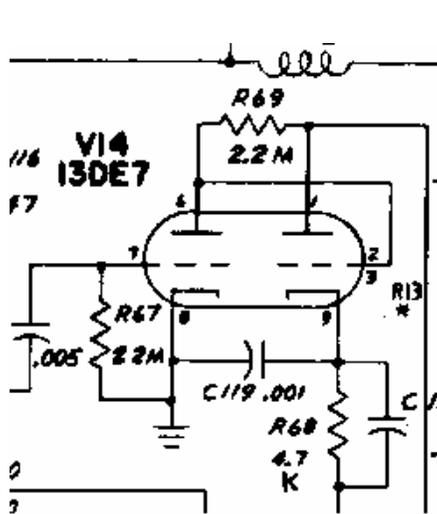


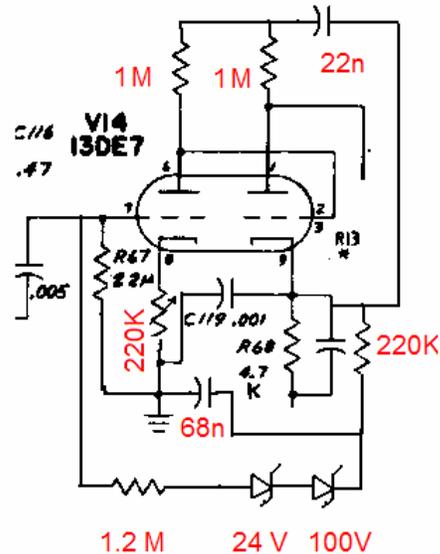
CONTROLLED CARRIER AM MODULATOR WITH ALC AND BOOTSTRAP.

DRAKE TR-4 transceivers and other tube transmitters that employ controlled carrier AM are susceptible to excessive microphone drive. With no modulation the left triode of the 13DE7 fully conducts and the anode voltage is very low: no carrier to the antenna. When the modulation level is increased the audio signal is rectified by the grid of the left triode, this gives negative bias to the same and the average anode voltage increases. The audio signal is superimposed to the anode voltage with full amplitude. This is controlled carrier. The problem of the circuit is that the “average” anode voltage should stop increasing, with increased modulation level, at about ½ of full voltage (full voltage is 250 V in the TR4). This does not happen in the DRAKE circuit and it is very easy to go from low modulation and low power to very severe “full distortion” and asymmetric modulation, eventually to a situation in which the output voltage is full drive with nearly no audio.

The design on the right corrects this behavior. When the average voltage to the 6JB6 screen grids go above ½ of full voltage (250V) the “average” voltage is limited by feedback, like we have in a stabilized voltage source. The audio signal is not limited at all and the overdriven modulator behaves now like a overdriven full carrier screen modulator. In practice it works much much better than before.



Old TR4 AM Modulator



Controlled Carrier AM Modulator with ALC and Bootstrap

To improve linearity and gain of the left triode, a bootstrap circuit has been added, including two 1 Meg resistors and the 22nF capacitor. With bootstrap the left triode operates with nearly constant current under dynamical conditions. It follows that the voltage gain is exactly $-\mu$ and large signal distortion is virtually eliminated.

Best Regards. IN3IEX Giorgio.