

**Wavetek Model 142 HF VCG Wave Generator**

jafinch78@yahoo.com

Message 1 of 6 , May 22

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I just won a Wavetek Model 142 HF VCG Wave Generator ~\$55 with shipping.

Wondering if anyone is familiar with this piece of equipment and if there is anything to consider first before powering on and working with, i.e. known defects, issues, etc?

This will be my first low, and looks like extremely low, frequency signal generator.

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**johncharlesgord**

May 23

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Hi!

I have had a 142 at my workbench for years. I don't remember any particular problem areas, just the usual switch exercising and or clean/lube now and then. There is a good pdf of the manual (including schematics and theory of operation) at:

<<<http://www.textfiles.com/bitsavers/pdf/wavetek/>>>

--John Gord

Reply

**Joe Shablotnik**

May 28

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I recently repaired the output amplifier of my 143. This 142 OA is very similar, as you'd expect. Rather than just replace parts I made a project out of it, endeavoring to fully understand the topology with the goal of sourcing cheaper more readily available replacement parts. I still don't fully understand it as it is a somewhat unique topology because it delivers DC as well as high frequencies, but I did learn a lot. This is despite scant on-line resources for high speed, high-voltage (relatively), discrete op-amps. It seems that once ICs op-amps took over nobody looked back, and discrete op-amp design became a lost art. John Gord, who responded to you already, was helpful.

In the end the main offender was a bad filter capacitor on the -24V rail located right near the 2n5160 PNP output transistor. (The analogous cap in this design is C108.) It was a tantalum cap that was blown and it was shorting the -24 rail to ground. I just removed it. It may once have been necessary as a final filter cap, but I had completely beefed up the +/- 24 volt supplies with massive new filter caps and LM317/337s. I also added current limiters which can be found in the Wavetek 145 schematic. (Also done with LM317/337s.) Adding them is a worthy insurance policy that I recommend.

I did also replace all but one of the transistors in the OA because I had already bought new ones. I suspected that the final-stage output transistors were bad, but I didn't have the heart to go back and test them. Basically I'm sticking my head in the proverbial sand as I don't want to know that I had spent significant time and money studying alternate replacement parts and finding sources when I could have just looked harder at the supplies. Lesson learned (again) - 85% of electronics repair jobs come down to the power supplies.

Good luck and enjoy your new waveform generator. If your OA ever goes the way mine did, check C105 and C108 first.

Chris

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**jafinch78@yahoo.com**

May 28

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Hi,

Thanks for the reference, I still have to take out of the box and test and for some reason your message didn't come through to my email.

In Christ,

James Finch

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**jafinch78@yahoo.com**

May 28

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Hi,

Thanks for the details and performance enhancement option ideas.

I like thinking that way also in regards to specifications of components to see potential for improvement especially if feasible on lower end units when comparing to higher end similar units design.

Some days with the systems that have capacitor issues with board corrosion... I wonder if placing some silicone on the bottom of the electrolytic would be a good idea. I see that and sometimes potted regions of circuits having silicone like dam with potting inside the dammed region.

Looking forward to reading the documents now compiled and re-reviewing with your references.

I'll keep everyone posted once I get to.

In Christ.

Reply

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**Joe Shablotnik**

Message 6 of 6 , May 28

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The two output transistors are both pricey, but the 2n5160 is the real money sink. It's also no longer available in that exact part number. Central Semiconductor makes it as a CM5160, and it's about \$7-\$8 from the likes of DigiKey and Mouser. I found Mouser to have a better variety of the parts for the 143, and I like their web-page a little better, so I went with them.

The driver transistors in the stage behind them (2905A and 2219A) are \$1/each, but only if you buy them from Newark/Element 14. Other than those, Newark wasn't a helpful source. But when one compares the specs for the CM5160 and its NPN compliment 2n3866 (2n4047 in your case) to the 2n2905A/2n2219A, one has to wonder if those lower cost 2905A/2219A transistors couldn't have been used as output transistors as well. It begs for the research because if successful it would mean that you could replace your entire output section for \$4. It would be even better for me because in the 143/145 OA design, there is yet another stage that uses that expensive 5160/3866 compliment.

In the stage before that, the 2n3563 is still available as a PN3563, but it comes cheaper as a PN918 these days. Also, I found that substituting a variety of high speed TO-92 in this spot worked. Not so much for its PNP compliment 2n3640. That one you simply cant find in a TO-92, or at least I couldn't. It's the only one I didn't directly replace in my 143 makeover. I found two near-substitutes (MPSH81 and PN4917), but after I saw that the 2n3640 still worked, I'm saving its subs for when/if it really goes.

And who knows...maybe I'll need them for my own high speed discrete op-amp topology. Now that'll be some fun, eh? In the meantime I've got an incredibly capable wave-form generator. As do you.

Enjoy,  
Chris

