

Tube of the Month

The Arc Rectifier

Early in the last century, there was a combination of DC and AC voltage equipment being used in the World. In the US, the advantages of AC over DC lighting was finally established, but many cities were using the old DC lighting equipment installed by Edison. In 1902, Peter Cooper Hewitt discovered that a vacuum tube with an AC anode and a negative cathode made from a pool of mercury would act as a very efficient rectifier. Once the mercury was made partially into its vapor phase, the conduction would continue. The problem was getting the arc going as there was no heating circuit and everything was in a vacuum. One common solution was a mechanical machine that would rotate the bulb until the mercury made contact with a positive electrode. The bulb was then rotated back into position. Any interruption in the input voltage would stop the rectifier and it would have to be tilted again. Large units could be 1, 3, 6 or 12 phase. The multi phase units provided well-filtered DC.

These units were commonly used in lighting and very large DC supplies like those used for electric trains. My grandfather turned in his horse for an electric streetcar in the Netherlands back about 1910. Larger units were made to handle up to a million watts. By 1920, the vacuum tube rectifier had been developed, but large transmitters were still a problem as the available tubes were small. Hams could get used ARC rectifiers and old pole pigs, so the age of QRO was started. The hams developed solutions to the “keep alive” problems including large relays to tilt the bulbs and using Model “T” spark coils to provide a constant low current voltage to keep the reaction going. Today those few rectifiers that have survived are feared by museums due to the large pool of mercury.

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