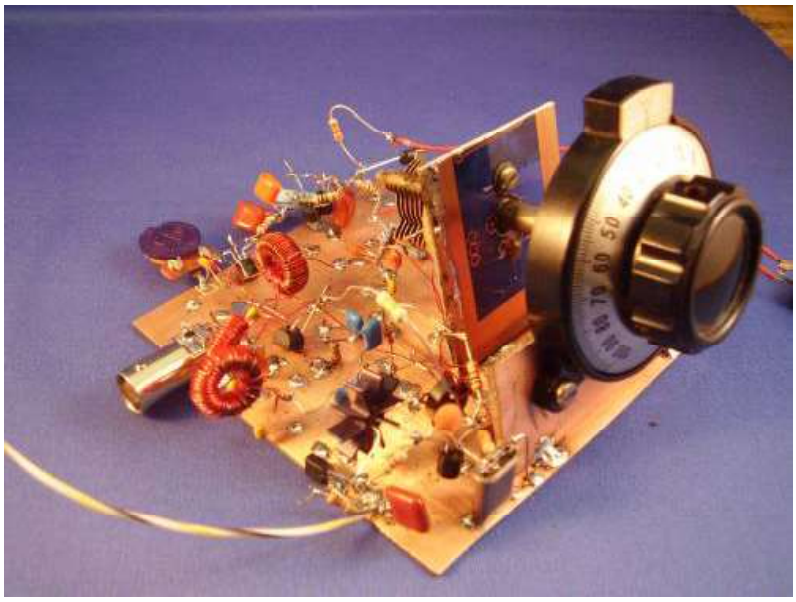
The “Twin T” 600 Hz side tone oscillatorbelow is included on the circuit board. If you have a keyer which can generate it’s own side tone, these parts can be eliminated. The “side tone out” connection goes to the point labeled “ST



IN" on the main schematic. C24 and C25 can be combined as one 0.047 ufd cap. Film type caps should be used for C21 to C25.



Deadbug style prototype back view



Deadbug prototype style front view

Pictures of the dead bug constructed prototype:(but is missing the audio mute parts, as these were added after the photos were taken) These photos prove it doesn't have to look pretty to work! A small finned heat sink was used on the PA in this version so that prolonged keydown periods could be done while testing.

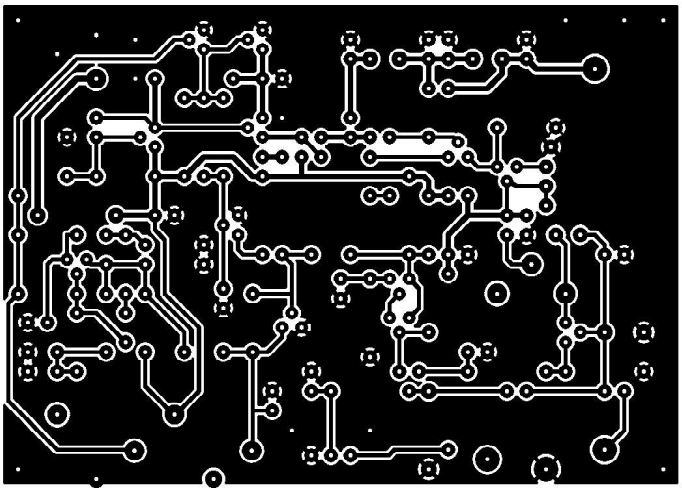
PCB Construction and parts list:

The printed circuit layout is printed below. The image should measure 2.5 x 3.5" when printed. It is a .pdf file and will print to scale. The view is through board, so it can be printed directly onto toner transfer film or paper. The image is reversed when you iron the pattern onto the board.

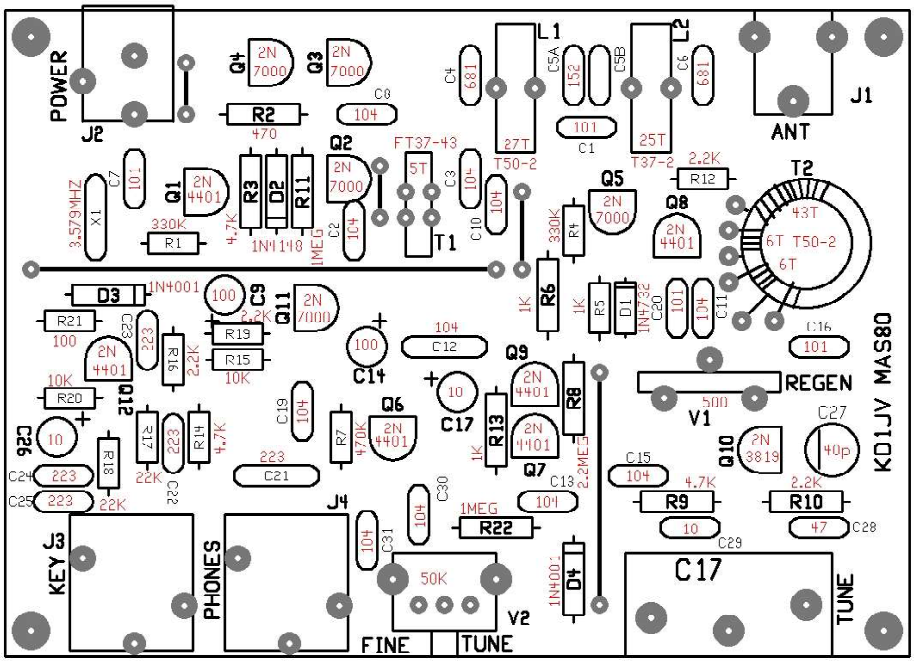
Parts subsitution:

I used 2N4401 NPN transistors, as I have a lot of them. Other NPN's such as 2N3904 or PN2222A should work as well. The J-FET I used is a 2N3819, but other N channel J-FETs such as the J-310 can also be used. Note however, the position of the gate lead is different in most other J-FETs, as shown on the schematic. The diode used for varactor fine tuning is shown as a 1N4001 on the schematic. I used a 1N4753B, a 47V zener diode. The 1N4001 may result in a smaller tuning range and C29 may have to be made larger in value to compensate. A red LED also makes a good varactor diode. The Main tuning range is about 200 kHz, from 3.5 MHz to 3.7 MHz. If you want increased range, make C27 larger in value and compensate with the trimmer cap to put the tuning in the band. Values used in the side tone oscillator should not be changed, as this will change the oscillator frequency. Also, the values used in the transmitter low pass filter need to be as shown. You do have some leway in the other resistor values, going +/- one 5% step should not be a problem, though common values are used.

Most of the part numbers shown next to the part values are for Mouser. J2 and V1 are sourced from Digi-Key, but be advised they have a $5.00 surcharge for orders of less than $25.00. Toriods are available from www.kitsandparts.com



PCB Artwork. Size is 3.5” x 2.5”



INSTALL JUMPERS BETWEEN PADS INDICATED BY BLACK LINES.

Parts Placement Diagram

Q1	2N4401	NPN	R1	330K 1/4W 5%	C1	100p COG	
Q2	2N7000	T-FET	R2	470	C2	0.1 ufd	X7R, 50V 0.1" ls
Q3	2N7000		R3	4.7K	C3	0.1 ufd	80-C320C104M5R
Q4	2N7000		R4	330K	C4	680p COG	80-C315C681J1G
Q5	2N7000		R5	1K	C5	1500p COG	80-C315C152J1G
Q6	2N4401		R6	1K	C6	680p COG	
Q7	2N4401		R7	470K	C7	100p NPO/COG	80-C315C101J1G
Q8	2N4401		R8	2.2MEG	C8	0.1 ufd	
Q9	2N4401		R9	4.7K	C9	100 ufd 16V ALUM ELECTRO	
Q10	2N3819	J-FET	R10	2.2K	C10	0.1 ufd	
Q11	2N7000		R11	1MEG	C11	0.1 ufd	
Q12	2N4401		R12	2.2K	C12	0.1 ufd	
D1	1N4731B	5.1V	R13	1K	C13	0.1 ufd	
D2	1N4148		R14	4.7K	C14	100 ufd / 16V	
D3	1N4001		R15	10K	C15	0.1 ufd	
D4	1N4001		R16	2.2K	C16	100 pfd NPO / COG	
			R17	22K	C17	POLY-VARIABLE 150p	QRPKITS
T1	FT37-43	5T	R18	22K	C18	10 ufd / 16V	
T2	T50-2		R19	2.2K	C19	0.1 ufd	
L1	T50-2	27T	R20	10K	C20	100 pfd NPO/COG	
L2	T37-2	25T	R21	100	C21	0.022 ufd	
			R22	1MEG	C22	0.022 ufd FILM	140-PM2A223K
	MOUSER	R's 291-VALUE-RC (10 MIN)			C23	0.022 ufd FILM	MOUSER
J1	BNC	USE PANEL MOUNT			C24	0.022 ufd FILM	
J2	PWR	CP-102A-ND 2.1mm DIGI-KEY			C25	0.022 ufd FILM	
J3/4	STEREO	161-3507-E MOUSER			C26	10 ufd / 16V	
					C27	40 p TRIMMER	659-GKG40015
V1	500TRIM	201XR501B-ND DIGI-KEY			C28	47 pfd NPO	
V2	50K LIN	317-2091F-50K MOUSER			C29	10 pfd NPO	
X1	3.579MHZ	559-FOX036-LF MOUSER			C30	0.1 ufd	
					C31	0.1 ufd	

"Snort's Shorts"
By Steve Smith, WB6TNL

Hello, I am Steve "Snort Rosin" Smith WB6TNL. This is the third edition of "Snort's Shorts" monthly column in QRPp. Each month I present Snort's Shorts Hints, Mini Reviews, project ideas, and contributions submitted by QRPp readers.

Reminder: Like a QSO, this column is two-way: Your hints, reviews or project ideas are always welcome for inclusion in one of my columns so please, share them with your fellow QRPers. You are also encouraged to submit suggestions. Email to: <sigcom@juno.com>, Thanks!

Snort's Shorts Hints

This Month, our first Hint is another idea presented to us by Doug Hendricks KI6DS, Editor and Publisher of QRPp:

Adding Screw terminals To A PC Board

Have you ever needed to add a terminal to a PC board that will accept a ring or spade or ring crimp lug? Here's a simple way to do it: If you are making your own board, make the 'land' where you want the terminal located, about ¼-inch in diameter. Drill a hole of the proper diameter to pass a machine screw of either 6-32 or 4-40 thread size (or metric sizes, if you prefer). You will need the following: 1 machine screw about 1/2" long, 1 lock washer, split ring or star. 2 ea. 1/4-inch nuts (or metric), two flat washers sized to your machine screw. Assemble the hardware with the screw head on the side of the board with the traces. On the opposite side, place the nut on the screw and tighten. Next is the two flat washers, then the lock washer followed by the second nut. The spade or ring terminal fits between the two flat washers.

Books, Books and More Books

Some links to outstanding sites where one can download old books and magazines related to ham radio and electronics:

Archive.org is a wonderful resource. Here's a link to their on-line copies of electronics books:

<https://archive.org/details/folkscanomy_electronics?&sort=downloads&page=1>

Here's a link to one most QRP-ers will recognize:
<http://tinyurl.com/j6h8m7s>

American Radio History is another fabulous site:
<http://americanradiohistory.com/> This site has thousands of magazines archived including, among others, all issues of Popular Electronics and Electronics Illustrated.

Here's a link to my very favorite issue of Electronics Illustrated:
<http://tinyurl.com/hulh9ev>

Safely de-soldering components from a PC board (without special equipment)

During a recent telephone conversation with another ham to help him troubleshoot a radio, I realized he was having difficulty removing a component without damaging the "through-hole" plating on the PCB. So, I told him of a trick I'd used during my many years in the service business.

First, place a bridge of molten solder across the component leads (this works best with 2 or 3 lead components). Then heat the blob of solder while pulling on the component. Do this as quickly as possible but not before the

solder blob is completely melted.

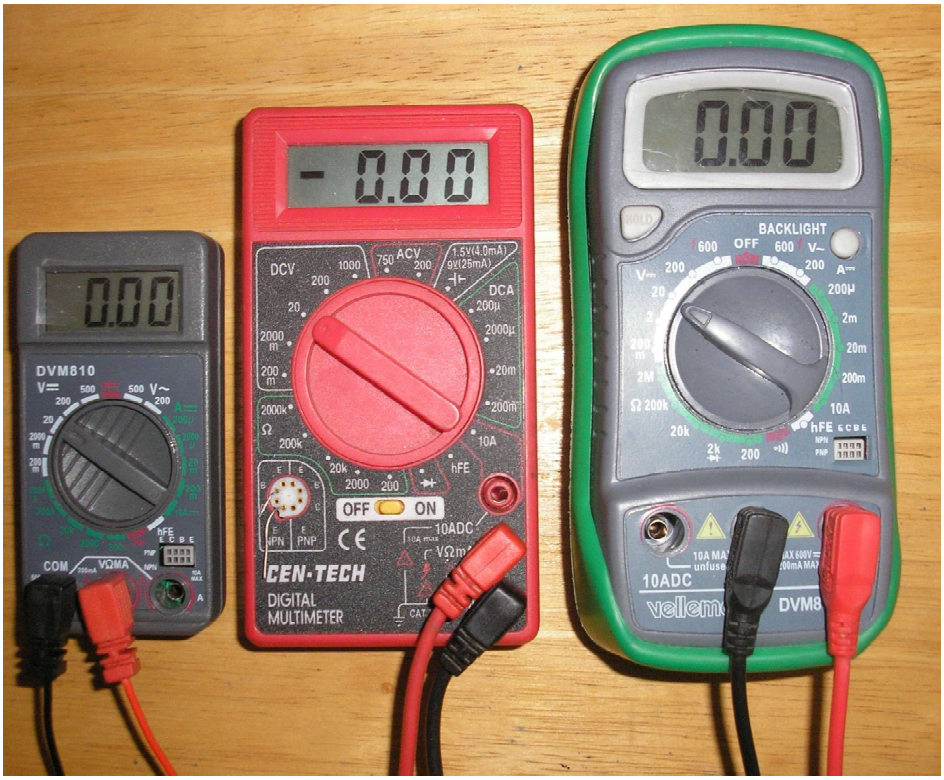
After the component is removed, remove the solder blob and clean out the holes with your favorite method; either a vacuum device or “solder wick”, again using the minimum heat necessary versus the quickest time.

Components with more than 3 leads can also be removed safely but that requires some de-soldering experience and a slightly different method.

For beginners, I strongly recommend practicing on a scrap PC board from cast-off electronics; my favorite being a PCB from a television set or PC monitor.

Snort’s Mini-Reviews

Velleman Model DVM810 Mini Digital Multimeter



L-R: DVM810, Harbor Freight Tools #98025/90899, DVM850BL

I’m always on the lookout for inexpensive but good test equipment. When I find something to report on that looks like it will do the job, I buy it and try it so that I can share the results with you. This month is the Velleman Model DVM810, a compact, shirt-pocketsize DMM occasionally offered at discount by

Fry's Electronics for around $5. I was a bit surprised at the diminutive size (things always look larger in the Fry's ads than they actually are) but was intrigued enough to plunk down a fiver.

Specifications:

DC voltage: 200m/2000m/20/200/500V
basic accuracy: ±0.5% (±0.25% for 200mV range)
maximum input: 500V
AC voltage: 200/500V
basic accuracy: ±1.2%
frequency range: 45-450Hz
maximum input: 500V
DC current: 200µ/2000µ/20m/200m/10A
basic accuracy: ±1.0% (±2.0% for 10A range)
overload protection: 200mA 250V fuse (10A-range is not fuse-protected)
Resistance: 200/2000/20k/200k/2000k
Basic accuracy: ±0.8% (±1.0% for 2000k range)
Overload protection: 220Vrms max. for 15 seconds
Over-range indication: yes
Transistor test: yes
Diode test: yes
Low-battery indication: yes
Maximum # display digits: 3 1/2
LCD display size: 0.5"
Ranging mode: manual
Data hold: none
Backlight: none
Dimensions: - 3-5/8"H, 1-7/8" W, 1" D (9.21 cm x 4.76 cm x 2.5 cm)
Weight (with battery and leads): - 2.6 Oz (74 Grams)
Power supply: GP23GA 12V battery (incl.)
Accessories: manual / test leads / 1 GP23GA 12V battery
Auto power-off: no

Pros:
Small size (easily fits in shirt pocket)
Light weight
Reasonable range of measurements
Reasonable accuracy
10A DC current range
Good display size and contrast
Quality "feel" of range selector switch

Cons:
Flimsy test leads (will -not- handle 10 Amps!)

Poor print contrast, Ohms range switch selector (dark Green on dark Grey)
Poor insulation specification (see “Opinion”)
Marginal transistor test socket contacts (see “Opinion”)

Opinion:

For a $5 meter, it is OK; not spectacular but not junk either. It would make a real handy instrument for trips to the swap meets (in fact, I have done just that) or throwing into a “go bag” (as I have also done for the Norcal Monthly Meetings).

Caveat: The insulation is rated for 500 Volts. I wouldn’t trust this meter to be safe under those conditions and will never use it past the 200V full-scale switch position. I was concerned about cost of a replacement battery however that was allayed when I found them for $0.50 . The socket for transistor HFE testing is almost useless; the socket makes poor contact with the transistor leads. This is fairly common with inexpensive DMMs such as the Harbor Freight Tools “freebie” meters. Compared to the HFT red “freebie” DMM, this meter is inferior, IMO. But it is SMALL and lightweight as compaired to the HFT.

Next month, I’ll be reviewing the Velleman DVM850BL shown on the right-hand side of the photograph.

Harbor Freight Tools #61451/#63135 “Ammo Box”:

Brand Name: Bunker Hill Security
Material: Polypropylene
Product Height: 7.1 in. (18 cM)
Product Length: 11.6 in. (2.95 cM)
Product Width: 5.1 in. (12.9 cM)
Dry Weight: 1.05 lb.
Metric Weight (476 Grams)

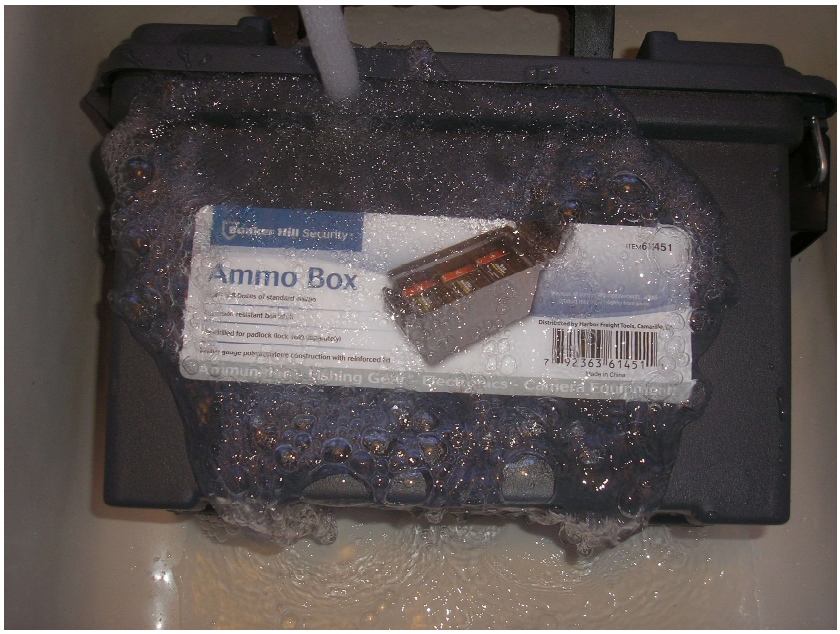
I’d noticed these at my local HFT store so when I received a coupon that made the price $5.00, I decided to grab one for review.

This box is all injection molded plastic except for the “Corrosion resistant bail latch”. The latch bail snaps down with over-travel to secure the cover. The cover has a continuous seal of unknown material which fits into a channel in the lid and mates with the lip of the box. The top has a convenient, comfortable, folding handle.

I envisioned this item as being a good QRP Field Box. There is plenty of room for all but the largest QRP radios plus possibly some high-density padding, a battery, tuner and antenna.

It is not advertised as being water-proof or even water-resistant , however I had hopes that it would be so, I dunked it under our kitchen sink spigot. I inverted the box and aimed the water stream around the entire mating seam of the top and bottom sections.

Image From Harbor Freight Tools Web Page
<http://www.harborfreight.com/ammo-box-63135.html>



Results: Not waterproof. There were several drops of water inside which appeared to have gotten past the lid seal. I would call this “water-resistant” since the stream was fairly high volume and aimed directly at the seal. Light rain might not get past the seal.

Conclusion:

Probably not “Appalachian trail” friendly but nonetheless a decent little box for more benign environments.

Harbor Freight Tools Item # 3311, 2-3/4-Inch Articulated Vacuum Vise.
<http://tinyurl.com/hft-vacuum-vise>
Specifications:
Brand Name: Central Forge
Maximum jaw opening: 2-1/2 in. (63.5mM
Replaceable (plastic) jaw (y/n): Yes

Features:
Universal joints for 360 degree horizontal adjustment and 180 degree vertical adjustment to allow setting to optimum work angle. you to work from the best angle.
Cast aluminum construction
Removable rubber jaw pads
Lever for suction application/release

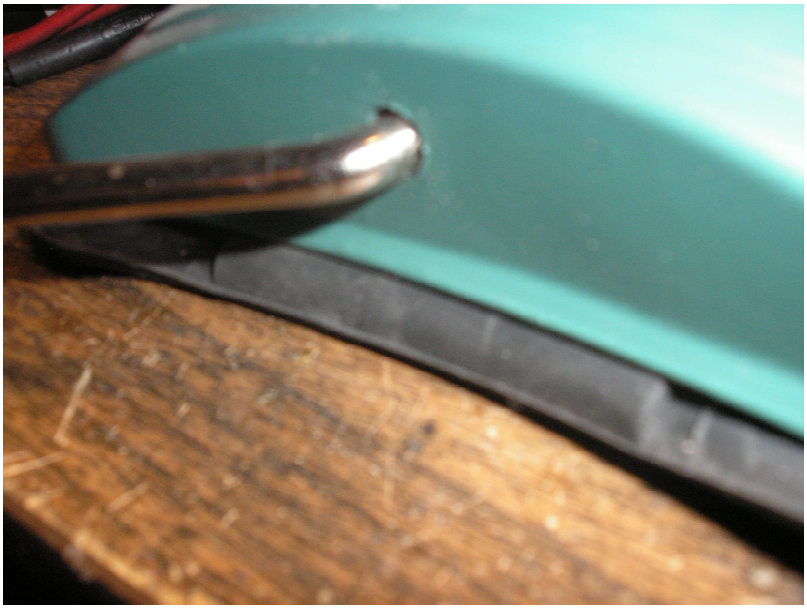
Observations:

I found this vacuum vise to be quite usable and of good quality. It will stay attached to many surfaces such as Formica, glass, metal and some non-porous wood materials.

When the suction release handle is in the fully released position, upon the next application of vacuum the locating tabs on each side of the triangular fool get caught under the base casting, requiring prying them out before the release handle can be operated. This could be alleviated by gluing the rubber tabs to the base.

Conclusions:

A nice hobby vise for the money. Not up to the quality of Panavise but absolutely useful for electronics work.
I recommend it.



Detail showing rubber tab caught under base

That wraps things up for this Month. See you next time!!

73, Steve WB6TNL