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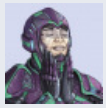

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Troubleshooting a broken Wavetek 142 HF VCG frequency generator.

« **on:** March 23, 2015, 02:22:53 pm »

this is a documentation of my efforts to fix a broken Wavetek 142 HF VCG.

the back-story: i bought a used wavetek 142 HF VCG off ebay, it was not supposed to be broken but it was... i don't want to go in depth about the auction.

that being said the unit arrived with the vernier knobs unattached and the 2 straps (that hold the front of the unit in place) completely gone. in addition the seller claimed the "frequency selector was noisy" this is partially true but i discovered it requires special circumstances for it to happen and is probably caused by the contacts which are very dirty.

the knobs attached back on no problems. as for the two straps, i have a gigantic bowl full of various screws, nuts, bolts i have accumulated over the years salvaging orphaned electronic devices. i found 4 screws and fixed the second issue no problem.

the next issue became apparent when i turned the unit on and measured the output. immediately on all settings the waveform was always decimated, reduced by 10 times. the 1st image shows this quite effectively. at x10 with the frequency dial set to 10 the output is 10hz, ten times less than what it should be.

in addition the output seemed odd and investigation revealed the duty cycle would change with frequency, particularly the square wave function. this literally removed 95% of the hope i had for this unit. i was sure it was a lost cause but i pressed on.

a read of the manual revealed the culprit, the symmetry switch when activated causes the output frequency to be divided by 10. the manual also states turning it all the way counter clockwise deactivates symmetry.

the problem? when turned all the way counter clockwise you hear a nice click...but nothing happens.
additionally the metal cap fell off and rolled away! 2nd pic.

at this point i figure the symmetry switch was be broken.
the instruction manual has the schematics for the entire unit. picture 3 shows the symmetry switch as it appears in the manual. it is a module with 2 switches labled "SW4A" and "SW4B".
as it turns out the wavetek model 144 uses pretty much the same components as the 142 including the mainboard. SW4A is shown to be on the back of the model 144, thus we are only interested in SW4B... in case you are still curios SW4A does nothing when activated (i tried just because).

thus begins the teardown.
picture 4 shows the screws on the back that remove the back plate and after this the shell slides off and the main board becomes visible.

the mainboard is shown in picture 5.

the symmetry switch "SW4B" is found and test clips are attached to the contacts, on the other end a temporary switch is added as shown in picture 6.

picture 7 is a before and shows the generators output with the frequency switch set to x100 and the dial set to 10.

picture 8 shows what happens when the symmetry control is turned all the way counterclockwise and the temporary switch is depressed. we get the correct frequency! 1Khz!

picture 9 shows the full capability's of the Wavetek HF VCG revealed. at x1M with the dial set to a little over 10 we get 10.14Mhz as shown on the Extech 430.

so the frequency is correct but is the symmetry really turned off? is the waveform unaffected? now i don't own an oscilloscope (i plan on getting the rigol DS1000Z) but coincidentally at around the same time i was setting up a computer for the lab, if your a purist shield your eyes and look away for i will use... the computers sound card. (dun dun dun!)

the program is called SoundScope and it is free to download. picture 10 shows the computer set up with the software detecting a waveform from a HP-200CD wide range oscillator.

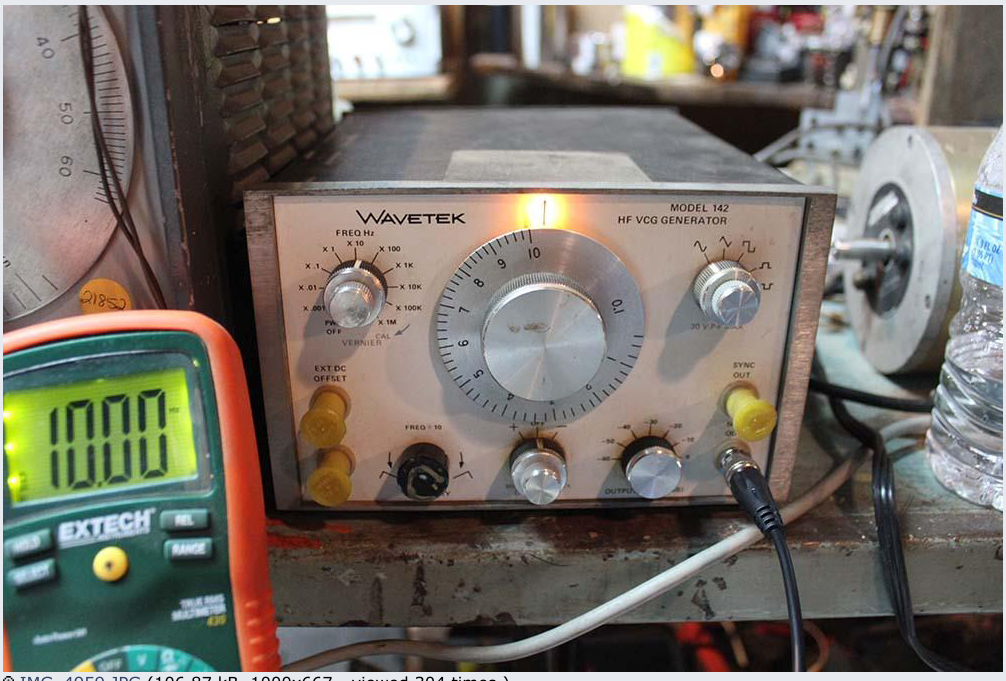
picture 11 shows the metal cap making its second escape when setting everything up.

picture 12 shows a before, we can see a sine wave viewed through the "oscilloscope" with the temporary switch off, the waveform and frequency should not look like this.

picture 13 shows the final test, the temporary switch is turned on and the waveforms are corrected and the frequency is exactly where it should be. three functions are displayed, sine wave, triangle wave and square wave. each work correctly and at varying frequency. the waveforms do not skew and symmetry is at 1:1.

the last picture shows the Extech 430 displaying the duty cycle of a waveform at 49.9% which seems close enough.

so far it looks good, and since the company that makes the switch is no longer around i think i might install a mini toggle i have lying around. im open for discussion.



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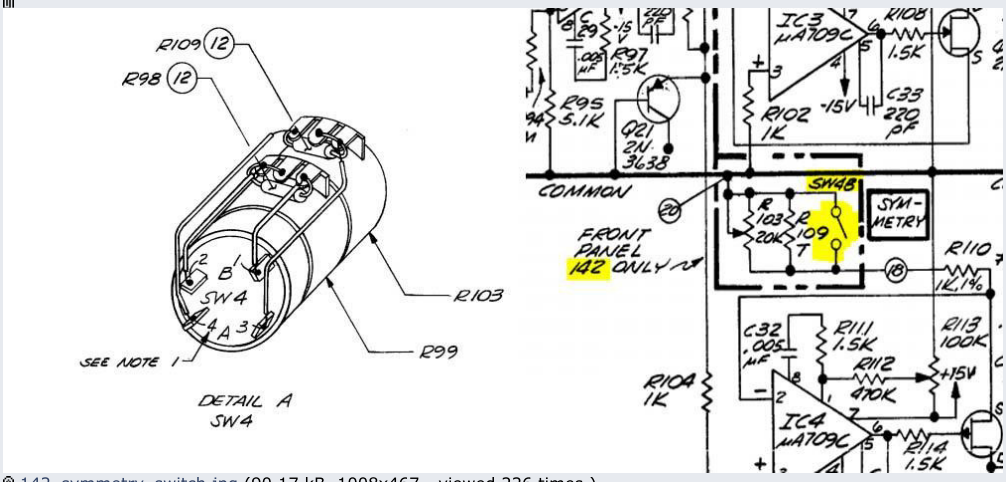

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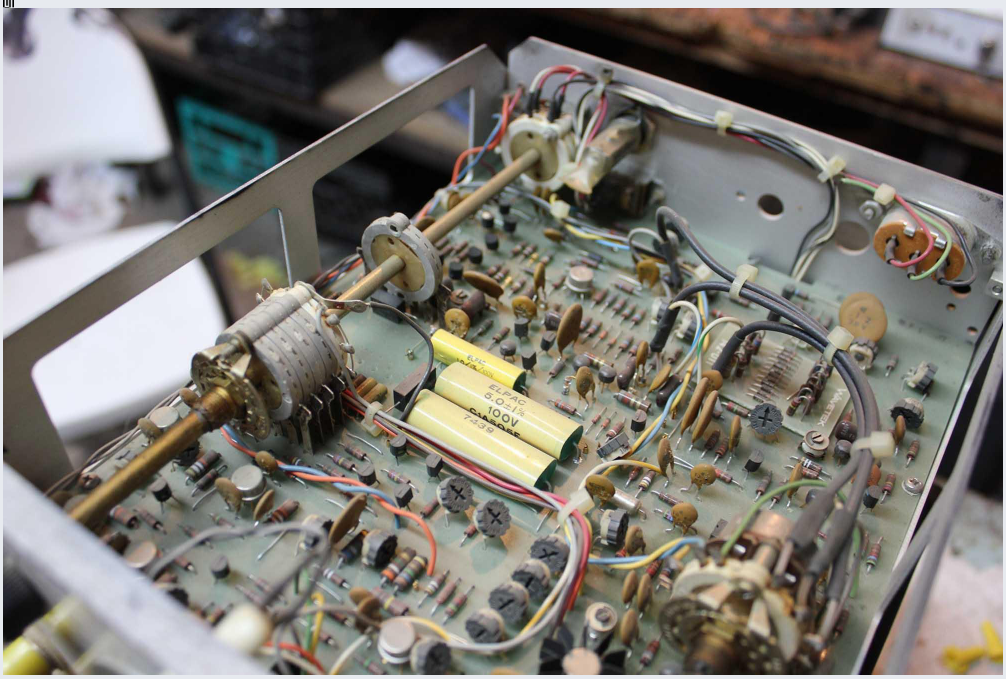

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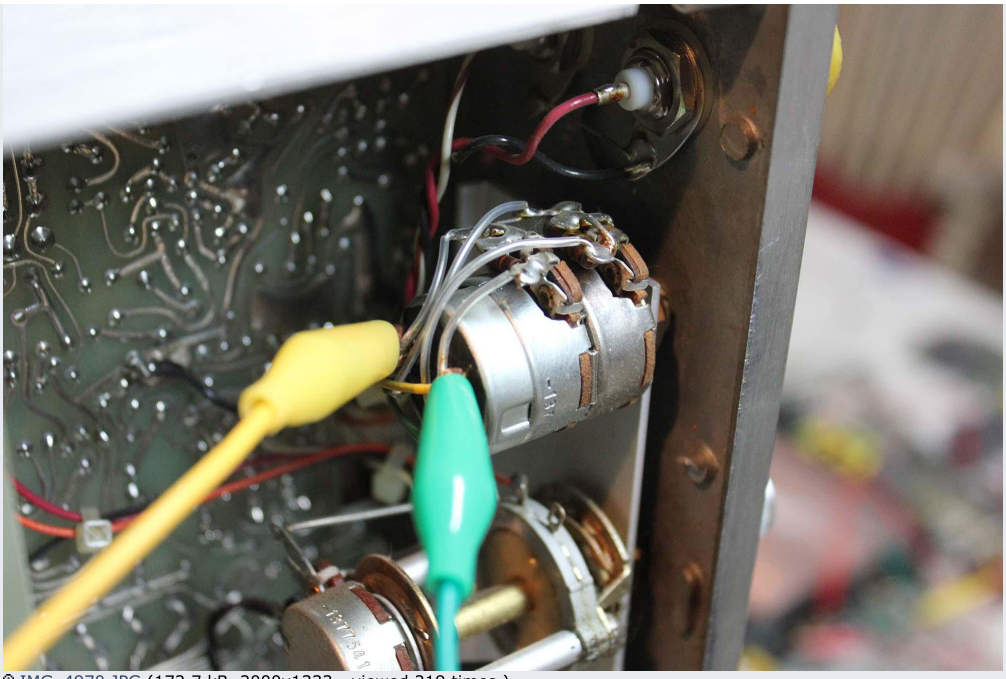

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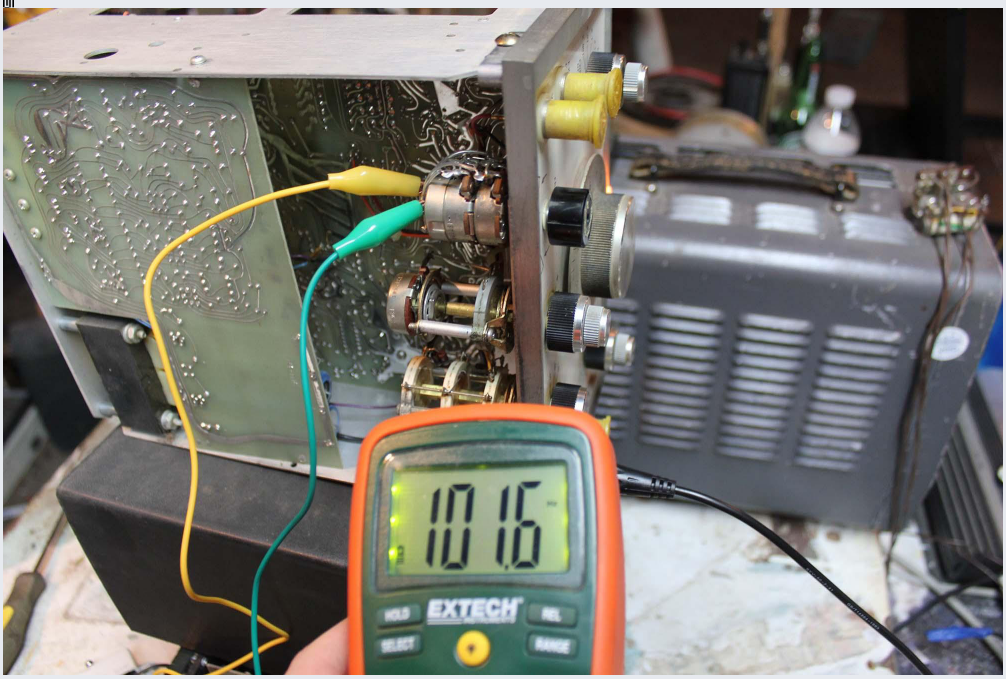

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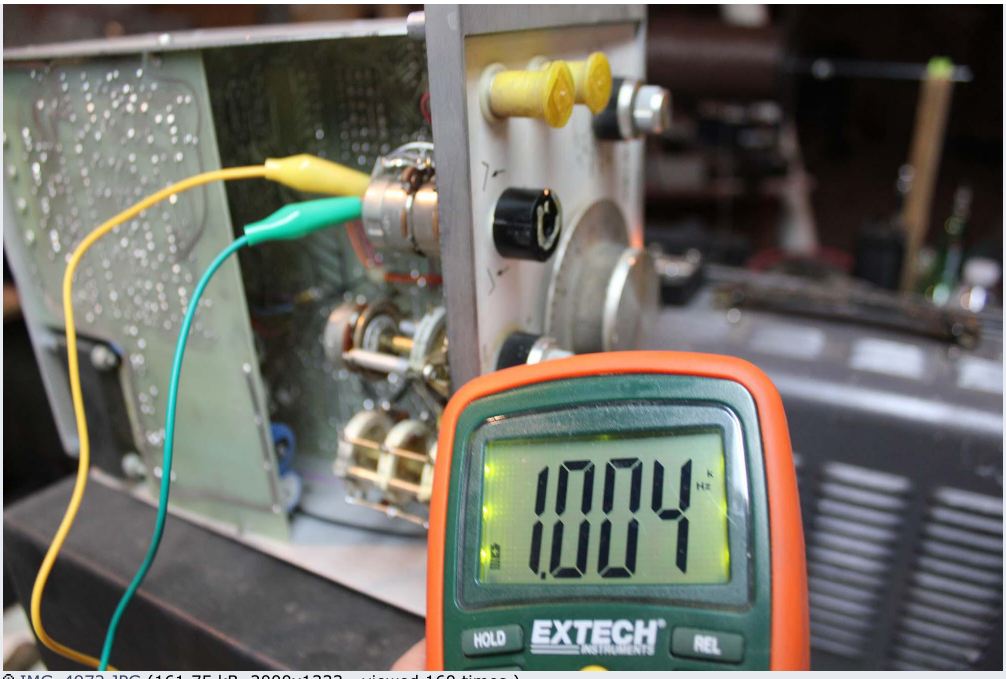

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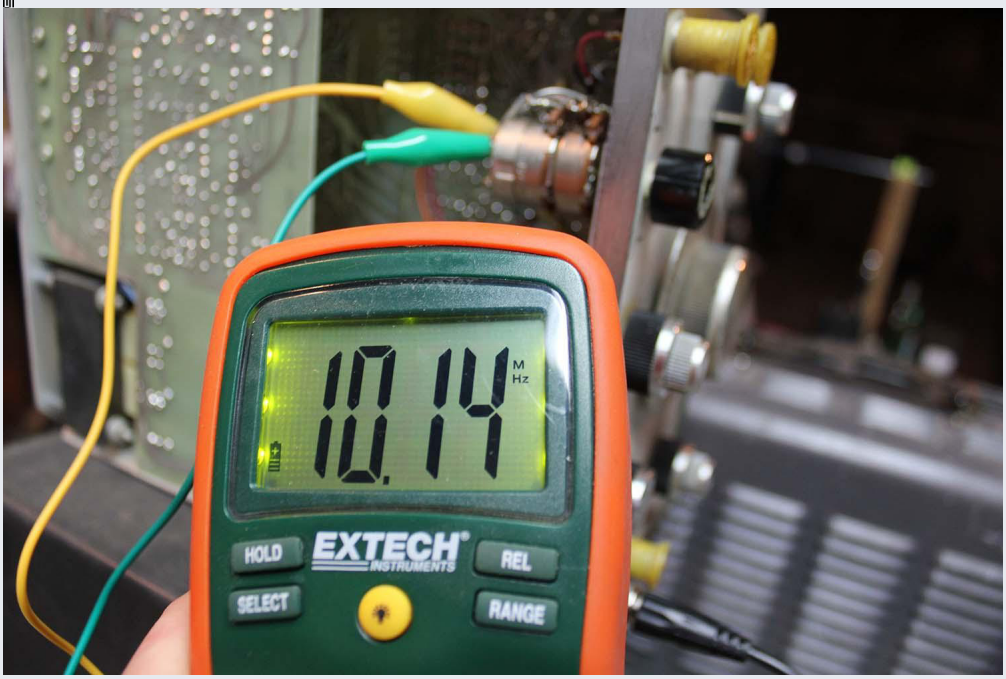

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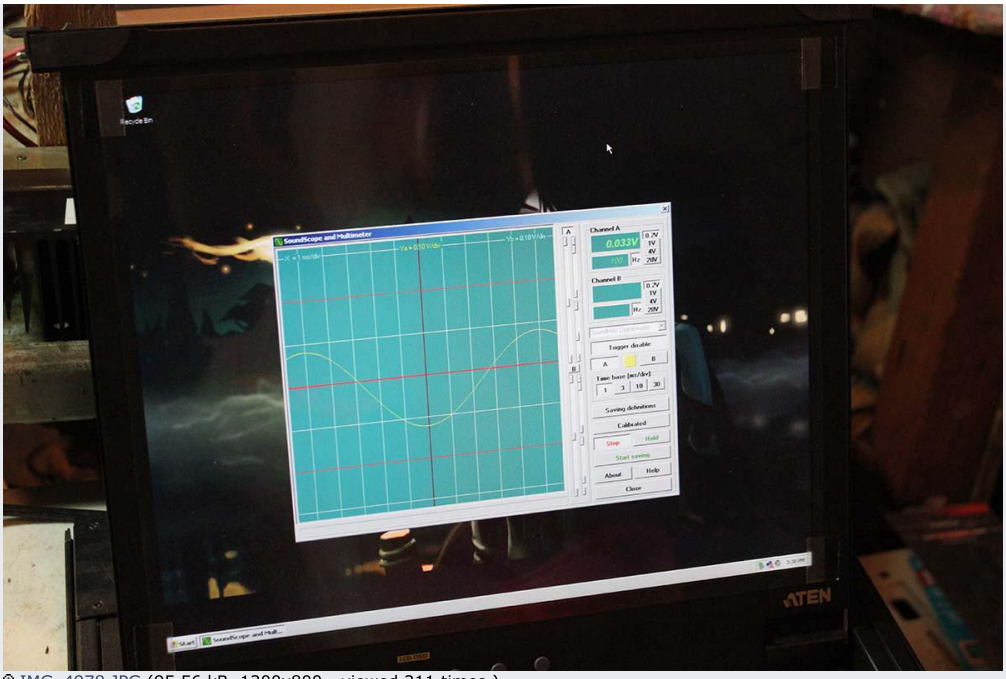

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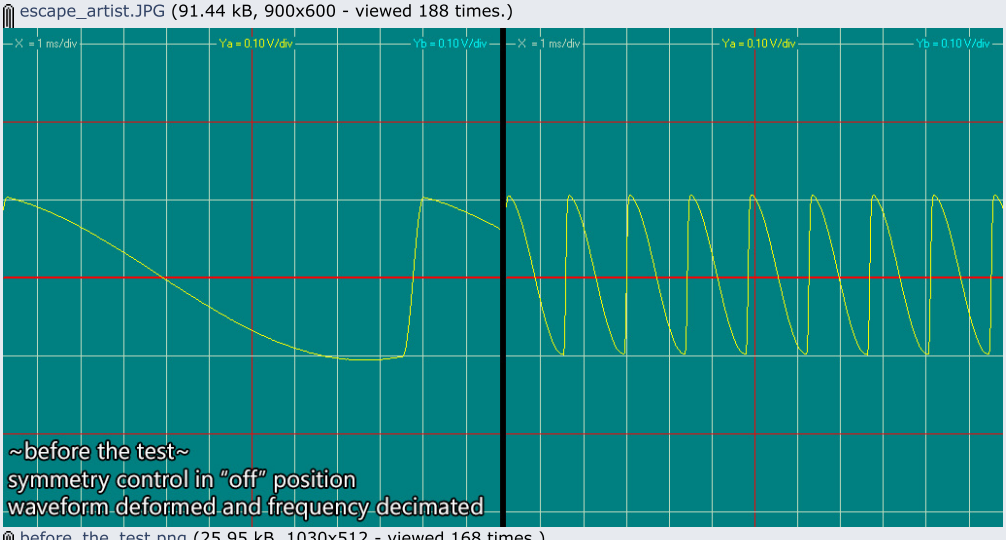

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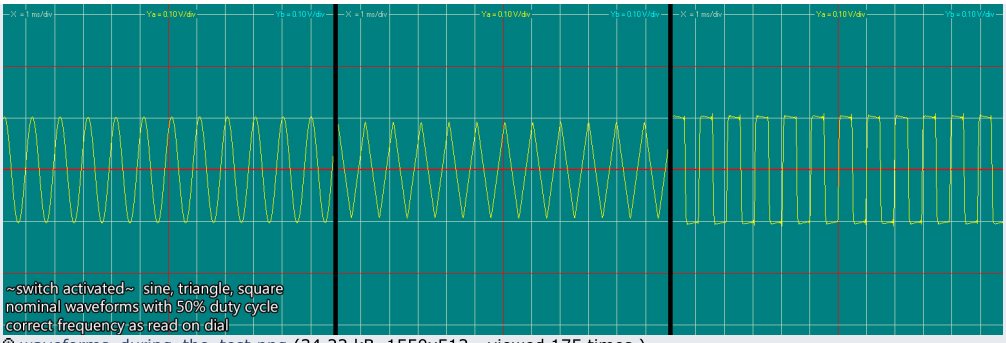

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