

Variable KV Power Supply Construction Notes

10 Mar 11

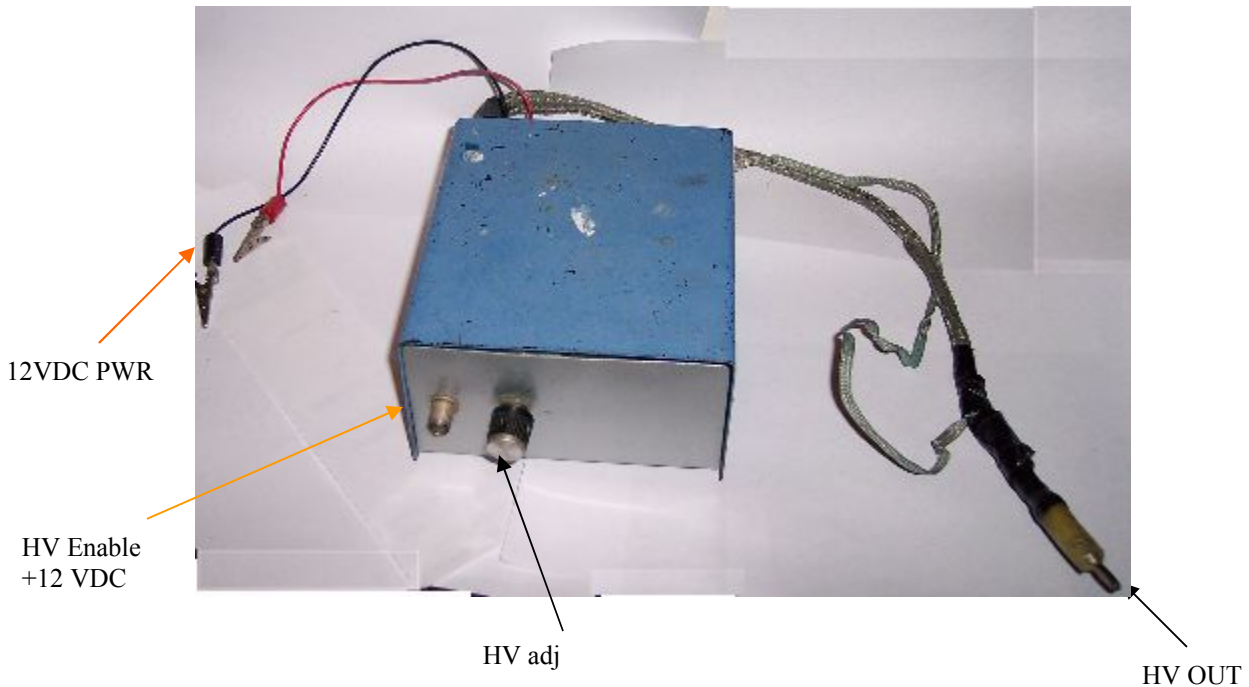
By Vaughn P. McDowell

The purpose is to document and refurbish my ten year old variable HV power supply used to power up my 300KV mini- Marx generators. Most of my newer designs use the TL 494 controller; this one uses the NE555 and TL082 op AMP . The refurbishment procedure is not to change the basic design but to simply clean up the controller board and HV section and simplify some of the redundant components. This has been a very handy HVPS which I wish to fortify.

My old general purpose
variable HVPS

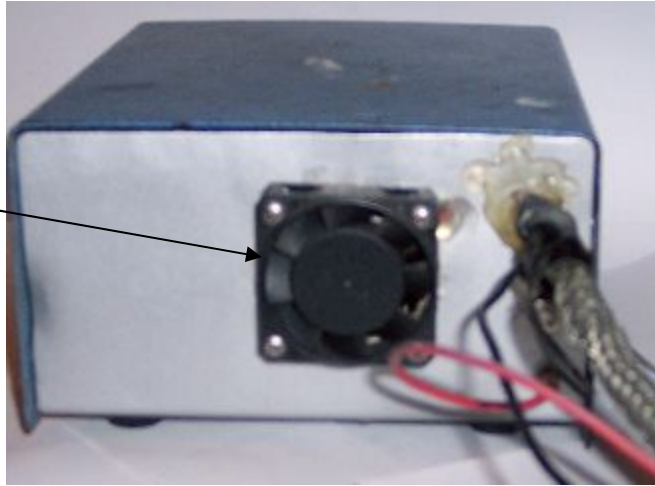


Front View

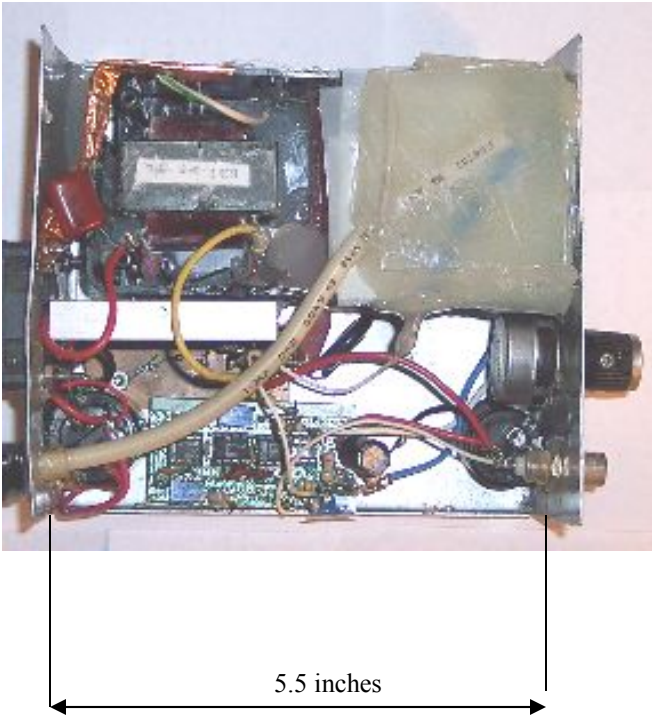
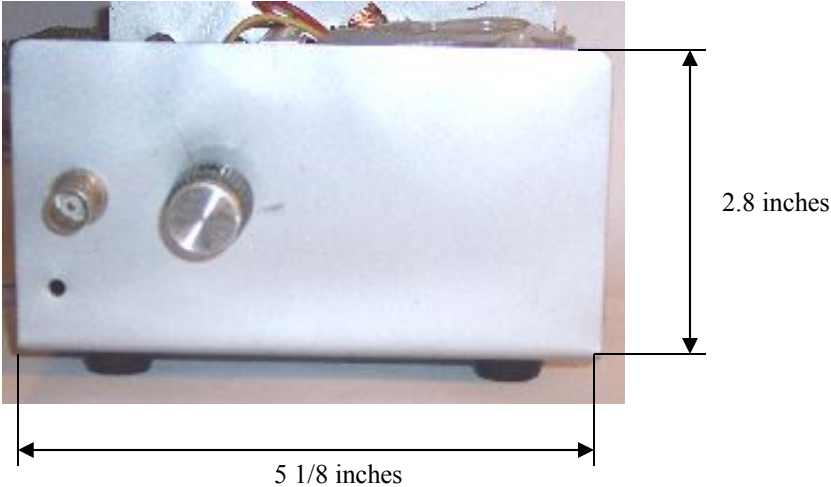


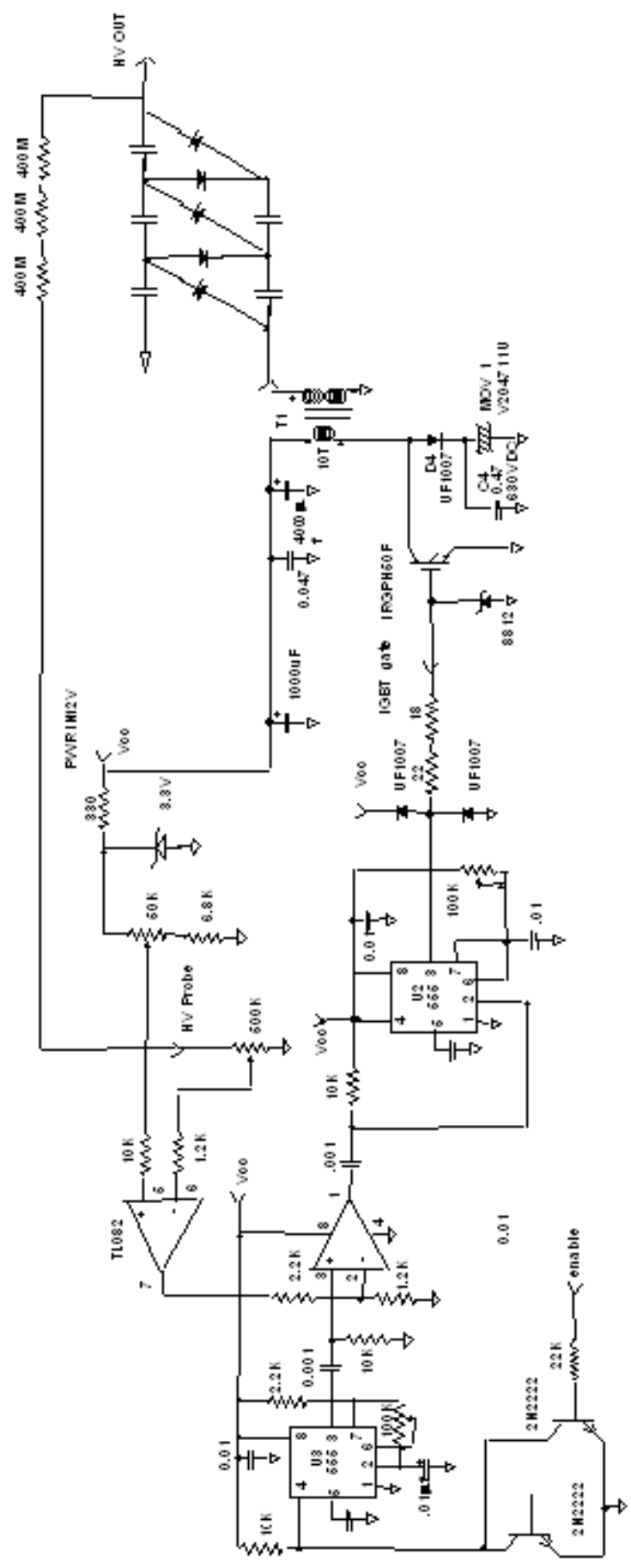
Rear View

12 Volt IGBT cooling fan



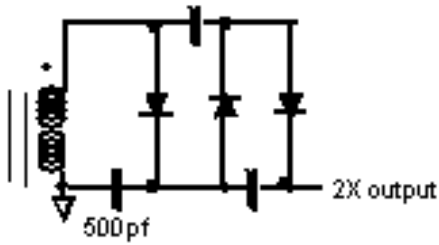
Construction Note 20KV HVPS UNIT \ Some Physical Outside Dimensions



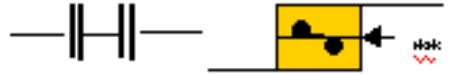


Construction Note Variable HVPS UNIT \ HV Section

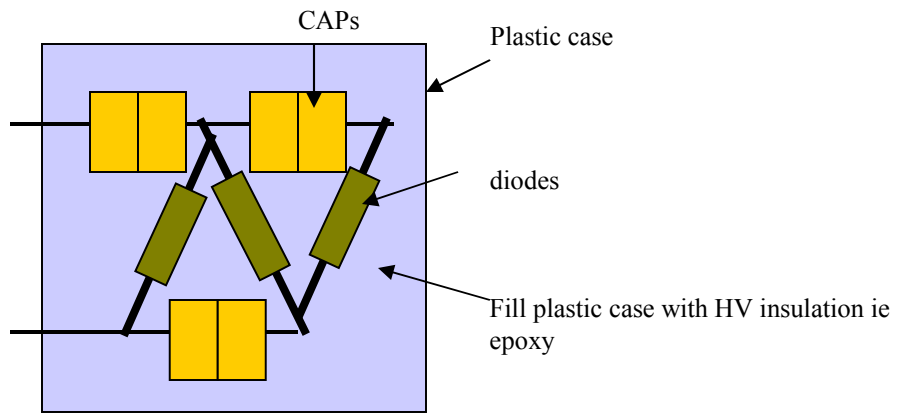
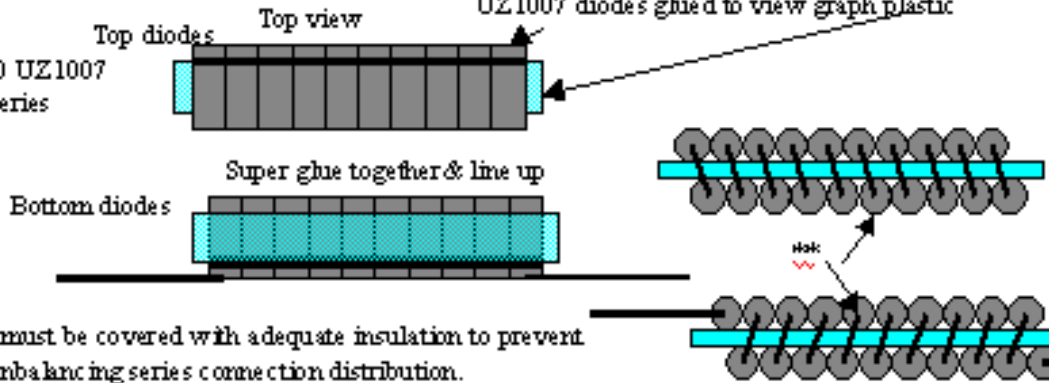
Voltage Multiplier:



Ex. Capacitor Philips Series DD High Voltage Disc Ceramic Type DD60-102 1000pf @ 6KV; two ea connected in series



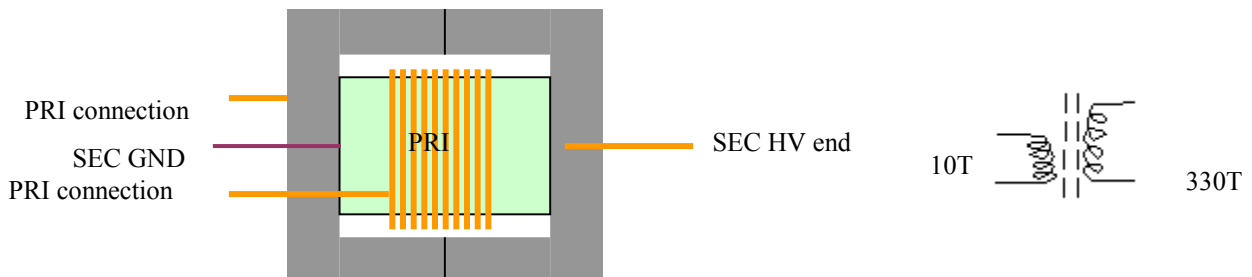
Ex. Diode = 20 UZ1007 connected in series



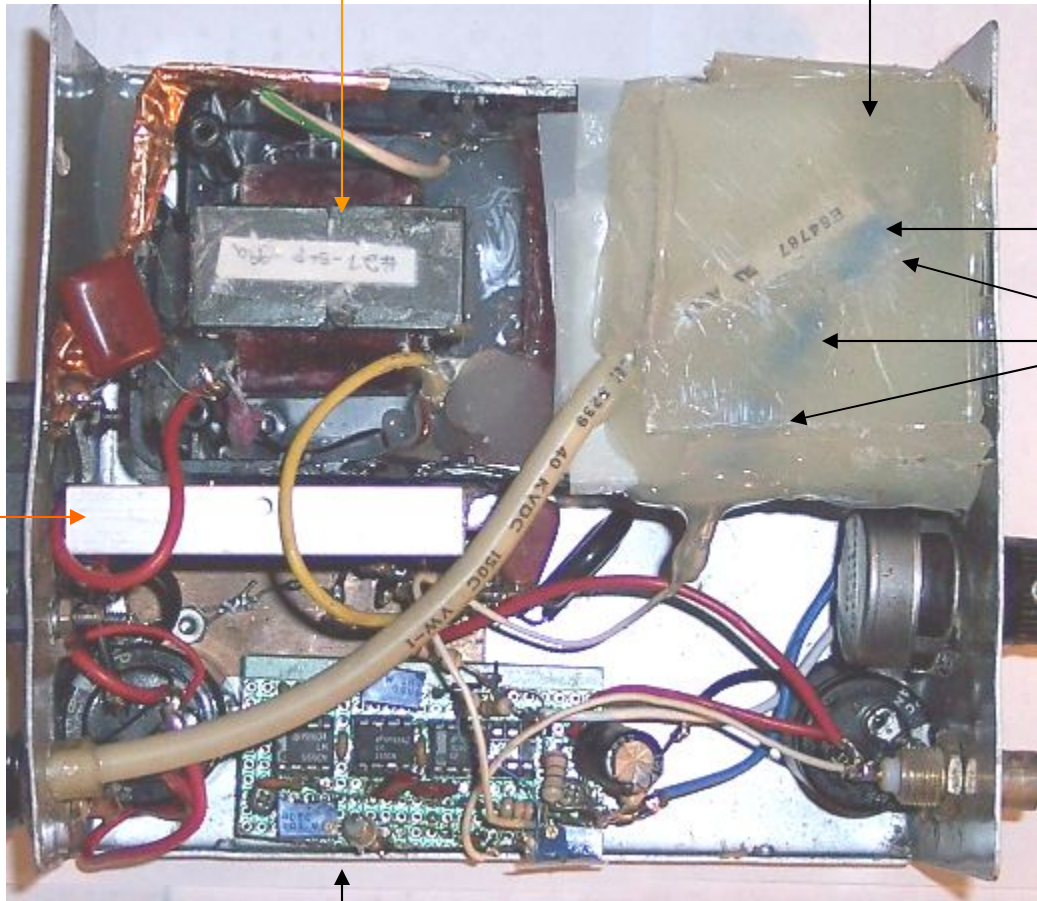
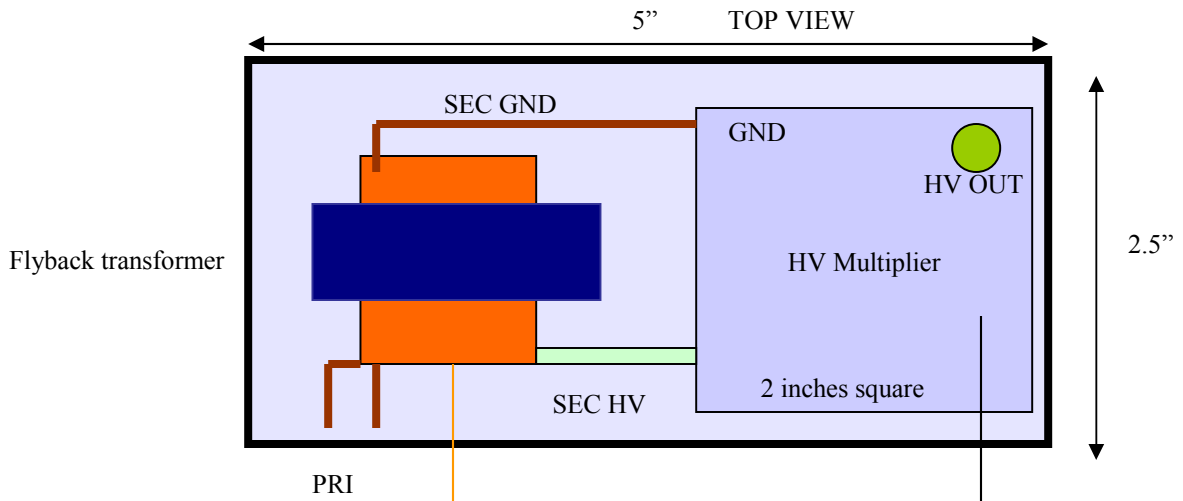
Construction Note Details \ Transformer

The technique for the flyback transformer construction is described at:

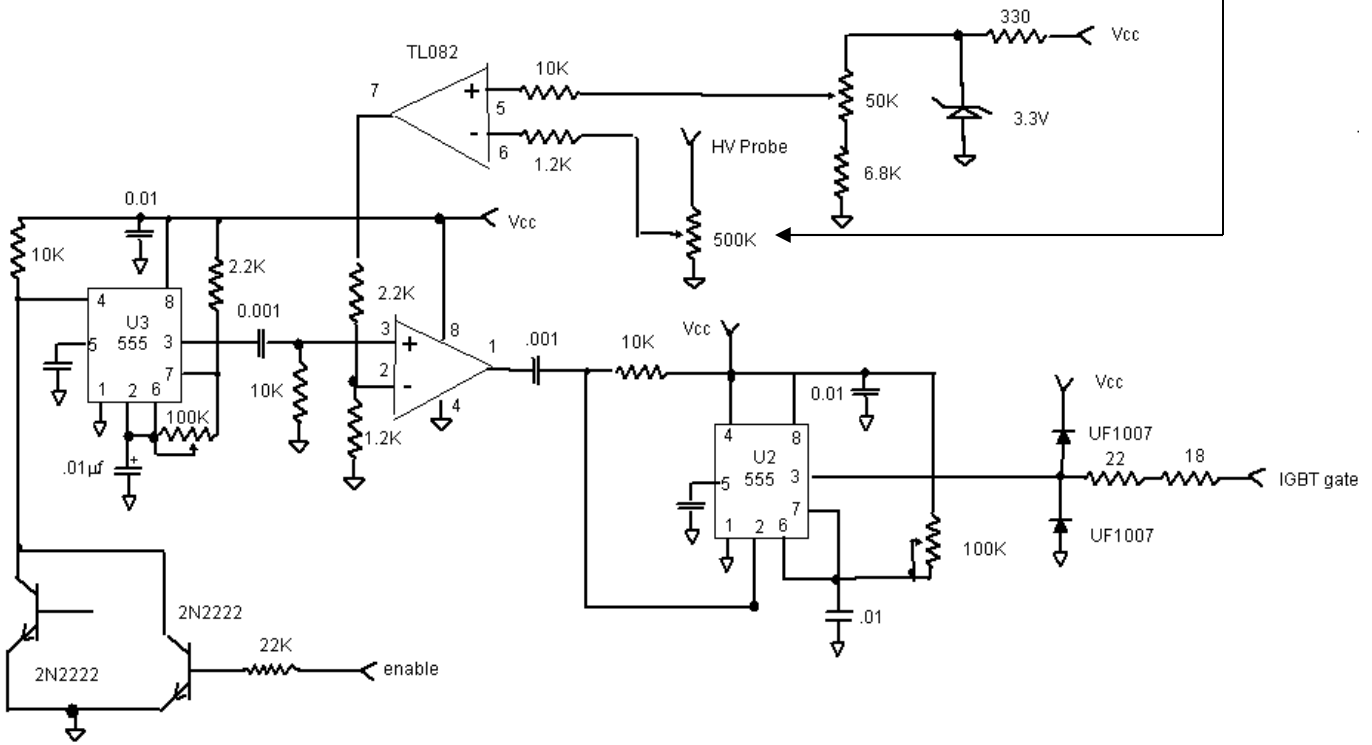
(http://vaughns_page.50webs.com/HV/transformer/flybk_A/flybk_a.html) The Fair-Rite core type is similar to type 77; the core itself is ETD part # 9577440002 or similar. The primary is 10 T of # 20 magnet wire; the secondary about 330 T # 30 magnet wire.



Radio Shack black plastic utility box



schematic



Comment Update:

About 10 years ago I realized that the TL 082 without a NEG Vcc would become unstable when the input was too close to zero volts. This was compensated (see pin 5 circuit) by adding the 6.8K resistor to the 50K adjustable potentiometer; making sure that the input is always at a sufficient value above zero. With out this precaution when adjusted to near zero the HVPS would run full blast! The unit has been over the past 10 years very smooth operationally. However recently after deciding to document and clean it up modify and put it back together again it didn't operate as smoothly as before. Afterward I replaced the 500K potentiometer with a fixed 560K resistor shunted with a ceramic 0.01uF capacitor; the unit now runs smoothly almost a good as before.