The Heathkit Laboratory Generator – by Arden Allen, KB6NAX

If it weren't for the wealth of kit makers in the 50's I doubt I would have followed my interest in radio to a life long career in electronics. One of the Heath kits I was fascinated by was their Laboratory Generator. It was of moderate difficulty to assemble and was well worth the effort for those anxious to learn electronics in detail. Although it's not a truly laboratory grade instrument the relatively good quality of signal output makes it a highly useful instrument.

The first in a series of three editions the model LG-1 hit the market in 1950 and was manufactured until 1962.

The LG-1

Heath in the early 60's shed its battleship gray for more stylish apparel. The Laboratory Generator was reborn as the model IG-42, sporting a multi-tone look. Internally it was identical to its predecessor. The IG-42 had a long run, from 1962 until 1979.

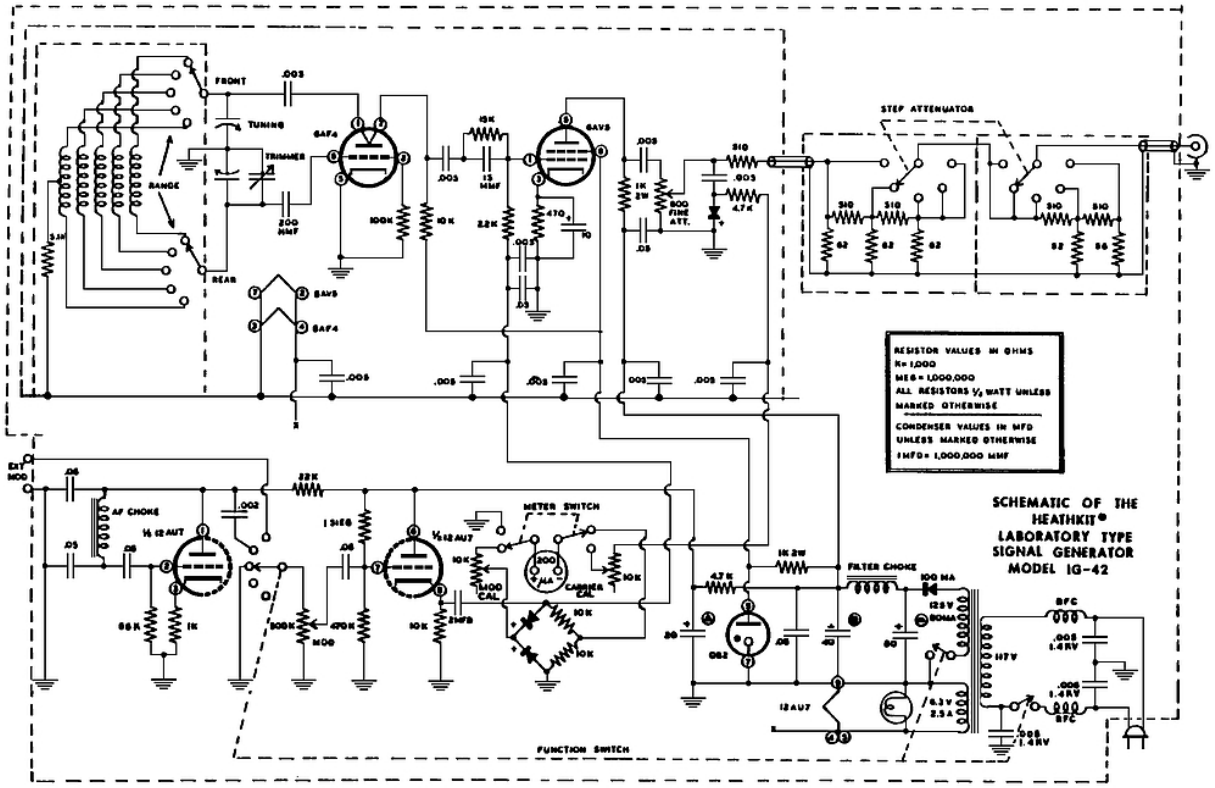
The IG-42 (note the chicken head knobs and BNC connector upgrade)

As the electronics kit market evolved modernity had its say and safety became more of a concern. The Laboratory Generator then made a brief reappearance in 1979 as the model IG-5242. This latest edition was upgraded to new makeup, a three wire power cord, and the new test equipment favorite BNC connector replaced the obsolete microphone connector. The internal circuitry was still unchanged except for the power supply selenium rectifier being replaced with a silicon diode. Curiously, the name was changed to “RF Generator.” No doubt the electronics enthusiast’s shift in interest to digital electronics doomed the Laboratory Generator as it was discontinued after one more year.

The IG-5242

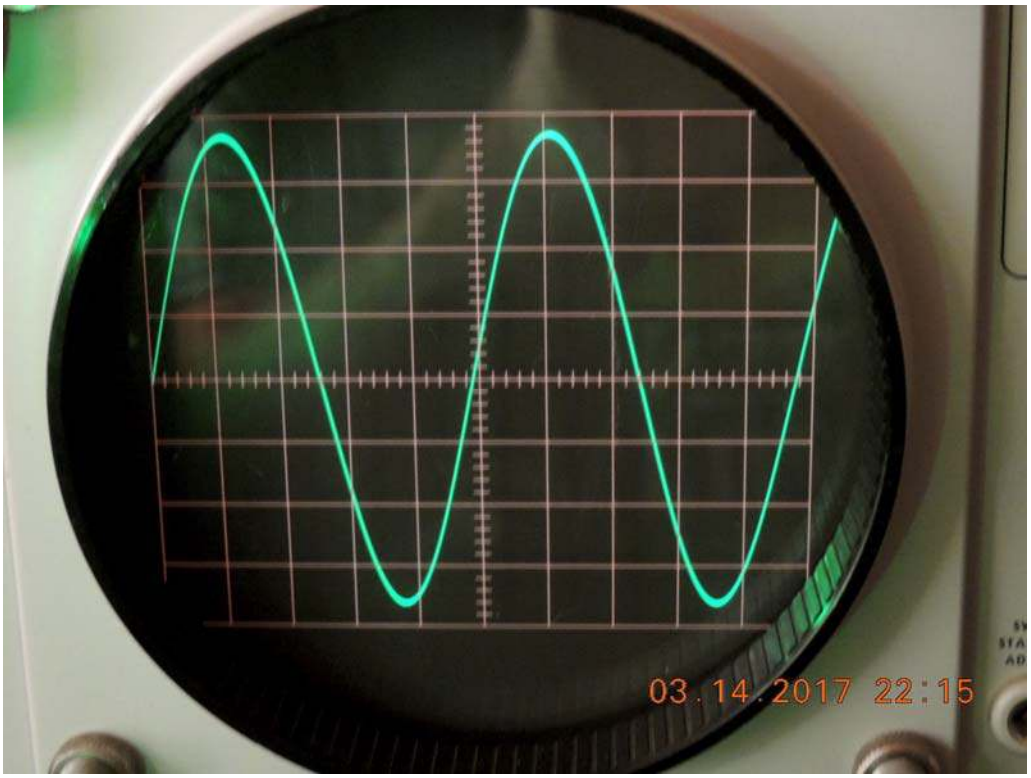
Several IG-42's had shown up in the CHRS radio shop, two of which I took on to restore to like new performance. The most obvious first problem was the failing set screw knobs. Probably Heath's worst of all knobs they were set screw types that after being tightened again and again would split apart. Today it's a rare Heathkit that has its full set of original knobs. Chicken head and water faucet knobs lend greater confidence to these instruments. Some of the plastic pointers also develop a slight curve from aging and rub against the faceplate. A bit of heat from a hair dryer allows reshaping the plastic. As usual, the grubby looking candidates had to go through a beautification treatment. Switches and controls then needed help. I applied MG Chemicals Super Contact Lubricant to the switches and Caig Fader Lube to the potentiometers. One of the two generators had a frozen tuning reduction drive. I applied mineral spirits and allowed it to soak into the concentric shafts until they began to free up. Then I applied more solvent and withdrew it and the gunk that followed with Kleenex. Several cycles later the tuning was fully functional. A day later I applied a long lasting grease to the planetary drive bearings and Super Contact Lubricant to the concentric shafts.

Next came power up via variac and operational examination of the two instruments. One had been previously re-capped, one not. Both had their original Twist-Lok electrolytic capacitors which drew no excessive current and properly filtered the rectified AC, so no worry there (yes, some 'lytics do last a very long time!). All functions worked with one minor exception. The instrument that had been recapped suffered from excessive distortion of the 400 Hz audio tone. That was due to the 12AU7 oscillator's 68K grid resistor being actually 77K (yes, some resistors go bad after a very long time!). Tube parameter variation has little effect on the distortion performance of this circuit. The 68K grid resistor and the 22K plate resistor must be of proper values for low distortion. Better yet, the 68K resistor can be replaced with a 100K trim pot and adjusted for optimally low distortion.



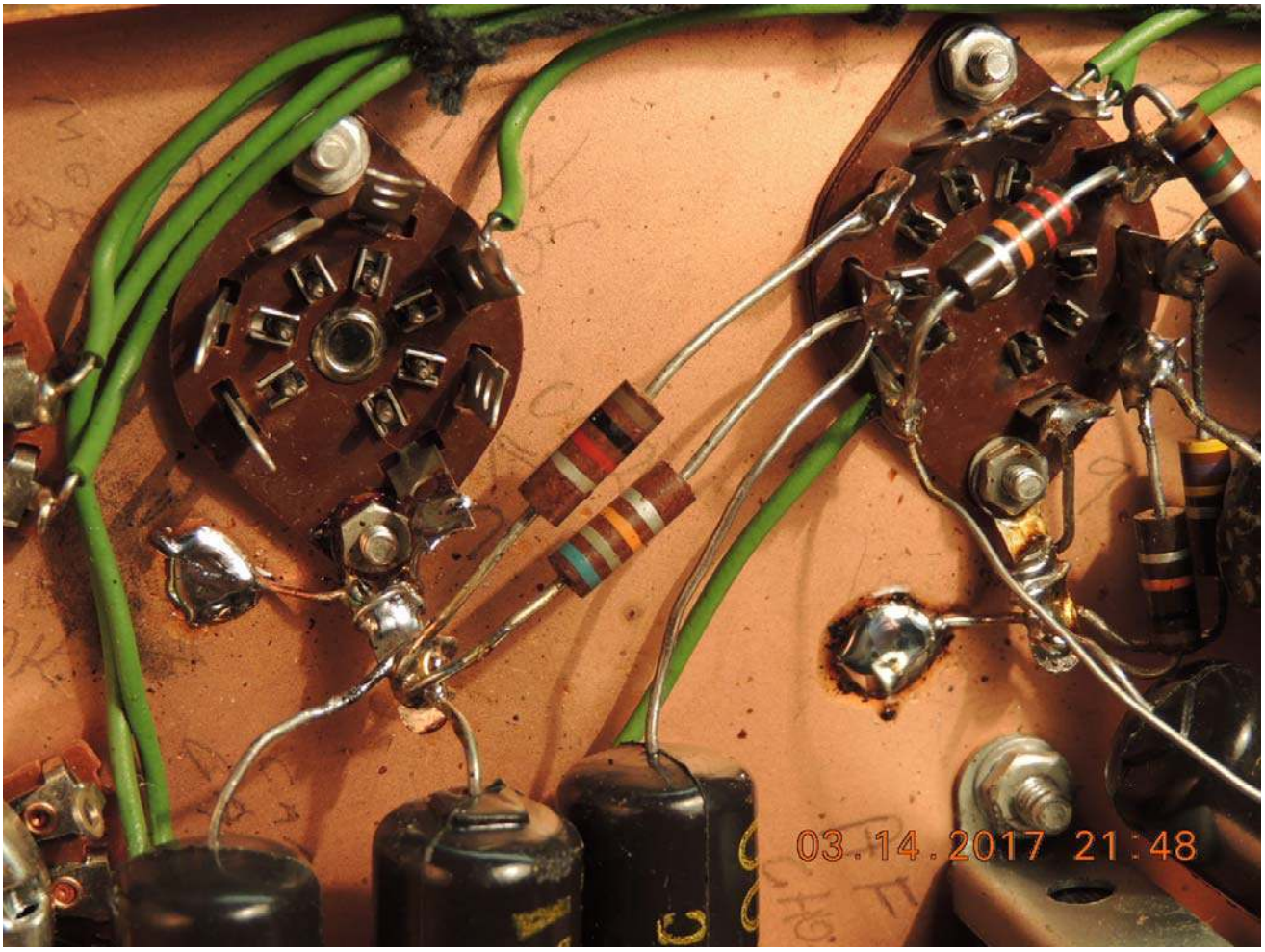
Laboratory Generator schematic diagram

As can be seen from the oscilloscope view of the 400 Hz tone at the modulation level control distortion is acceptably low.



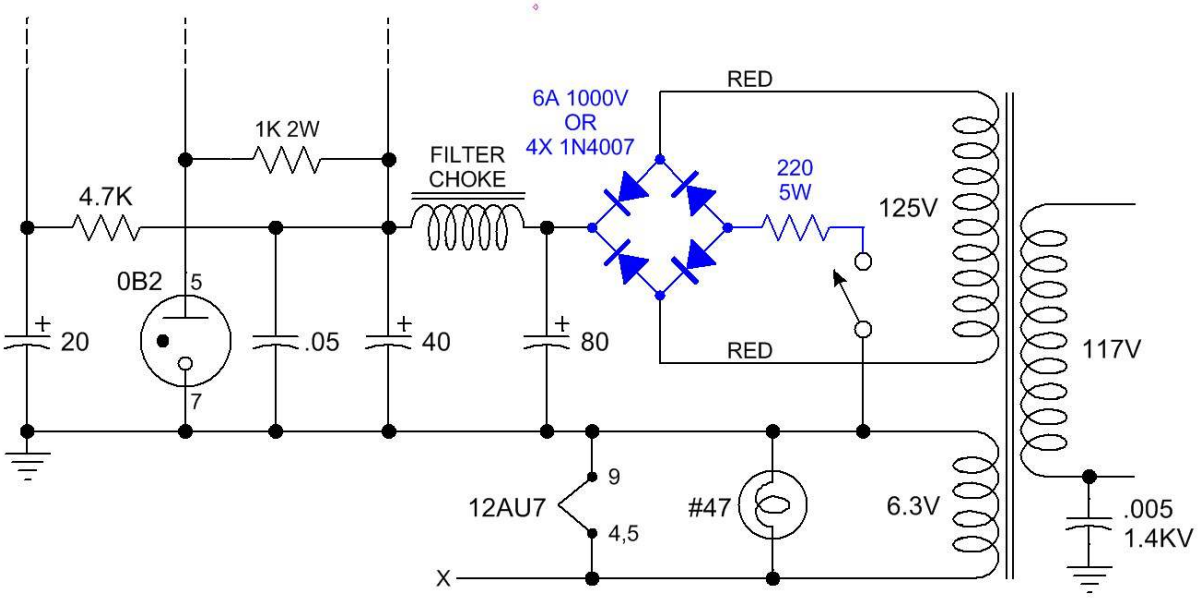
400 Hz tone oscillator waveform

Next came a more scrupulous examination of the generators. One of my main piques about Heath kits was their use of phenolic wafer tube sockets. Delicate because of their cheapness they often are a source of trouble due to weak pin contacts. But even worse was Heath's device of making grounding points by using the socket mounting screws as grounding terminals. Wherever I find them I add a jumper to chassis as shown below.

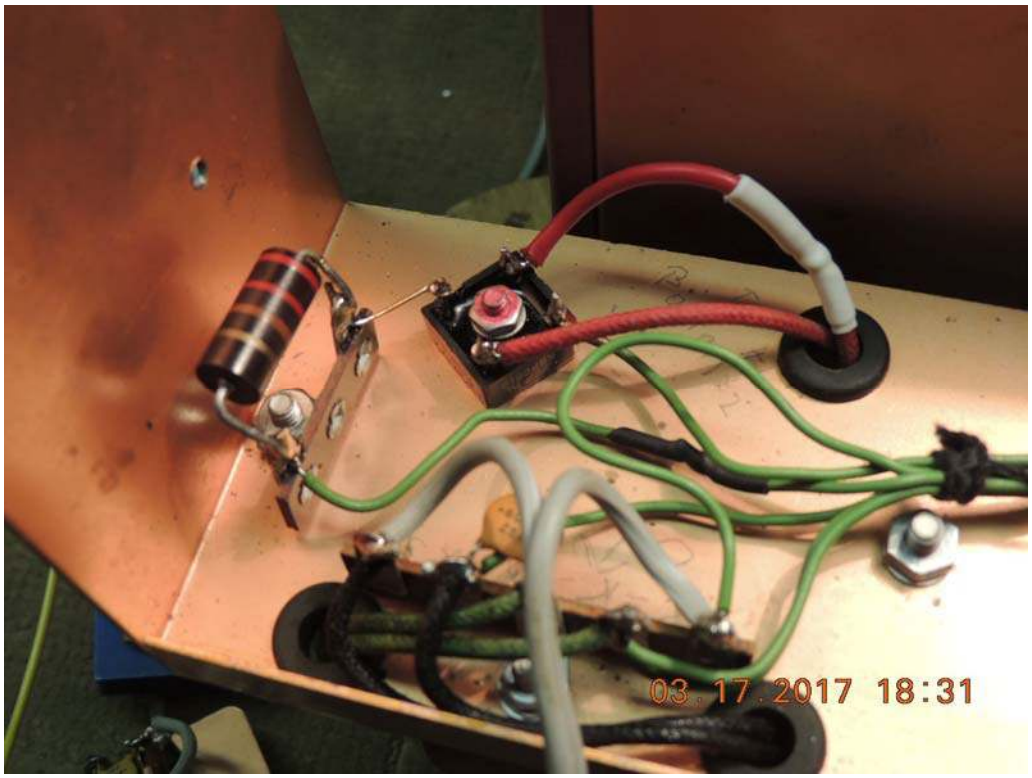


Grounding lugs on sockets jumpered to chassis

One of Heath's main deficiencies in design was their employment of half wave rectified power supplies. No doubt physical size and economics dictated the choice of half wave selenium rectifiers in many early Heath designs. 60 Hz hum is particularly annoying in test equipment because you want to differentiate hum problems in radios under test from the test signal which should be free of incidental modulation. Fortunately, there is plenty of room in the IG-42 to upgrade the power supply to full wave rectification, which greatly reduces the incidental hum modulation of the carrier. Shown below is my incorporation of a full wave rectifier bridge at the selenium rectifier mounting point with the addition of a 220 ohm series resistor. The series resistor keeps the filter capacitor from being over voltaged and also improves filtering. The 2 watt resistor runs a bit too hot so I recommend the installation of a 3 or 5 watt wire wound resistor.

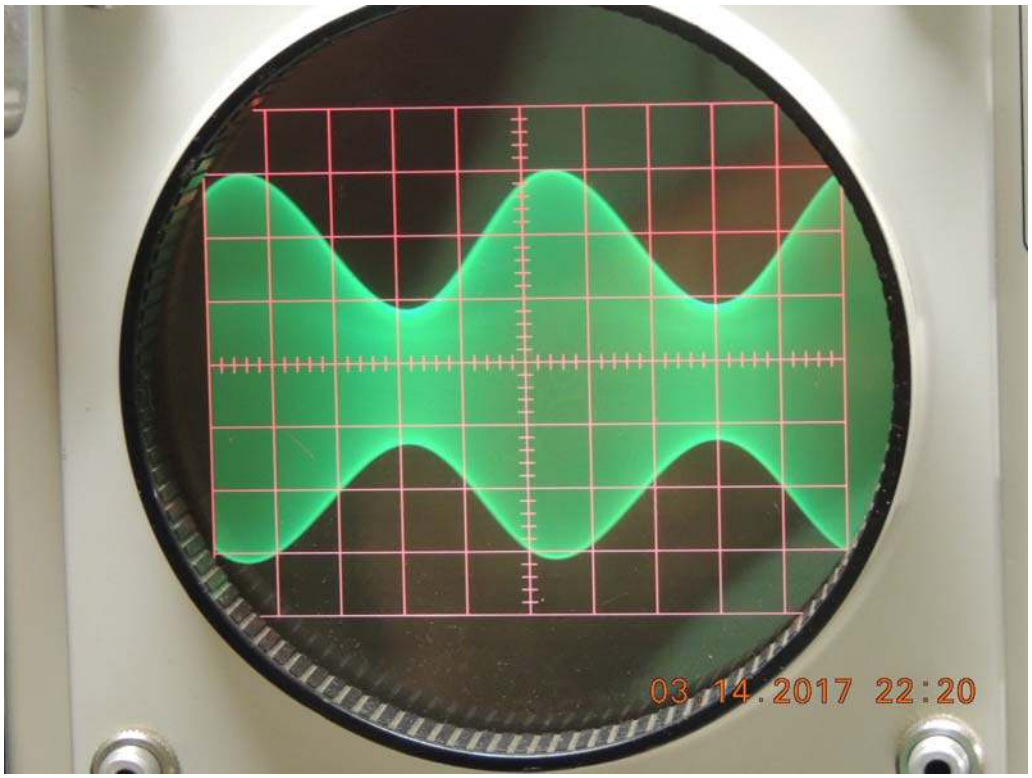


Full wave rectifier upgrade shown in blue



Power supply full wave rectifier upgrade

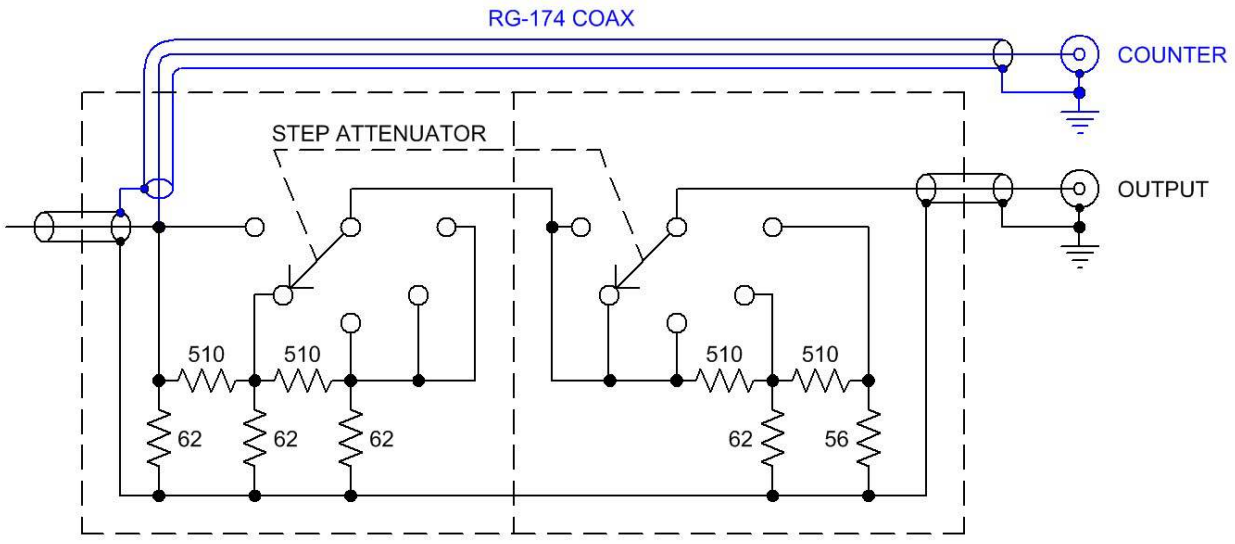
Shown below is the excellent waveform envelope of a properly working Laboratory Generator with 30 percent modulation. With clean modulation the detector and audio circuits of a radio can be properly evaluated by ear and oscilloscope.



RF envelope with 400 Hz tone at 30% modulation

Last, but not least is the addition of a frequency counter output and replacement of the microphone connector using BNC connectors. Shown below is the RF output BNC connector. Adding a frequency counter output involves connecting a length of coax to the input of the RF attenuator (next to the RF output). Some disassembly required, of course.

RF output BNC connector upgrade



Addition of frequency counter output shown in blue

In summation, for the antique radio restoration enthusiast, there's nothing better or more available for the price than the Heathkit Laboratory Generator.

Arden Allen, KB6NAX
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