

### 3 - Tubes for power supplies - Rectifiers

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This section includes both rectifiers and other types used in power supply circuits as voltage stabilizers, current sensors, series or shunt regulators or related functions. Of course, due to a certain overlap with other applications, types listed in this section may also be found in other sections. It is the case of vacuum rectifiers which may also be listed as components for radar modulator circuits. It is also the case of power regulator tubes also used as RF/AF amplifiers. Rectifiers include vacuum, mercury and gas rectifiers. Also industrial thyratrons, commonly used as controlled rectifiers, are listed in this sections, while faster thyratrons are listed as radar pulse modulators.

Some types are of particular interest. It is the case of cold-cathode gas rectifiers, as the [B](#), [BA](#), [BH](#), [CK1006](#) or the high-voltage [5517](#). Here the conduction is caused by gas ionized particles and the shape of electrodes plays a fundamental role in determining the direction of conduction. In the [CK1007](#) an initial ion bombardment heats a quasi-conventional cathode and then the tube operates as a gas-filled rectifier.

Some high-power rectifiers were readily derived from transmitting triodes, suppressing the grid, as in the case of [15R](#) or of [250R](#). When high current emission was required more than one electrode system were paralleled inside the same bulb. In the case of [2-150D](#) the current is increased by mounting two electrode systems side by side. In the [4B31](#) two in-line cathodes are lodged inside a single anode. Some tiny rectifiers, as [589](#), [6390](#) or [6102-WL](#) were capable of handling considerable currents at high voltage, their cooling and insulation being very efficient by oil immersion.

Among thyatron devices worth of notes are the [6D4](#) and the [GC-873](#). The first one was designed by Sylvania to compete against RCA [2D21](#) as low power thyatron, but found its elective use as random noise generator for frequencies up to 5 MHz. The Amperex [GC-873](#) is undocumented but its outer shield externally connected to one of the pins, suggests the idea it was an electrostatically triggered variant of the 873 gridded mercury thyatron. Probably it was contemporary of [C-100A](#), sharing with it the overall look and the electrostatic control by means of an external grid.

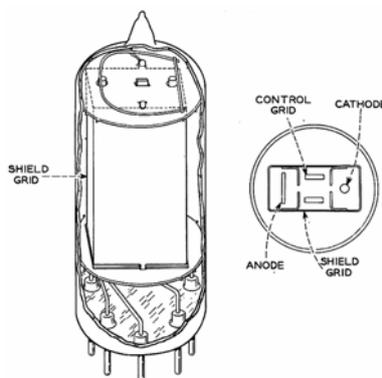


Fig. 4 - Electrode arrangement of 2D21 low-power thyatron.

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## Tubes for power supplies - Regulators

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This subsection includes several devices specifically intended for use in regulated or stabilized power supplies: voltage stabilizers, current sensors and regulators, power amplifiers and some special devices.

### Voltage stabilizers

- The simplest devices to obtain quite constant DC voltages under line and load variations are based upon the Townsend discharge among parallel electrodes into inert gas filled bulbs. The simplest stabilizers were then simple neon bulbs, as the [991](#), with gas pressure controlled in order to give a predictable ionization threshold. Precision voltage references were made with overall voltage stability in the order of 0.5% in a year of continuous operation. WE [423A](#) operated at 100 V, 4 to 8 mA, with a long term stability better than 1 V per year. A small amount of krypton was added to argon filling gas to improve operation at low temperatures. Collection also includes samples of high voltage stabilizers, based upon the horizontal voltage slope of corona discharge.

### Current regulators and sensors

Current regulators, also known as barretters or ballast tubes, were usually based upon the positive temperature coefficient of iron wires in low-pressure hydrogen atmosphere. Other interesting devices used in current or voltage regulators were the so called temperature limited or saturated diodes. In a diode with a pure tungsten filament the plate current is related to the temperature of the filament, and hence to the current flowing in it, by the Richardson emission law. Temperature limited diodes were used in AC/DC voltage or current stabilizer to monitor the current flow through the load. Some temperature limited diodes were specialized for use as random noise generators and are listed in the measurement section. Only few ballast samples have been coded at the moment.

### Power amplifiers

Several power triodes and beam tubes were designed for use as series regulators in voltage stabilized power supplies. The most popular types were low-mu twin triodes, as the [6AS7](#) and its ruggedized variant [6080](#), the [6336A](#) and the [6528A](#), capable of handling up to 400 V at 300 mA per plate. Shunt regulators were preferred in high voltage stabilized power supplies: tubes as the [6792](#) were capable of handling up to 25 kV at 10 mA. In the collection we also find special devices, as the [6216](#), designed to operate as active filter choke.

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