Wavetek model 95 Synthesized Arbitrary Function Generator

The Wavetek 95 is a synthesizer function generator that can also generate arbitrary waveforms. The maximum output frequency is 20MHz. The maximum sample rate in arbitrary mode is 20MS / s. This device also has option 001, a highly stable TCXO as a time base. (The black knob is not original)

Sine, triangle and rectangle are available as standard curve shapes. The symmetry can be set between 5% and 95%. The maximum output voltage when idling is 30Vpp or 15Vpp when the output is closed. The DC offset can be set in the range from 0 to 15Vpp or 7.5Vpp (output terminated).

The values for amplitude, frequency and offset can be entered with 4 digits. The adjustable frequency range is 1mHz to 20MHz, whereby the generator is operated freely in the range from 1mHz to 20Hz. This is where the signal from the synthesizer is delivered. The synthesizer can work with the internal reference as well as with an externally supplied 10MHz reference on the back. External triggering of the generator is also possible. The sync signal is also brought out on the front panel. AM, FM and SCM (Suppressed Carrier Modulation) are available as modulation types. The maximum sweep range is 1000: 1 and you can work linearly or logarithmically with an adjustable sweep duration. The ramp is output at the "SWEEP OUT" socket. If an oscillator is connected to it, for example

In burst mode, an adjustable number of full oscillations is emitted for each trigger event. The repetition rate can be set via "TRIG FREQ". As output impedance, asymmetrical operation (BNC socket) 600R, 75R or 50R can be set. The balanced output (banana sockets) can be switched between 600R and 135R.

What is particularly interesting about this generator is its ability to generate arbitrary

waveforms. Four of these can be stored in the internal memory. You can generate it on the computer and then load it into the generator via GPIB or create it directly on the generator. Point, line and block edit functions are available for this. In the block edit mode a function block (+ SINE, -SINE, + COS, -COS, + RAMP, TRI etc.) can be inserted between the first and second cursor. The waveforms can also be filtered with several filters.

I bought this generator in 2011 at the Hamradio in Friedrichshafen. According to the seller, it was "perfetto". I noticed that it wasn't so "perfetto" just by the blinking of the "UNLOCK" light, and as everyone who deals with electronics knows, the word unlock in connection with synthesizers doesn't bode well ... In any case, I was allowed to try the generator before buying. So I played around with the various settings (an oszi was also connected) and suddenly the display got darker and then the fuse flew. So we changed the fuse and switched the generator back on. The display stayed darker than before and of course nothing happened at the exit, apart from a DC voltage of a few volts. Of course, I immediately tapped the output stage transistors and traded the price very, very low and bought the generator. I often buy defective measuring devices in order to repair them. (Inspired by Marc's repair reports).

We then took a closer look at the part at the campsite. The filter in front of the fan was completely clogged with dust. That also explains the failure of the output stage transistors, which get quite warm. The first hammer came after opening the case. On the back there are three BNC plugs that are connected to the AWG board via coaxial cables and SMB plugs. These SMB plugs were all pulled out and dangling around in the case. Directly above the power supply. A real "blast" then ... Fortunately, it did not start ... We checked the supply voltages on site (thanks to the properly labeled measuring points) and found that they were +/- 24V without the output board plugged in and with the board on go back about +/- 15V.

When I got home, I made some measurements and found that my guess was correct and that both output stage transistors were broken. Unfortunately, it was the types SRF2573 and SRF2574 from Motorola. I didn't even get a data sheet from them, just a specification. That's why I just cheekily built in two comparison types that were currently in stock. From then on, the generator has delivered decent signals again. One problem with the repair was the non-existent service manual. I only got the manual for the Wavetek 288. This is largely the same, only the output board is different and the AWG board is missing. But the power amplifier itself is almost identical. So sooner or later I will install the output stage transistors built into the 288.

The first error was basically fixed, then the UNLOCK error came next. Thanks to the documents now available, I was able to measure around in the synthesizer part. To do this, I had to remove the shielding housing that is soldered onto the mainboard. I saw that it was already someone's turn. I suspected something bad, and so it was. After opening it, I saw that someone had pinched a leg from an ASIC and bent it up ... I just wonder why someone does that ... Even if he did it because of me based on measurements, why did he solder everything back together again and still sells the part? Anyway, after the connection was made again with a piece of wire, everything worked again as it should. All in all, actually a scrap machine, if you will. From there, even the low price was still too much, but who suspects such errors .... However, it is always really fun to look for / find the errors (depending on the one ;-)) and to fix them. It's a great

feeling when you buy a device that costs a lot of money in a functional condition, buy it dirt cheap as defective and then repair it.
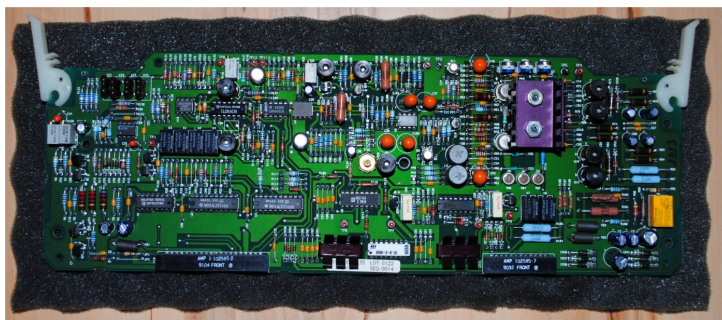
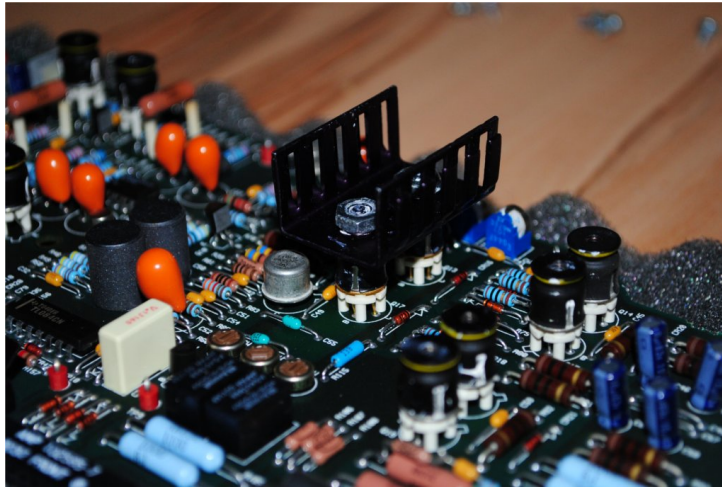Here are some photos of the generator:
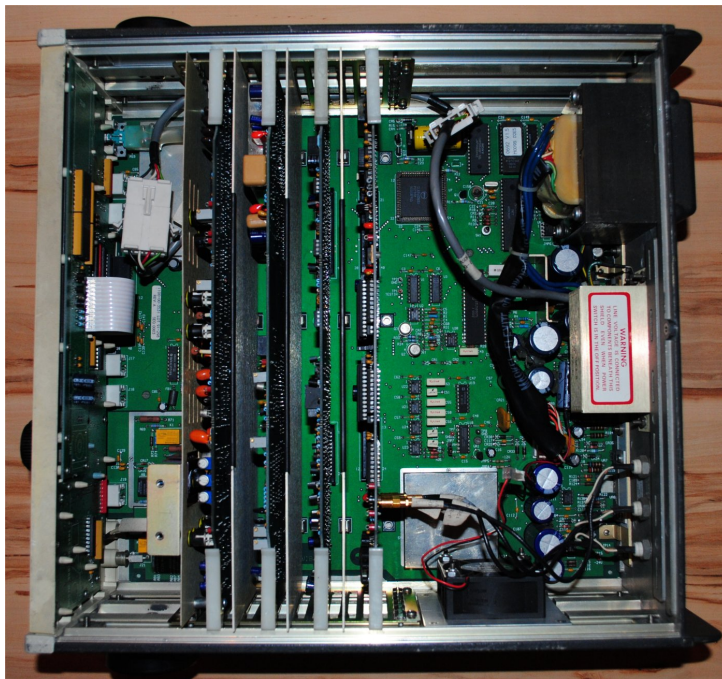
Upper cover removed. As you can see, the generator consists of a motherboard and four slots and a front panel.
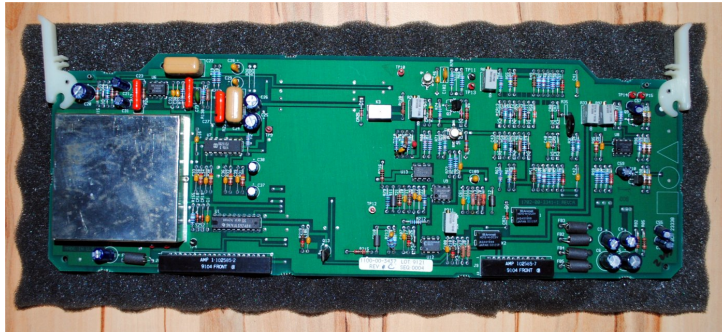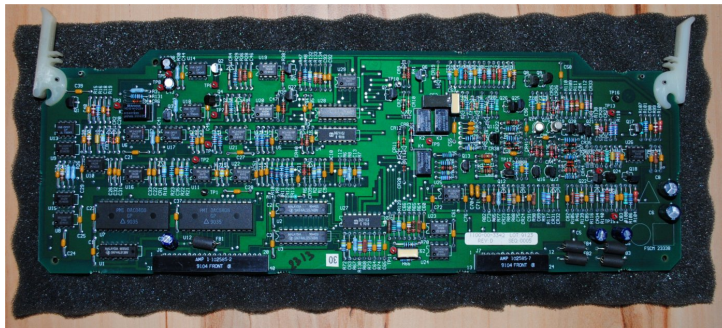

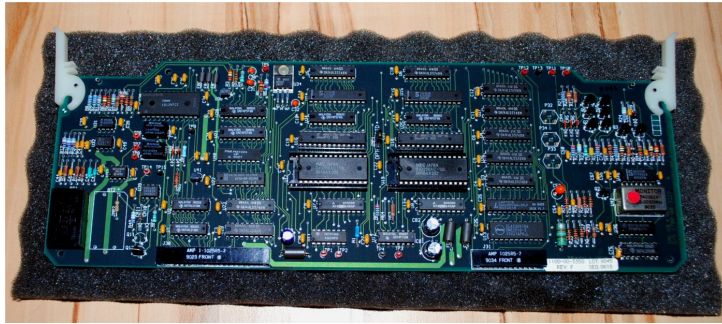Output board

Output board without cover plate.

The two output stage transistors are located under the heat sink. The retaining clips were very tight.
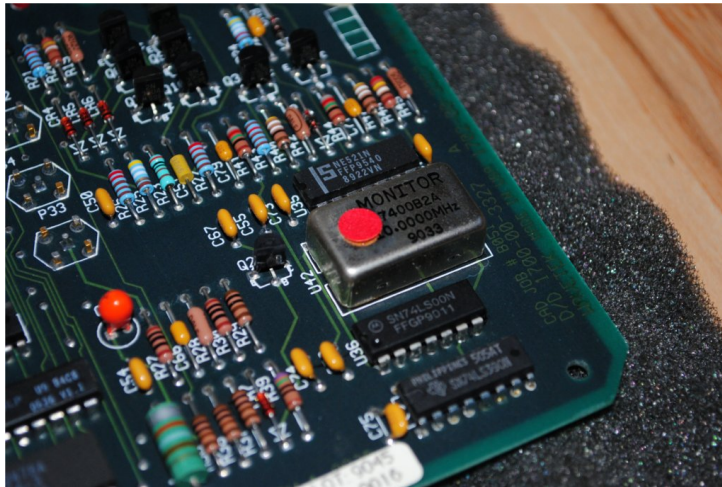

Part of the PLL control loop sits on this board

The actual function generator part with sine shaper and sweep DACs. The finest analog electronics

Arbitrary board. This is where the arbitrary waveforms are generated. The TCXO is also located on this board. The two large ICs in the middle are the memory for the waveforms.

The silver box is option 001, the highly stable TCXO oscillator.
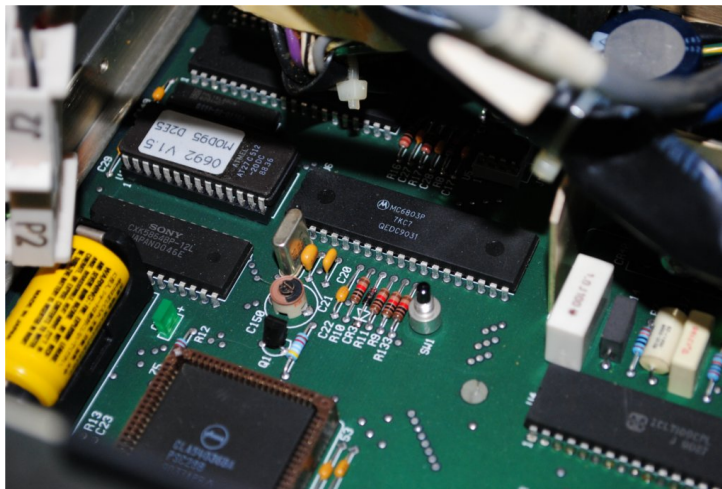
A 6803 is used as the CPU. I backed up the EPROM immediately because the firmware is apparently nowhere to be downloaded. Backing up an EPROM takes a few minutes and then you are on the safe side.
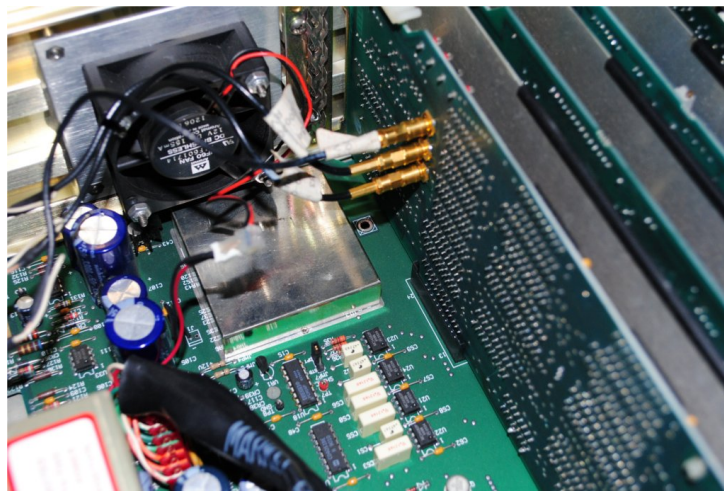
Here you can see the three SMB plugs that simply dangled around in the housing. A short circuit that was just waiting for its chance ... The IC where the pin was pinched is also located under the sheet metal housing.

Since the successful repair, the generator has been doing its job in my laboratory without complaint. It impresses with its performance and flexibility. Since it was built in 1991, it is currently the youngest device in my measuring device park. He is even a year younger than me ;-)

Salzburg, June 2011 73 de Christoph Baumann, OE2BCL

To the reader Christoph, thank you very much for the beautiful photos and the text. Main Gallery Miscellaneous Gallery Imprint and Disclaimer