TUBE COLLECTOR

TUBE COLLECTORS ASSOCIATION

"HISTORY • PRESERVATION • APPLICATION"

Vol. 12 No. 5 October, 2010

TUBE COLLECTOR

TUBE COLLECTORS ASSOCIATION, INC.

PO Box 636, Ashland, OR 97520, USA

The Tube Collectors Association is a nonprofit, noncommercial group of individuals active in the history, preservation, and use of electron-tube technology. *Tube Collector*, its bulletin, appears six times per year.

To join TCA: annual dues is $20.00 (in North America; $25.00 elsewhere), to the address above. Please make checks payable to "Tube Collectors Association." Payment by PayPal is welcomed, to *tca@jkasystems.com*. The membership year runs January-through-December. Those joining after February receive the year's back issues of TCA publications. Multi-year memberships are offered: in North America, $37 for two years or $54 for three; elsewhere, $49 for two years or $73 for three.

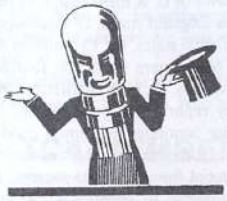
Articles on tube topics are invited. Editorial correspondence should go to the editor at *tubelore@jeffnet.org* or **102 McDonough Rd., Gold Hill, OR 97525**.

Renewals, changes of address, and other membership business should go to Bob Deuel at *tca@jkasystems.com* or **PO Box 636, Ashland, OR 97520**.

FRONT COVER: Hisashi Ohtsuka inspecting an LRS Relay at the Technical Museum in Stockholm. The tube, and a Telefunken amplifier that uses it, are being loaned to the museum of the University of Electro-Communications in Tokyo. This greatly enhances the excellent tube collection that Ohtsuka donated, and that he has continued to support (see *TC*, April 2005, p. 1, and Oct. 2009, rear cover). *Photo: Bengt Svensson*

REAR COVER: A dealer sales aid featuring the "Selling Fool" doll, which originated with the famous cover / commercial artist Maxfield Parrish about 1926. There's a little commercial archaeology here: the "ST" bulb on the tube indicates that RCA was still using the Fool into 1932 or 1933. *Image: Joe Knight*

MICROPHONICS FROM THE EDITOR



2010 TCA AWARDS WINNERS

The Schrader Award for collecting goes to Allan Wyatt for his extensive National Valve Museum, a virtual museum available at heep://www.valve-museum.org. It has an emphasis on British tubes / valves. It contains chronology, photos, reprints of articles, reproductions of advertisements, etc. It is indexed and searchable digitally.

Wyatt's site offers a DVD of his content. We have a copy on order and will review it upon receipt.

The Stokes Award for Documentation has been given to Adri de Keijzer for his product, the CD-ROM Electronic Valve Specifications for Common Valve (CV) Tubes, produced in 2009. It reproduces thousands of pages of rare information, seldom seen on paper. (See *TC*, April 2009, p. 21.)

Besides the cited project, de Keijzer also assembled the RCA HB-3 data super-binder on CD-ROM (*TC*, Dec. 2009, p. 10).

DILKS WINS DOUBLE

Only partially related to tubes, but noteworthy: John Dilks, K2TQN, has been given the 2010 Houck Award for Documentation presented by the Antique Wireless Association. The basis is John's 11-year series of "Vintage Radio" articles in *QST*. He had previously taken the 2002 Houck Award for Preservation, based on his radio collection and "mobile museum" project. This makes him the first person in the 39-year history of the awards to capture both. This calls for congratulations!

Jim Cross speaking on the GE "dot" code at 2010 member meeting

IN THIS ISSUE

picturing the output resonant circuit. In a triode it may be a rather long lead from the plate to the cathode connection. It may even be impossible to get a first-quarter-wavelength-mode resonant circuit at the upper frequency limit and one must resort to multiple-quarter-wavelength-mode operation. One must also consider the internal cathode-lead inductance since it is also a common circuit element with the input circuit. That part of the cathode circuit that is common to both the input and output circuit provides a coupling that is degenerative.

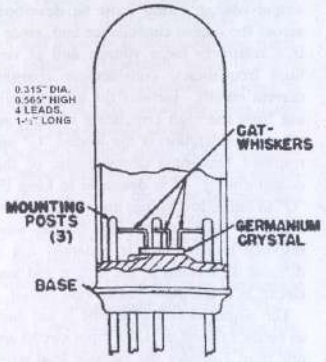
The output circuit of a tetrode may be considered as a circuit formed of the anode and screen, and as such is simpler than the triode output circuit. The screen lead may be made closer to the anode and of large low-inductance design. Because of the availability of the screen connection and because the output capacitance of a tetrode is lower than in an equivalent triode, the output resonant circuit can be made first quarter-wave resonant mode at a higher frequency than in a similar triode. Also, because the output capacitance is lower, the permissible load impedance is higher in a tetrode than in a triode, keeping in mind the 5 mc bandpass requirement in both cases.

Recalling that the driving-power requirement is similar between the triode and tetrode when operating near the limit frequency, and because a higher load impedance is available in the tetrode because of the lower output capacitance, the overall gain-bandwidth product of the tetrode is superior to the triode. The tetrode becomes increasingly superior to the triode as the frequency is lowered away from the limit frequency.

The input and output circuits of a tetrode lend themselves to connections to convenient and isolated cavities. The input circuit is considered to be simply that circuit formed by the cathode and cathode lead, and the grid and grid lead, together with any additional external circuit added. The output circuit is considered to be the anode and anode lead and the screen grid and screen-grid lead together with any additional external circuit added. This simple isolation of the two circuits is possible in a tetrode and not possible in a triode. Because of this isolation, the physical and mechanical aspects of the external circuitry are simplified when using the tetrode.

SYLVANIA TETRODE TRANSISTOR

Radio-Television Service Dealer, Nov. 1953



Sylvania has developed a so-called "tetrode transistor" and now is making final tests on a so-called "pentode transistor" that is expected to become commercially available later this year. Development of the tetrode and the pentode transistors complements Sylvania's work in triode transistors which the company is now producing commercially.

THE AUDION OF THE "INSTITUTO DE FÍSICA DE LA PLATA"

Abel Santoro, LU8DXI

During 1920 the progress of wireless in Argentina was very important. In this year several home experimental stations were put to work in Buenos Aires and La Plata town.

In the year 1884 the "Universidad Nacional de La Plata" (La Plata National University) was organized and in 1906 was established the "Instituto de Fisica de La Plata" (La Plata Institute of Physics). At this institute two scientists were experimenting with wireless communication, Mr. Alberto Nicolás Eliçabe and Mr. Juan A. Otero.

Fig. 1. Mr. Eliçabe and his station

Mr. Eliçabe built a wireless station at the Instituto de Física, to transmit in telegraphy and telephony modes. He employed the De Forest and Telefunken audions of that time. Figure 1 shows him operating the station in early 1920.

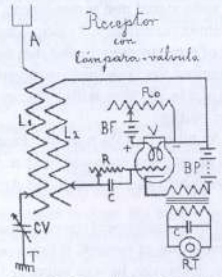


Fig. 2. Receiver schematic

Figure 2 shows the circuit of the receiver of this station. The receiver of this station was a Tesla system with a variable condenser CV in the aerial-earth path. The valve V has its filament heated by a battery BF of 4 to 6 volts, and the filament power is controlled by rheostat Ro. The plate of the valve is connected to another battery BP of 30 to 40 volts.

Figure 3 shows Mr. Otero, while Figure 4 depicts the staff of the Instituto de Física, where the first person sitting on the left is Mr. Eliçabe.

Fig. 3. Mr. Otero on the air

Fig. 4. Institute staff

The high price of imported audions at that time suggested to Mr. Eliçabe and Mr. Otero the idea of making them in the laboratory of the Instituto de Física. After several unsuccessful tries, their first audion, made about June 1920, worked well. This tube, named the Magnotron, was probably the first valve ever made in Argentine. Figure 5 shows a photo of this audion, while Figure 6 is a photo of a relaxed Mr. Alberto Eliçabe in later life.

ACKNOWLEDGEMENTS

- Architect Carlos A. Eliçabe, grandson of Alberto N. Eliçabe
- Universidad Nacional de La Plata
- *El Argentino* newspaper, La Plata, November 28, 1920
- *Caras y Caretas* magazine, Buenos Aires, June 20, 1920.

Fig. 5. First locally made audion

Fig. 6. Mr. Alberto Eliçabe later on

RCA FIELD SALES REPORT - 6C4 AND 6F4

From Military Sales files in the Dowd-RCA Archive, a holding of the AWA Museum.

April 1, 1951

R. L Kelly

Customer: Stoddart Aircraft Radio
Location: Los Angeles, Calif.
Date: April 3, 1951

6C4: I talked with Al Parker concerning their problems with the JAN 6C4. He reported they have found almost 30 of a shipment of 250 unusable in their circuit due to "loose elements." Two are used in an electronic voltmeter circuit very similar to the voltomyst circuit and rejected tubes cause what they consider an excessive and erratic shift of the zero position of the meter when the tube is tapped sharply. He states they have used our 6C4 before in the same circuit with no trouble and that he does not believe that the rejected tubes are within JAN limits. I pointed out that his requirements on zero shift and the tap were very severe, as they strike the tube very sharply. Samples of rejected tubes have been sent to the Application Group for comments.

Stoddart also has experienced trouble with grid current since, due to other circuit factors, they use a 5.6 megohm resistor in the metering circuit. Since their circuit is designed to give full scale deflection with about four volts signal and is non-linear, they require extremely low grid currents. I told them JAN limits permitted 1.5 micro-ampere but that our product definitely ran on the order of tenth of a micro-ampere and that there was little possibility of radical improvement there. I suggested the possibility of dropping the heater voltage slightly. At present, they are able to age in all tubes with a twenty hour aging at about 1.5 watts dissipation and normal heater voltage.

6F4: They have re-examined approximately 65 tubes (a 25% rejection based upon 300 tubes) previously rejected for cracks and flaws around the seals and have accepted all but 15 (5% rejection). Samples of tubes rejected were previously sent to the Application Group for comment.

Al Parker said they are planning a redesign of their instrument covering the 15 to 400 mc range and will stress miniaturization. He did dot know, at present, if this would include sub-miniatures in place of miniatures now used. However, he was interested in the possibilities of the 6BQ7 for this job and I called his attention to the ISL bulletin on this tube.

/s/ W. H. Robinson
Appl. Engr.

THE TUBE-BASE ASBESTOS RACKET

Ludwell Sibley

Based on a talk at the 2010 member meeting

Bakelite plastic has been around for a bit more than a century. It's been largely displaced by more modern materials but is still commercially available under a variety of trade names. It's a phenol-formaldehyde resin, filled by addition of a healthy amount of wood flour or possibly ground mica, powdered glass, or asbestos.

In recent years a culture has grown up: there is asbestos in tube bases, and it can give the user mesothelioma, a nasty lung cancer. A Web search on "tube base asbestos" brings up three sponsored links to asbestos-chaser law firms, followed by an article by the writer, "Tube Bases and the Asbestos Hustle," from the January 2008 issue of the *AWA Journal*.

Nobody in the tube-collecting community is intimately connected to the flow of litigation, but there have been at least three lawsuits in which the plaintiff claims to have been injured by asbestos. (There was another case in which the cancer victim said he had gotten the disease from sanding paint off a Bakelite radio cabinet.).

No matter how big a fantasy the whole matter is, attorneys are reluctant to take a case involving a dying patient and a deep-pockets corporation to a jury. Hence there is substantial leverage for the plaintiff and defendant to settle out of court.

In the latest case, the aggrieved party had been a mobile-radio technician in the days of tube radios. The defending law firm had obtained, at whatever cost, xerocopies of the tech manuals for a dozen or more radios - base stations and mobiles - of a brand the plaintiff had worked on. It was a quick matter to scan the books and determine the tube types that were used. There were an ocean of miniature types, a few Loktals in the base stations, a raft of 2E26s and a smaller constellation of 6146s in the transmitters, plus an 829B and a 5894. One of the 450-MHz stations used a 6897 disc-seal type. The base stations used a mix of solid-state and 5R4GY rectifiers.

A tube-conscious individual may realize that not one of those tubes involved Bakelite, with or without a dangerous filler. The 2E26, 6146, and 5R4GY all use Micanol mica-filled compound. There's no way those tubes could have exuded asbestos!

The case has recently been settled, hopefully at less cost to the defendant than without research into the tubes.

Just to get the matter into the TCA record, here's RCA's internal doctrine on base materials [1]. Four materials are mentioned:

(A) "[A] general-purpose, wood-flour-filled black phenolic material used on most receiving and picture tubes. A wide variety of grades of this material was used for different applications. For example, picture tubes, which usually operated at high voltages, required a base grade having a high dc resistance; receiving tubes were usually not critical as to base resistance."

(B) "[M]olded melamine, a material of very high dc resistance which, because of its high shrinkage on aging, is not used very much . . ."

(C) "Plaskon, an alkyd-type material used mainly on phototubes or other tubes requiring bases that would maintain extremely high dc resistance under adverse moisture conditions. Plaskon has the one disadvantage of being very brittle and easily cracked."

(D) . . ."Micanol, a mica-filled phenolic. It is used for high-frequency applications, particularly on power tubes. Micanol has extremely good dc-resistance characteristics; is it, however, extremely difficult to mold and is more expensive than the other materials described."

Another internal training handbook has turned up lately, from Bell Laboratories this time [2]. It also reports ordinary Bakelite as being wood-filled. It is a concise description of the plastics industry as of 1940, and is worth repeating here. It does, however, omit Catalin, the non-filled, liquid