

Circuit Improvements for the Dentron GLA 1000 and other Sweep Tube Amplifiers

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The Sweep Tube Amplifier label is often used to describe Beam Power Vacuum Tubes in common Grounded Grid and Super Cathode Driven circuits. Beam Power tubes were often used in television horizontal output sections which meant they were common to find used. New replacement tubes could be found at low cost due to the high quantities produced for tube television manufacture. Homebrew builders found sweep tubes worked well for High Frequency RF Power Amplifier projects. Published constructions articles became common place in ARRL and other Amateur Radio Journals.

The Dentron Radio Co. [1] was one of many Amplifier Manufacture keen to take advantage of the lower relative costs required to produce Sweep Tube desktop amplifiers. Sweep Tube Amplifiers often used similar circuits. Design weaknesses when found in the Dentron GLA-1000B [2] and similar amplifier circuits, should be corrected. The following topics discuss some practical cures for common weaknesses found in the Dentron GLA-1000B and similar Sweep Tube Amplifier Circuits.

1st draft

Circuit Description

The Dentron GLA-1000B shipped with four Dentron supplied D-50A tubes in a compact desktop amplifier package. The D-50A is similar to the common 6LQ6/6JE6 Beam Power Tube. Owners found it possible to replace the D-50A directly with the 6LQ6/6JE6 even with the later reduced ratings. Both the D-50A and the 6LQ6/6JE6 tubes are long out of production, but similar replacements are available from Svetlana [3].

The amplifier is driven super cathode design with a choke (RFC1) and stud zener (D1) providing the bias voltage and cathode current path. The output is a conventional pi design with relay K1 providing rf path t/r switching. The front panel meter is front panel switched to monitor high voltage, cathode current or relative output. Operation using an ac input line of 110 or 220 volts is set by the proper location of internal supply jumpers. Cooling is provided by a rear mounted boxer style fan along with a novel front panel switch to provide an alternative second coaxial output jack labeled DL. The DL position was suggested for a "dummy load" or termination connection to be used during amplifier tuneup [4].

High Voltage troubles

Common horizontal output sweep tubes typically operate well with an anode voltage up to about 1kv. Above the manufactures Design-Maximum Ratings, beam power tube operation quickly become a mixed bag of trouble [5]. Tubes with anode potentials well above their design-maximums often can and do experience internal high current flash over events, of which can prove disastrous. The typical GLA-1000B power supply provides a resting anode voltage above 1150 vdc by design. The extremely high available anode voltage of this amplifier in the standby mode is best compared to a Fox near an unfenced Hen House. It's just a matter of time before trouble starts. A high voltage glitch resistor [6] will provide some measure of protection during an extended flash over event or an internal tube element short. The filter capacitor bank contains three paralleled 100K carbon resistors used for balance and bleed down. They should be changed out to MOF resistors of similar 100K, 3 watt value [7]. Carbon resistors can and do vary greatly from their rated resistance tolerance with heat and age.

Good things to add:

Resistor R7 provides the power supply negative lead return and serves as the plate current meter shunt. Meter protection should be added by adding two 1N5408 or similar diodes in series, placed parallel to R7. The banded end (cathode) of the "top diode" in series should connect to the R6/R7/C23 junction. The anode (un banded end should be soldered to ground. Exact replacement meter movements are unavailable, this is cheap and easy protection. Should the 1N3321 24 volt zener diode fail, a string of 1N4007 or equivalent series diodes may be placed in the zener location to develop an equivalent zener voltage drop. While I prefer the simplicity of the original single bias diode, the replacement string method provides a practical low cost method to replace a failed