THE ARCOTRON

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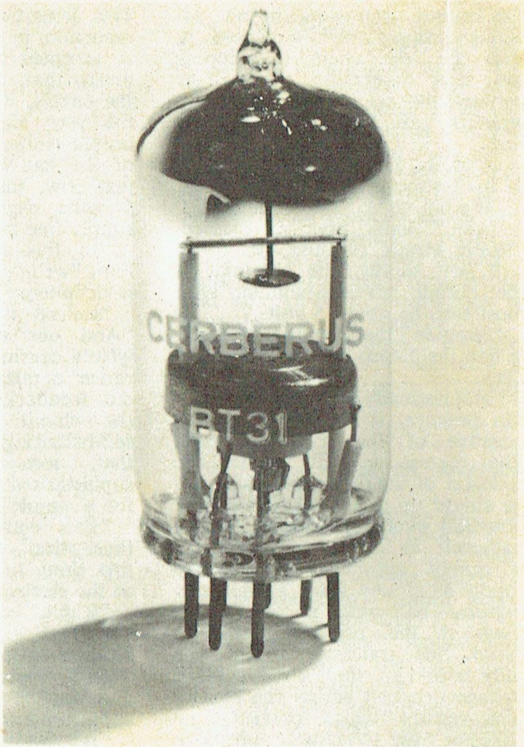

An arcotron is a cold cathode power switching tube filled with an inert gas. It has somewhat similar characteristics to a thyratron, but requires no heater supply. Arcotrons can be used for the control of power fed to incandescent lamps, electro-magnets, magnetic clutches, solenoid valves and heating elements, etc. They can also be used to control ignitrons or small spot welders.

Arcotrons are manufactured by the Cerberus Company of Switzerland, whose range includes at least seven types. However, this discussion will be mainly confined to the BT31 arcotron, since all of the others are now maintenance types. The BT31 is the smallest of the arcotrons, all of which have a coding commencing with the letters BT. Some of the tubes are quite large and can pass peak currents of 100 amps.

An arcotron tube contains a cathode, an auxiliary anode, a control grid and a main anode. The pressure of the gas inside the envelope is several orders of magnitude higher than that in a thyratron and this eliminates the problems of removing gases liberated from internal surfaces.

Arcotrons do not require any heater and therefore there is no warming up time. (The cathodes of some thyratrons are permanently damaged if the anode voltage is applied before the cathode is fully warmed up.) In addition the elimination of the heater power—which can be considerable in the case of a thyratron—permits the design of arcotrons which are smaller than thyratrons of the same power rating.

The electrode structure of an arcotron is shown in Fig. 1. The auxiliary anode H and the control grid G are perforated discs arranged perpendicularly to the axis of the tube. An auxiliary arc discharge is maintained between the cathode and the auxiliary anode, the potential between these electrodes being about 25 volts. Electrons from the auxiliary discharge can penetrate through the auxiliary anode into the space between this electrode and the grid. Viewed from the grid they appear, therefore, to form a virtual cathode. If the grid is negative, the electrons cannot penetrate into the space between the grid and the anode gap. As the grid potential increases, a point will be reached at which the anode potential attracts electrons through the holes in the grid. This occurs when the grid is still negative with respect to the auxiliary anode. The electrons produce ionisation in the main anode-to-cathode gap, and a discharge occurs.

Characteristics

The critical grid voltage at which breakdown takes place depends on the anode voltage, as shown in the characteristic of Fig. 2. When the operating point is in the lower left-hand side of the diagram, the tube will be cut off, whilst in the upper right-hand section it will be conducting. If the operating region is in the shaded area, some BT31 tubes will conduct whilst others will remain cut off.

Further details of the BT31 and other arcotrons may be obtained from Cerberus A.G., Werk für

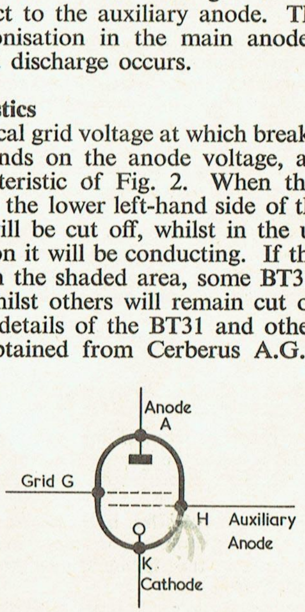

Fig. 1. Electrode configuration of an Arcotron

Electronentechnik, Männedorf, Switzerland. Arcotrons and other Cerberus tubes are available in England from Walmore Electronics, of 11-15 Betterton Street, Drury Lane, London, W.C.2.

Table
Principal Characteristics and Base Connections for the BT31

Min. anode breakdown voltage	600 volts
Max. auxiliary anode breakdown voltage	250 volts
Arc voltage, main anode to cathode	20 volts
Permanent cathode current	300mA
Max. peak cathode current	10A
Grid voltage, max.	—100 volts
Inverse anode voltage, max.	600 volts
Auxiliary anode to cathode arc voltage	25 volts

Base Connections (B9A base)

1	2	3	4	5	6	7	8	9
G	A	H	K	K	G	A	H	K

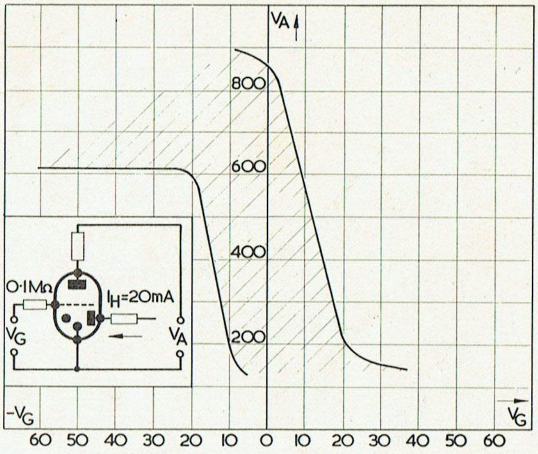

Fig. 2. Control characteristics of the BT31