

(006W)

Information on Other Tube Makers: 6 Pages

By H. Ohtsuka

1) General

We might have to recognize as fact that there is a weakness in Japan in terms of documentation, and if we look back old days when we opened up the country to the western world, same situation has seen.

As to dawn of vacuum tube era, we can see situations of major electric companies like TEC/Toshiba, JRC and NEC from their own history book*. As the editor, I respect their writing in recognizing the first days of their development of each vacuum tube, etc., but there are some discrepancy even within their writing. This must be an unavoidable matter as it is extremely difficult in determining the day of introduction of a type of vacuum tube. If you look at carefully, there may be months or even year(s) of span in the date between their design and actual sale in the market, and such determination must be extremely difficult for outsiders. Therefore we must solely rely on the each manufacturer's official publication.

Note: *: See (003W 1/2),(004W) & (005W) respectively

In this article, editor tried to gather reliable materials from all papers available today, and added notes as required.

2) Remaining Records on Other Tube Makers (from “History of Electron Tube” edited by S. Okamura)

a) Oki Electric Co. (p.p.: 103):

“In Oki Electric Co., a study of vacuum tubes was initiated under the instruction of Electrotechnical Laboratory. An air-ship-type triode was developed, and in 1918 a prototype of telephone equipment for a connection between the sea and the land using this tube was completed and delivered to the Electrotechnical laboratory.”

From “100 year step of Oki Electric Company” in Japanese:

Oki electric started production of vacuum tubes since 1916. This was an excellent view for a civil company challenged vacuum tube production at that time. K. Murozumi and S. Fujii took lead of research work. Research and production of vacuum tubes were conducted in Tamachi factory in Tokyo, and manager of research and testing section, T. Baba was the responsible person. They found out papers from Electrical World and Electrician magazines, created a glass vacuum tube with diameter of 5cm. Assembled anode and grid in the bulb, and tested after evacuation. But could not stop glow at 60V of anode voltage. Test result showed good sensitivity below 60V compared with a crystal detector, but was extremely unstable in amplification operation.

They used nickel for anode and grid, and tungsten for filament. For stem sealing, as we could not find materials as shown in the magazines, utilized platinum wire which was used for telephone repeater lamps. They must have heated nickel plate well to exhaust occluded gas. They experienced extremely tough time, but result indicated problem was how high vacuum can be obtained.

The governmental test lab. was working on the same target at the time, but they had a modern high performance pump. But we only had an early oil-pressured pump which could never obtain high vacuum. We tried to put magnesium powder in the glass tube to remove remaining air and heated from outside, but never successful as remaining gas was not only oxygen.

Our idea was fast, but hit a wall as vacuum pump was the obstacle. J. Toki who was the chief engineer at the time had to return to the government.

It is regret that if we could continue research with a pump having high performance, we might be able to reach creation of “getter” faster than TEC.

In 1919 we formed a wireless equipment shop in Osaki factory, and a new pump with high performance has installed. Thus we could manufacture so-called hard valve, and with the tubes we manufactured, wireless communication system for special ship for emperor, Sakaki-Marui has realized.

After that, we continued manufacturing our own triode tubes for broadcasting receivers and shipboard wireless equipment with good reputation, but then, a patent claim on getter raised from TEC, and we were forced to quit the whole operation.

We have still continued our research work after this incident by curiosity of our research staff, but it was extremely regretful matter as this movement was a remote source of our delay in wireless field. ----- English version by ed.

b) **An-naka Denki** (now Anritsu): p.p.: 51, “History of Electron Tube”

An-naka Denki (now Anritsu) was established mainly for repairing and manufacturing military-use wireless telecommunication equipment in 1900. It took charge of TYK transmitters.

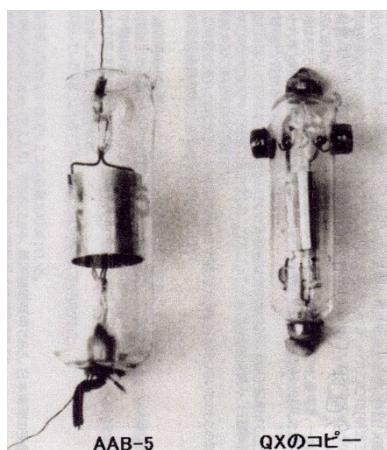
b-1) From 30 Year History of Annaka Denki Seisakusho” (from 1900 to 1930)

“Chapter 3-1: In 1924 when radio broadcast has started in Japan, we have supplied radio receivers, headphones, speakers, etc. trying to avoid overseas products invade Japan too much”.

“Chapter 4: Major Products: When we started business in 1900-01, world was in early stage of spark wireless system, and we have manufactured induction coils first, and then extended to spark transmitters, various detectors, storage batteries and capacitors. And in 1917 started manufacturing vacuum tubes to overcome inconvenience of crystal receivers (this was discontinued in 1924 by a reason).”

Note: This is a small part of whole book. It is written in Japanese, and excerpts were made by the editor. There is no mention on the tube types they made, but gave us an idea of manufacturing time period. Also, the main reason they discontinued tube manufacturing must be patent problem between TEC, etc.-----
Ed.

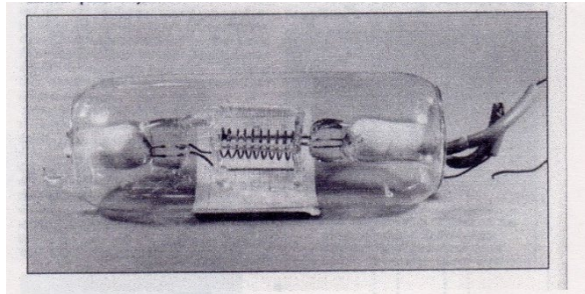
b-2) A piece of information on internet (it says from 60 year history of University of Electro-Communication): “There are at least 2 types of vacuum tube known overseas: One at the left of photo is a soft valve, and assumed to be used as audio amplifier in Japanese navy’s equipment. On the right, equivalent to **QX**, must be for detector. The latter has took over by TEC when they quit manufacturing”. As date of introduction of those types (plus some more type like **AAB-7** existed?) are



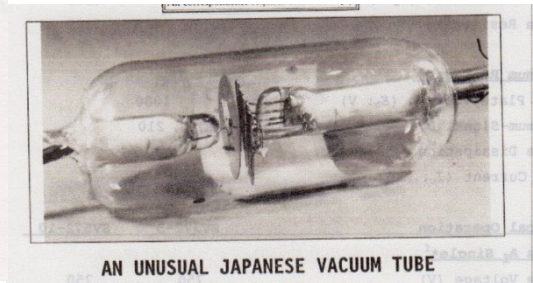
unknown. We assume production date of them must be between 1917 and 1924 (see above), and probably around 1920. According to TEC’s list (001L), the year of introduction of **UM-103/A** and **UM-104/A** (equivalent to British **V.24** and **Q**) by TEC are listed as 1927, and therefore possible to imagine that TEC utilized Annaka’s knowhow on those tubes for own production. But a question still remains what happened on **AAB-5**, or possible other types later. Anyway, **AAB-5** or any other Annaka tube was

unknown to Japanese tube society until it was shown in Saga. ----- Ed.

b-3) From OTB by AWA, following photos are reported (type number unknown):



Vol. 32-4, Feb.'92: Page 8
by Lauren Peckham



Vol. 31-4, Feb.'91: page 22
by Lauren Peckham

b-4) Standard type tubes also made?:

In our UEC museum, there is a tube bearing “Annaka” marking exists. It looks like popular **201A** type tube, but inside is invisible as covered by Magnesium getter. It only marked as “Annaka 258”. This tube can be seen in the photo file in (001P) at the end of this report. According to Annaka’s history book, they quit making tubes in 1924 (see above), and **201A** was first introduced in 1922 by RCA, and therefore it seems possible.

c) **Kawanishi Machine** (From “Japan Wireless History/ Nihon Musen Shi,” edited by Radio Regulatory Commission, 1951 (in Japanese).
“Chapter 9.1: Start of producing wireless equipment”:

We, Kawanishi Kikai Seisakusho has started manufacturing wireless communication equipment in Kobe since 1933. In 1937 an independent research laboratory has open, and research on vacuum tubes and material for communication equipment has started.

c-1) Trial on Vacuum Tubes and actual products (p.p.:125-126):

In March, 1935 exhaust process on first trial product **C-204 (UV-204)** has started, and then **C-202A** (transmitting tube), **BM-966 & BM-972** (rectifier tubes) were tried, but never obtained successful result. After all effort has spent, finally

in 1936 put in mass-production process. In 1936 various transmitting tubes including **C-167**, a water-cooled type, have finally put in mass-production. We had tremendously tough time to achieve the result.

In December 1937 we received certificate from Japan Broadcasting Society on **KX-12B** (rectifier) and **UX-26B** (receiving tube), and further, production of **KX-80**, **UY-27A**, **UY-56** and **UY-24B** have commenced.

In November 1939 we completed prototype of **FB-325A**, transmitting tube, and put it to commercial production. This tube was a special one for our company, and used exclusively for aircraft. Its production has continued as our main product.

Note: Kawanishi has taken over by TEN, then by Fujitsu ----- Ed.

d) **Miyata Co.** (p.p.: 103):

“In 1918, the Fleming and De Forest type tubes were produced in Miyata Co. as a subcontractor of Shimazu Co. by the request of schools.

e) **Riken Vacuum Industries** (p.p.: 77)

“The validity of Langmuir’s patent terminated which many vacuum tube manufacturers had long a grudge against. As if a dam had broke, Riken Shinkukan Kogyo (now Hitachi) was born.

f) **Others** (p.p.: 105-106)*1:

“There were medium and small sized companies who produced tubes: NVV vacuum tube of Japan Vacuum Tube Company, TVV vacuum tube of Tokyo Vacuum Bulb Company, Elevam vacuum tube of Miyata Company*2, OK vacuum tube of Okada Trading Co., Rajia vacuum tube of Koeisha Industrial, Eiro-bulb of Chiyoda Company, Low-loss vacuum tube of Oriental Trading Co., Best vacuum tube of Yasuda Lamp Company, NDK vacuum tube of Nippon Electronic Industry, Don vacuum tube of Don Vacuum Tube Company, HW vacuum tube of HW Vacuum Tube Company, KO vacuum tube of KO Vacuum Tube Company, Eastron vacuum tube of Easton Vacuum Tube Company and Noble vacuum tube of Ohta Vacuum Tube Company”.

The hard triode **NVV-6A** made by the Japan Vacuum Tube Company had a high reputation and was used in the television receiver of 1927.

Notes: *1: In the original book in Japanese, it says “They have appeared up to beginning of radio broadcast”. ----- Ed.

*2: Miyata Company is the same one as appeared in 2) d).

3) Other Tube Makers no detail has found yet

There are still few tube makers who are not found record yet.

Following list (as of 1944-45) in “History of Electron Tubes” shows Hitachi and

Table 2.2. Damage of major receiving tube manufacturers due to air raids.

Name of company	Name of plant (Location-city)	Air raid		Production (10 ⁴ pieces)		
		Yes/no	Date	Extent	Before ¹⁾	After ²⁾
HITACHI	Mobara (Mobara)	YES	1945/8	0	4.7	4.7
KAWANISHI KIKAI	Gifu (Gifu)	YES	1945/7	7.5	10	0
MATSUSHITA DENKI	Osaka Ebisubashi (Osaka)	YES	1945/4	0	0.5	0.5
NIPPON DENKI	Tamagawamukai (Kawasaki)	NO		—	17 ⁴⁾	0 ³⁾
NIHON MUSEN	Ohtsu (Ohtsu)	NO		—	0	0.2 ⁴⁾
	Mitaka (Mitaka)	NO		—	3	3
	Suwa (Suwa)	NO		—	0.2	0.2
	Hamamatsu (Hamamatsu)	YES	1945/6	10	1	0
TOSHIBA	Horikawacho (Kawasaki)	YES	1945/4	3	60	10 ⁴⁾
	Yobe (Himeji)	NO		—	2	2
TOTAL					98.4	18.6

1) At about the end of 1944.
2) At about June to July of 1945.
3) Due to the transfer of all manufacturing equipments to evacuation plants.
4) Estimated by Osamu Ikeya.

Matsushita (now Panasonic) made tubes during WWII, but no information has found up to now. Hitachi took over Riken {see 2) e) above}, and **table 2.2.** shows that they were making tubes at that time. But unable to find tube types or year of manufacture during the time period..

We know Matsushita made vacuum tubes, but their products are only known as Philips types which appeared long after WW II.