

8.1 – Current limited diodes

Current limited diodes, usually with filamentary tungsten cathode, are commonly used as current sensors, since they return a plate current proportional to the current flowing in the filament. Above few tens anode volts in a filamentary cathode diode the plate current depends upon the actual cathode temperature according to the Richardson emission law.



Fig. 8.1.1 – Current limited diodes used in power supply current stabilization circuits.

Typical use of current limited diodes was in AC voltage stabilizer circuits. In such application diode is operated at quite low plate voltage, far from the saturation, plate current being directly related to the rms filament voltage.

Current limited diodes were also used as white noise sources, since average plate current was the effect of the random emission of many and many electrons instantaneously leaving the filament surface. In this case the tube design was optimized for an uniform noise over the widest band.



Fig. 8.1.2 – Some current limited diodes designed for use as noise generators. The CV2341, in the middle, was designed to be directly interfaced to a 75 ohm coaxial line.

Even other tubes with tungsten filament have been used as noise generators. Microwave Receivers, M.I.T. Radiation Labs. series, lists WE 708A, 15E, 801A and 01A as tubes suitable to operate as noise generators. According to the same source, the gridless 15R was not capable of satisfactorily saturation.

8.2 – Gas noise generators

Any commercial fluorescent lamp can be used as powerful microwave noise generator, as shown in this article from [BSTJ, volume 28, 1949](#). Manufacturers introduced special gas discharge tubes designed to be mounted in the various waveguide sections, in order to virtually cover all the microwave spectrum.

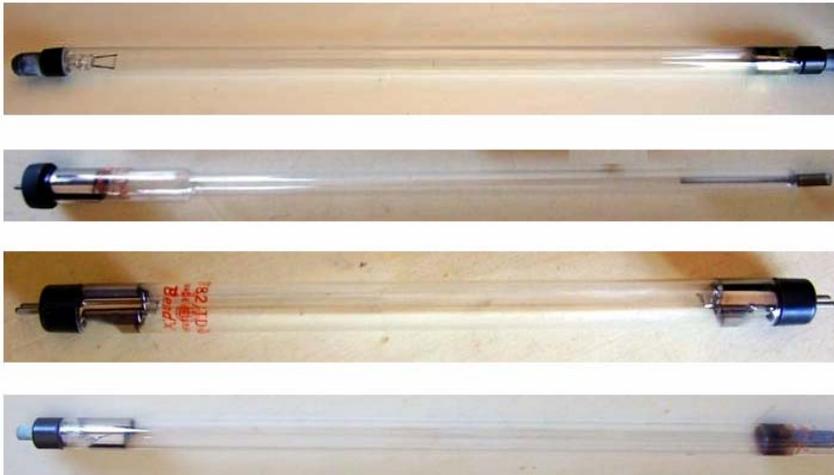


Fig. 8.2 – Some gaseous noise sources.

Even diode-connected thyratrons were used as RF noise sources. The most known example is the [6D4](#), a miniature thyratron which found its elective use as noise generator, operated in a transverse magnetic field.

Other noise sources were derived from trochotron and magnetron structures operating near the cutoff region. Magnetron noise sources were of particular interest in radar jammers, being capable of operating at high power levels. The collection includes a couple of documented trochotron tubes specialized to operate as noise sources.



Fig. 8.3 - Two trochotron tubes specialized to operate as noise sources, the [BD401/6702](#) and the [BX1203/6713](#)