

(003W-3)

Tube Making Record

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(1976) in Japanese (English version: by Sash Ohtsuka)- 3 Pages

1. It was 1916 when we started research on vacuum tubes. The first one was **UN-100**, **Audion** type which completed in 1919*¹. In the same year **UF-101**, **French** type, was also completed.
2. It was a small scaled production in a room in the research department up to 1923. In the same year private wireless telegraph/ telephone regulation was effected, and experiment in radio broadcasting has commenced, and matching such a demand, production of **UV-200** and **UV-201** has started. ----- excluded latter part: ed.

A. **Audion Valve (UN-100) completed in 1919*¹**

Cathode (filament) was of pure Tungsten wire, grid was two pieces of Nickel wire of 0.6mm dia., formed with tweezers and scale, anode was also two pieces of Nickel sheet cut with scissors to the required size. Those were quite inaccurate ones. Glass bulb was in a spherical shape, both-ends were sealed, and only cathode end was terminated with a metal base. For other leads, rubber tubes were inserted for insulation.

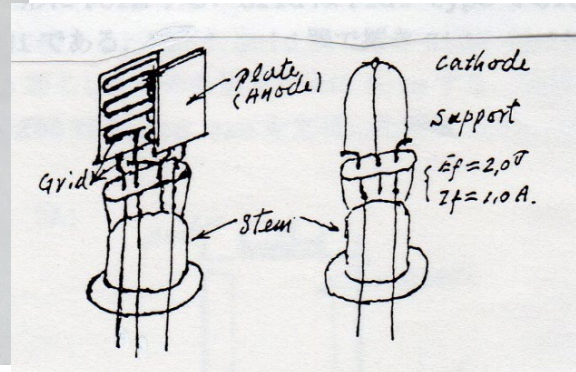
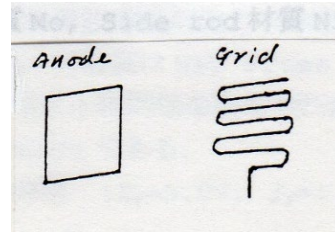
Treating metal parts: after removing unwanted matters with benzene, treated in the hydrogen furnace.

Exhaust and aging: Heat the bulb at 350°C for 10 minutes. At that time, there was no high-frequency electric furnace available, and therefore exhausted occluded gas in the electrodes with electron bombardment during exhaust process. It was easily seen deformed electrodes. We used red-phosphoric getter solution painted inside exhaust tubing, and heated with a burner during exhaustion for accelerate the process.

Aging process was completed during exhaustion. After exhaust process, conducted performance test, and then installed a base only for good products.

In exhaust process, we used an oil rotary pump for back up of mercury diffusion pump made of glass. Also cooled the glass trap with salt and ice.

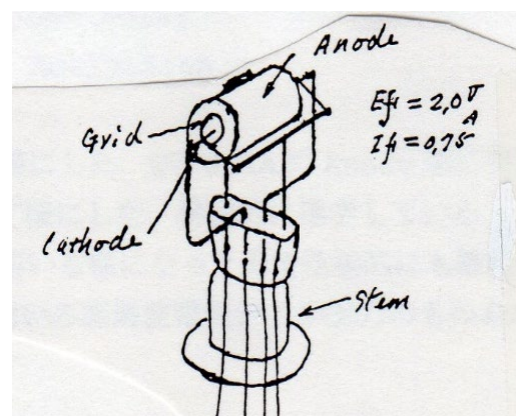
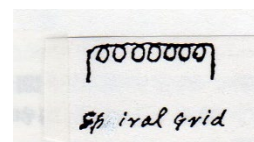
Note: *¹: According to other information like the list (001L), completion date of **Audion** should be in 1917. The editor guesses 1919 must be the year in which it was transferred from laboratory to production department.



Note: Filament is a reversed-V shape with a center supporting rod ----- Ed..

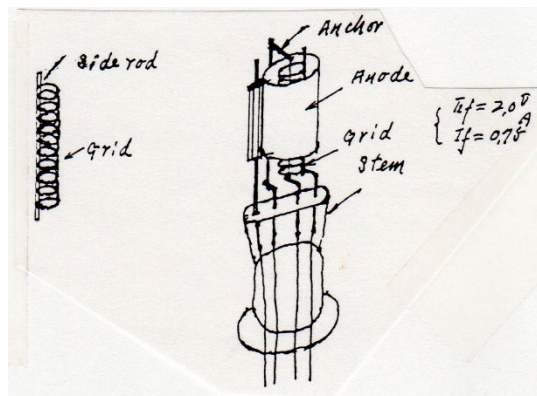
B. French type (UF-101) in 1919

This tube was a more improved type than **Audion**. Cathode was pure Tungsten, grid was a spiral coil without side rod. It was made by hand winder, and material was Molybdenum. Anode was cylindrical shaped Ni sheet made by press. This type had demand from government for quite long period, and produced approx. 1,500 pieces annually if I recall. The bulb was spherical.



C. **UV-102 in 1920**

Cathode was pure Tungsten, grid was spiral, side rod was Ni wire of 0.75mm dia., wound by hand grid machine and welded to side rod. Anode was cylindrical, material was Ni. Form to specified dimension after pressed, same as in **UF-101**. The treatment of metal parts and exhaust process are about same as **UF-101**.



D. **UV-200 and UV-201 in 1923**

Cathode was pure Tungsten and formed to V-shape in both types. Grid was flat type with two side rods, and grid wire was Mo, side rods were Ni. Wound by hand grid machine and welded to side rods. Anode was flat type, Ni sheet, formed to required size after pressed. Treatment of metal parts, exhaust and aging processes are almost same as in **UV-102**. Only difference was that **UV-200** was a soft valve, and therefore filled with Argon gas, so-called soft valve whereas **UV-201** was a hard valve.

Note: Could not put a photo copy of these types as they are not in our database now. I feel that Japanese made types seem no difference between the original ones. ---- Ed.

