

yesterday's radio



Early Vacuum Tubes

by N.C. Batch

No. 10 in a series

Recently I came across an interesting article relating to vacuum tubes in a 1912 magazine. This article stated the following; "the newly invented thermionic valve makes possible the reception of wireless telephone speech and music and wireless telegraph signals with a degree of satisfaction not approached by prior devices. This marvel of ingenuity appears to be a form of incandescent electric lamp that operates in a 'rather mysterious manner'.

Obviously, very few individuals were familiar with the 'mysteries' of vacuum tube principals in 1918. More than likely future generations will also look upon the tube in a similiar fashion, wondering in what mysterious way it operated. However, it should be of no surprise as transistors have been pushing vacuum tubes into oblivion at an alarming rate.

Let us look in the past and observe the vacuum tube developments. Thomas Edison, the noted inventor, first discovered the phenomenon of one-way conduction of electric current through a vacuum, which is also called 'the Edison Effect'. Like numerous other discoveries, it was not fully investigated and used until some time later. In 1904 J.A. Fleming discovered that, with slight alterations, an electric lamp could be made to act as a detector and rectifier of electrical oscillations. Fleming's valve was basically a diode which was subsequently improved in 1907 by Dr. L. deForest, who conceived the idea of introducing into it a third element, namely a grid, which enabled him to control the current flow between the filament and plate, and so the 'Audion' was born. The early vacuum tubes were of the direct heated filament variety, rather crude looking devices, unreliable and extremely expensive. These tubes were hand made and from 1904 to 1913, used only for reception, mainly by experimenters and radio hams. World War I brought with it an increased demand for vacuum tubes for military application. It was discovered that a vacuum tube may be made to generate continuous waves, and thus become a powerful transmitting agent.

The sudden demand for domestic radio receivers in the early 1920's resulted in a similar demand for suitable vacuum tubes. Manufacturers geared into mass production to keep pace with the demand and thus a variety of

tubes came on the market. These mass produced tubes were a remarkable improvement over their predecessors, both in quality and improved design. In 1925, an astonishing new tube design was achieved with the introduction of the ac (indirectly heated) tube. This ac tube was first designed by McCullough in Pittsburgh. At this point we should pay tribute to the Canadian inventor, Ted Rogers, who was responsible for giving us the first practical ac tube, namely the Type R-32 on which Rogers received a patent in June 1925. This tube was a remarkable improvement over the McCullough type (see *electron*, July 1969). Further improvement in tube design followed very rapidly with the introduction of the screen grid tube in 1928.

In North America, Western Electric was one of the earliest tube manufacturers, on this continent. Among many others, this company made the well-known 215A Peanut tube in 1919. Also in 1919-1920 came the introduction of type 200 'soft (low vacuum) detector' and type 201 'hard (high vacuum) detector' by RCA and Elmer Cunningham. The rating of these two tubes were one amp. at one volt. Northern Electric Co. in Canada manufactured the 205A, 215A for telephone application, as well as the famous R-215 Peanut Tube. These were released for the domestic radio application in Canada only. Another well-known tube made in the early 20s was the Meyer's triode in Montreal. In 1921 G.E. marketed the 5 volt transmitting tube UV202 (50 W), UV203 (250 W), and UV204. These tubes were also sold bearing the Cunningham name. In 1923 the Westinghouse Co. marketed the WD-11 and WD-12 (.25 amp. at 1.1 volt). These tubes were manufactured at the company's tube department in Hamilton. The 112 and 120 hard amplifier tubes appeared on the market in 1926. They were well known for improved tone quality with a proper grid bias. Also in that year the cold cathode BH rectifier diode was marketed by Raytheon Co. These tubes were particularly suitable for 'B' battery eliminators. The following years, improved ac tubes known as the 226 and 227 variety were made available, and screen grid tubes became common in 1928. Several Canadian manufacturers had their tubes made by the Radio Valve Co., on Dufferin St. in Toronto. This plant was operated from 1922-1945 jointly by Marconi Co. and CGE, until CGE took over completely in 1945. Tube manufacturing was terminated by CGE in the summer of this year. Indeed a chapter of Canadian electronics went down into history as this plant produced millions of tubes over the years for the domestic market. ❁

Whatzis Quiz for Old Timers

BY WILLIAM I. ORR, W6SAI

HERE'S a photograph of a beautiful Whatzis. Look closely and see if you can determine what this old-time radio gadget really is.

It looks something like a long lines oscillator, doesn't it? And observe the beautiful low-loss socket. Somebody had a great idea, and W6SAI wonders if *CQ* readers can tell him what this device was used for, and identify the tube shown in the socket of this wonderful machine.

If you think you can describe the object, write Bill Orr, W6SAI, EIMAC division of Varian, 301 Industrial Way, San Carlos, CA 94070. The first three correct descriptions of this Whatzis received by W6SAI will win an autographed copy of one of Bill's famous antenna handbooks. The answer to this Whatzis Quiz and names of the winners will be published in a future issue of *CQ*.

