National Capital Radio & Television Museum

Artifact of the Week:

de Forest Audion Tube



This week's featured artifact represents one of the most important milestones in the history of electronics.

As the 20th century began, radio (or "wireless" as it was known then) was in an embryonic state. Radio receivers required a device to detect the presence of incoming radio signals. A variety of detectors (magnetic, electrolytic, crystal, and others) were patented. But none were sufficiently sensitive for weak signals.

British inventor John Ambrose Fleming came up with a two-element (diode) vacuum tube (containing a filament and a plate) that served as a primitive detector, but it, too needed strong signals to respond.

American inventor Lee de Forest began tinkering with vacuum tube detectors around 1906. He added a third element, a "grid," and found that his triode tube device, which he called an "Audion," worked better than Fleming's diode detector. He patented it. While it did work as a detector, it was soon recognized that the Audion had an even more important characteristic—it could actually AMPLIFY signals! Now for the first time radio engineers could make feeble signals stronger and thereby communicate over much greater distances.

The Audion resembles a spherical lightbulb. Its construction is similar, no doubt because de Forest hired the H. W. McCandless Company, a light bulb manufacturing firm, to make them. They simply adapted their existing light bulb manufacturing equipment. De Forest offered an explanation of how he thought his invention worked, but other engineers developed a more accurate understanding. Much credit should go to the scientists and engineers at Bell Laboratories and the General Electric Company Laboratories, who strived to understood the physics of vacuum tubes, and soon made tubes that performed vastly better than de Forest's original Audion. De Forest thought that Audions needed some residual gas to operate properly, whereas it soon became clear that a high vacuum was the key to high amplification.

For the next half century (until transistors came along in the 1950s) vacuum tube descendants of de Forest's Audion made possible radio, then television, then computers. Today original de Forest Audion tubes are rare and valuable. The museum is proud to exhibit one.

We appreciate your support of the museum so that historical artifacts like this one, and the stories that go with them, can be preserved for future generations. THANKS!