Watson 'Hunter' Counter Mods

By G8MNY (Update Nov 16)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

I have bought a damaged one of these small 3GHz handheld counters, & I went about repairing & upgrading it as there were a lot of components & switch options possable that were missing on this bottom of the range model.

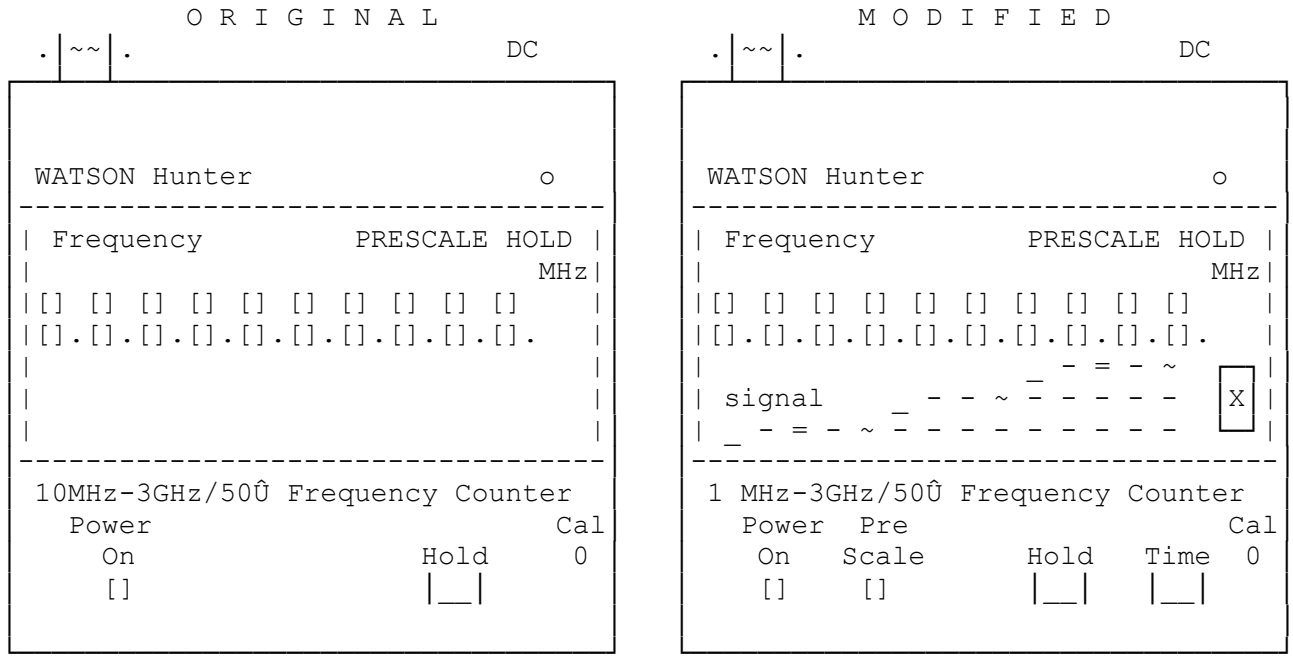
On point about this counter, it does now actually count what it shows & at VHF-UHF the resolution (what it counts) may be in 4 8 16 32 64 or 100Hz steps depending on what the prescaller system is doing.

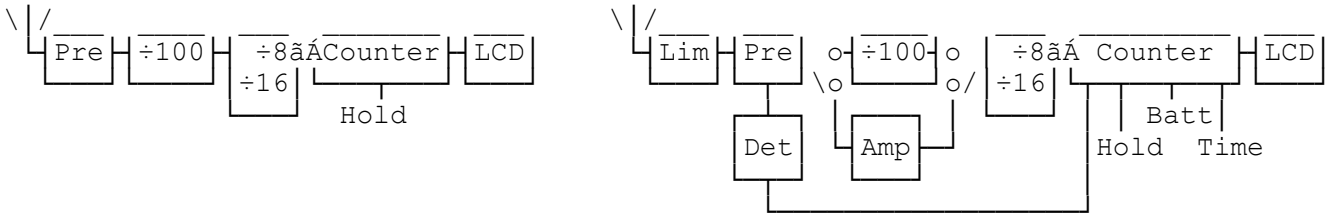
MODIFICATIONS DONE (in order of importance!)
1/ Add UHF clipping diodes across the BNC socket.
2/ Stop LCD rubbing marks from the lens casing. (& future smashed LCD)
3/ Add bargraph signal meter.
4/ Add low battery indicator.
5/ Add gate time push button, to give 0.1s 2s 1s & 5s gate times.
6/ Add "no prescaler" RF path to read 1 - 30MHz.

With 5 & 6 you can read 1MHz - 30MHz down to 0.1Hz & 30MHz - 3GHz down to 10Hz. But calibrating the crystal osc to high accuracy even short term is not easy.

There is only 2 other features according to the LCD graphics..
  a) switchable filter
  b) a period timer.
I did not understand the wiring for a) & I don't think the PCB supports b).

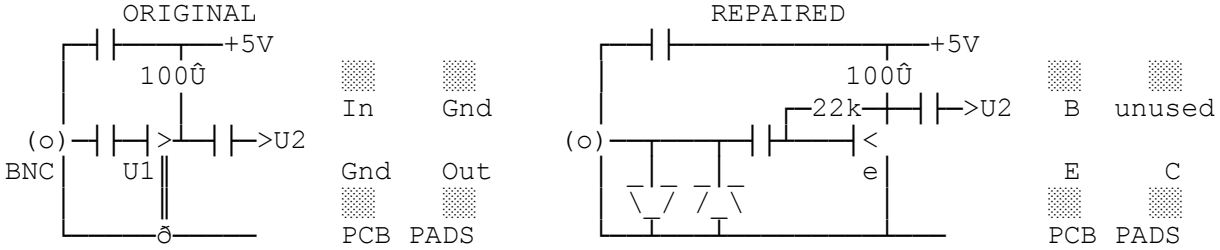
Be warned it as all very small Surface Mounted Devices! So other than the input clipper protection & LCD case modifications, I do not recommend the other modifications unless you are fairly competent with soldering SMD components on a busy SMD board!





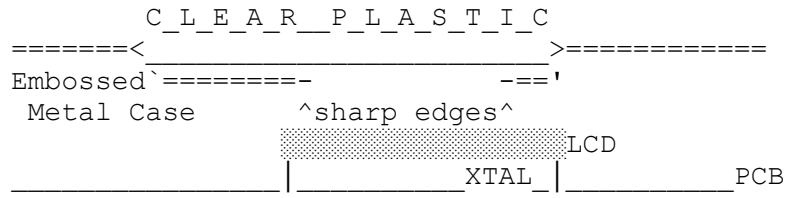
FRONT END FAULT
The fault was a blown up front end SMD MIMIC (A06), as there is NO input protection fitted!

As I could not find a replacement device to hand, I used a scrap cellphone preamp SMD NPN & made up an amp with just an additional bias R (22k). This NPN fitted over the 4 pad A06 OK, with the bias SMD 22k (selected to give the same current as the 2nd A06 stage) & placed over the NPN. It all worked well & a QRP 2400MHz Tx was measured OK with the search aerial alongside.



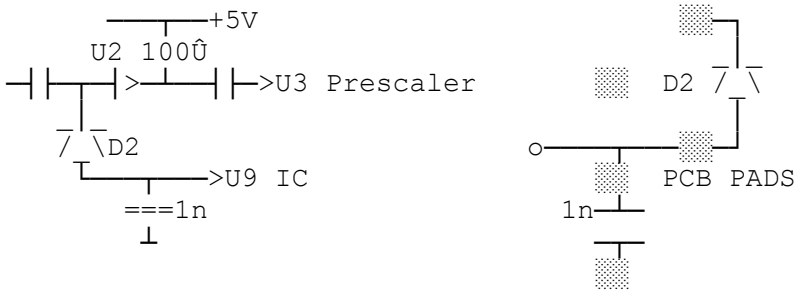
1/ To reduce the chance of a re-occurrence, I added 2 UHF clipping diodes wired across the BNC socket. 1N4148 diodes will do if you have no better.

2/ I had heard of someone breaking the display, this makes the unit a total write off!
Looking at my display, I could see tell tail marks (lines) where the LCD had been rubbed by the sharp case lens metal stamping edge.



To remove the sharp edges, use a small modelling knife held parallel to the case so that the lens can't be damaged. Then firmly drag the blade over the raised edges, scraping off the sharpest part of the edge. Go all around the raised lens stamping edge, make sure that there are no proud part that could put concentrated pressure onto the LCD glass. (e.g. when dropped)

3/ To make the bargraph display work, add a uhf diode to half of D2. I used a schottky one across just 2 of the 3 SMD diode pads. Note DIODE Polarity! Also add a 1n instead of adjacent missing R.

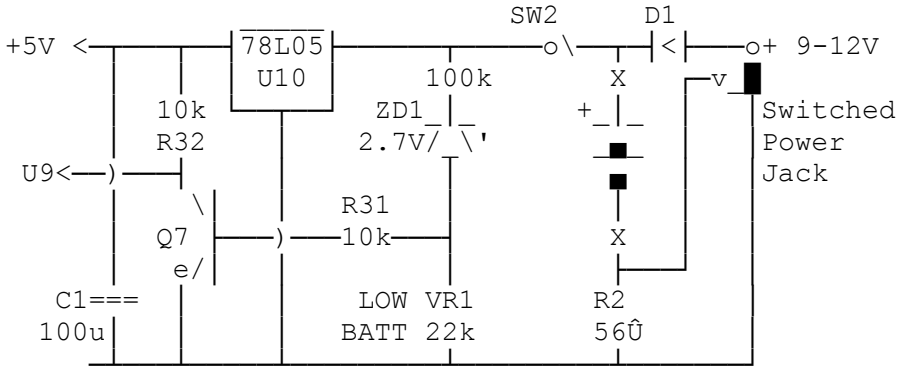


3/ By moving the HOLD push button from mounting holes "SW6" to the left over-lapping "SW4" holes, there is then room to fit an identical button in "SW7" position. ((()) ())
SW4SW5 SW6 SW7

Then you can get the counter to change the gate time from the default 0.2S to the 3 others possible times & hence the display resolution.

You then have to file the existing case button hole to a long slot. This is quite simple to do with a set of sharp needle files, but time consuming! I then cut & filed an ally blank to between the buttons & glued that in place.

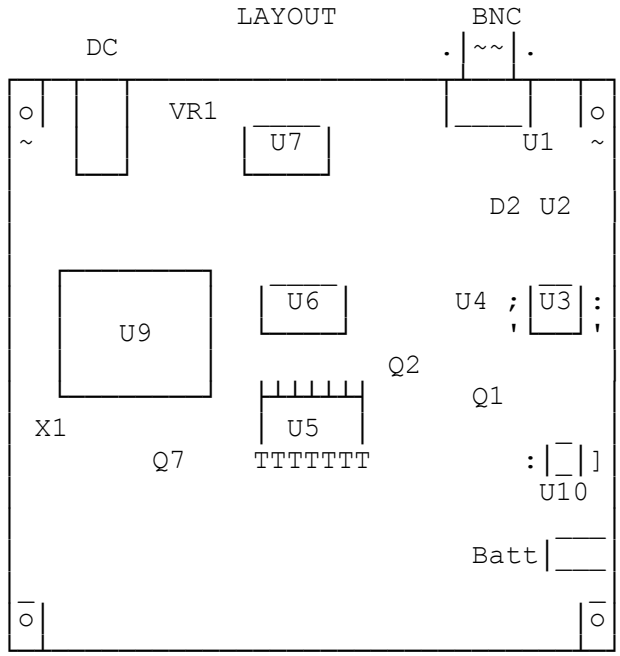
4/ This needs 1 small preset pot, 1 SMD NPN (L-4), 2 SMD Rs, & a zener. Looking at the circuit I found the zener needs a series R to work properly, & I selected one on test to make my pot have useful setting range.



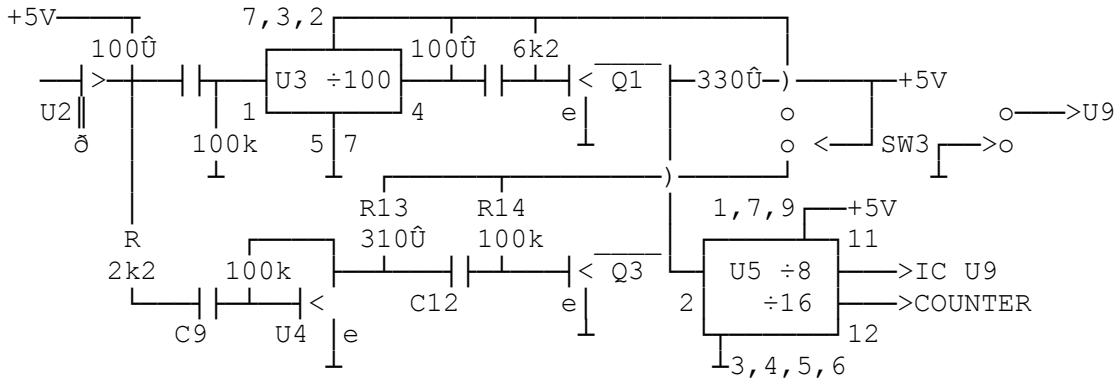
The battery does not give > 5V, so the regulator is not actually regulating when on battery supply! I suspect there should be more than 4 AA cells (but no room) if the supply needed to be properly regulated for more accurate work the

5x AAA Nicads might work better! The counter is actually quite accurate for its simple uncompensated xtal system.

There is a danger if connecting the counter to an earthed supply while having the BNC connected to other earthed kit. This is because the nicad battery charging is via a negative change power switch arrangement. During insertion the 12V will be placed across the 5V battery until the switch breaks the negative battery lead. This may only last a very short time but currents >5A can flow & could damage leads, PCB track & eventually the battery! [good for battery for a few seconds :-)]



5/ A far more complex modification is to add the 2 HF amplifiers, missing for the no prescaler mode, & move/add the missing switches to control it.



Again instead of a mimic amp U4 I used a biased HF NPN (L-4). But I found that I had to add a series R of 2k2 to C9 so that it did not load U2's output to pre-scaler IC U3. I re-used the changeover power switch SW2, as the SW3 changeover & I found a smaller make switch for the SW2 power switch. Again I had to make new hole in the case for SW3, & drilled then filed a matching rectangular hole.

N.B. Below 1MHz the counter software stops the display from counting. And there are tricks done in the count, so the resolution is not that displayed! eg. at 10MHz there are only 0.4Hz steps on the 10 sec gate, not 0.1Hz.

See other tech buls "Old Venner Counter Type TSA3334", "PIC Freq Counter Mods", "Marconi Counter Type 2434A", "198kHz Off Air Standard", & "Off Air Lock for Ref Osc" & "Calibrating Frequency".

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP