

TUBE COLLECTOR

TUBE COLLECTORS ASSOCIATION
"HISTORY • PRESERVATION • APPLICATION"

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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.

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To join TCA: annual dues is \$20.00 (in North America; \$25.00 elsewhere. Payment by PayPal is welcomed, to tca@jkasystems.com. If using a check or MO, please make it payable to "Tube Collectors Association" and mail to the address above. The membership year runs January-through-December. Those joining after February receive the year's back issues of TCA publications. Multi-year membership is invited, at: 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 welcomed. Editorial correspondence should go to the editor at tubelore@jeffnet.org or 102 McDonough Rd., Gold Hill, OR 97525.

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FRONT COVER: Joe Knight showing Jim McConville his official replica of the Lieben-Reiss-Strauss (LRS) Relay, made by Siemens & Halske, at the TCA meeting in October. The carton is emblazoned with warnings like "Achtung! Vorsichtig behandeln. Attention! Manier avec soin."

REAR COVER: A tube made in a Mason jar. See later in this issue. *Sibley photos*

MICROPHONICS FROM THE EDITOR



THIS MONTH'S COVERS

On the front, we see a freshly acquired replica of the Lieben-Reiss-Strauss Relay, produced by Siemens & Halske, one of the original makers of this icon of the Austrian-German electronics industry, and proudly displayed by Joe Knight.

On the back is a tube built into an ordinary Ball "Mason" jar, a vessel more usually filled with preserved fruit than with tube elements. This artifact was recovered from the basement of one-time "radio" author Abraham Binneweg, Jr., of Oakland, Calif. Binneweg had a strong run as a writer on short-wave receivers, beginning with *Radio News* in 1928 and extending into the '30s in *Short Wave Craft*. His "2-tube, 12,000 Mile 'DX' Receiver was reprinted in *SWC's 10 Most Popular Short Wave Receivers* in 1935.

The tube has planar wire elements supported on six 1/4" threaded brass studs extending through holes drilled in the glass. Each has a rubber gasket painted with sealing compound. One is drilled-through lengthwise and presumably acts as an evacuation tube.

Binneweg ran "Delft Radio" in Oakland. Modern-day writers (*Antique Radio Classified*, March 1995) have reported a suspicion that Binneweg was a pseudonym of Walter C. Doerle, also of Oakland, another popular writer on SW radios. It may have been the other way around, as Binneweg was writing a couple of years earlier.

In any event, Binneweg was a tube inventor! His U. S. Patent 2,343,849, "Radio Tube with Flattened Elements," applied-for in 1949, is a planar design that partially anticipates the planar tubes developed at Sylvania and Eimac soon after.

AWA AWARDS, 2012

The Antique Wireless Association has given its Houck Award for Preservation to TCA member Eric Wenaas, on the basis of his extensive collection of early (RCA) Radiola receivers and other equipment, as documented in his book *Radiola - The Golden Age of RCA*. The Tyne Tube Award went to our Ron Lawrence, based on the tube collection displayed on his "Radio Heaven" Web site, radio-heaven.homestead.com/menu.html.

For this year's TCA awards, see the meet report on page 3.

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It is appropriate to point that Wenaas has made a valuable contribution to tube history via his "Elmer T. Cunningham and the Vacuum-Tube Tangle" in this year's *AWA Review*. He examines the stifling patent situation of the Teens and early Twenties in far more detail than other writers like Tyne, explaining how Cunningham not only survived legal pressure from RCA but prospered.

the new Lee de Forest - King of Radio, Television, and Film. The Schrader Award for collecting is in the hands of Jim Cross, based on tubes displayed on his www.vacuumtubesinc.com, including tube history and features like the frauds depicted in his "Hall of Shame."



Cross (left) takes the Schrader plaque from Sibley

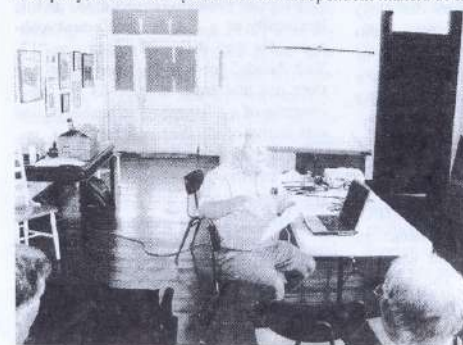
Deuel then addressed the Rimlock tube design, an eight-pin miniature format introduced by Philips in 1948 and expected to become "the new standard." Instead, RCA's nine-pin miniature format upstaged it. While it gained fairly wide use for a few years in European radios and TV sets, it is essentially unknown in North America.

Kent Leech displayed a few rare finds: a British

NT39, various European and British tubes, a freak Raytheon dual-plate 81, and the Mason-jar tube on the rear cover.

Cross reported his discoveries in the case of Sylvania's bold entry into graphite-anode transmitting tubes in the early '30s, and their abrupt disappearance from the market a few months later (think "RCA Trouble"). He covered the role of tube designers from other companies, notable Delbert Replogle of the De Forest Radio Company, and their diffusion from Sylvania into other companies in the Northern New Jersey tube scene.

Sibley gave an illustrated presentation on Charles Eisler and his Eisler Engineering Company, the most important of the independent makers of tube parts and machinery.



Deuel in mid-presentation

The auction, its offerings mostly catalogued in advance, contained 47 lots of tubes. Most of the sales of TCA surplus arose from generous contributions by Bill Wagner. Sales totaled a bit above \$900.

THE RAULAND CORPORATION

Abel Santoro, LU8DXI

The Rauland Company was founded in 1922 by Einar Norman Rauland, a radio enthusiast and inventor. In 1924, Rauland put his own radio station, WENR, on the air in Chicago, Illinois. In the '30s, the Rauland Company made equipment for public-address systems and radio equipment for the military.

In 1941 the company acquired the Webster-Chicago Corporation, dedicated to school communications systems, changing its name to Rauland Corporation. The corporation moved to 4245 North Knox Ave. in July 1941.

In 1942 the Rauland Corporation acquired Baird Television of America and began developing cathode-ray tubes, becoming an important supplier to the military during WW II. After the war Rauland began making picture tubes of 10" and 12" sizes.

In 1948 the Rauland Corporation was purchased by Zenith Radio Corporation, which was interested in the making its own picture tubes and other CRTs. At that point, Norman Rauland and George Borg launched a new company, the Rauland-Borg Corporation, continuing with sound and communications businesses.

A VIEW OF THE RAULAND CORPORATION IN THE '50S

The Rauland Corporation was a wholly owned subsidiary of Zenith Radio Corporation. The purpose of Rauland's electronic engineering was research in CRTs and related fields.

Rauland was oriented to the development and production of special tubes and other advanced electronic devices to military and industrial specifications.

This firm was composed of engineers and production managers with full knowledge of techniques of handling glass, metals, ceramics, gases, and phosphors. They had expertise in welding techniques, controlled-atmosphere firing of parts, refining of special oils, and other skills.

This company had complete research facilities and a staff including specialists in electron optics, photosensitive and infrared devices, metal-to-glass sealing techniques and tri-color tubes.

The company had automatic and semi-

automatic production equipment, much of which was developed and built in-house, such as metal-to-glass sealing machines, high-vacuum pumping and sealing stations, and baking and annealing ovens.

THE PLANT

Rauland Corporation had a modern, well equipped plant located on the northwest side of Chicago, convenient to rail, auto and air transportation. It boasted three rail sidings, more than a mile of flexible conveyor systems, and over 190,000 square feet of sprinkler-protected floor space in the main plant, much of it air-conditioned, plus an additional 45,000 square feet in outside plants.

Fig. 1 is an aerial view of the main plant.



Fig. 1. Drawing of the plant.

The research and engineering staff comprised approximately 60 scientists and engineers, a great many of them with advanced academic degrees, patents and published papers. Some offices are shown in Figs. 2A and 2B.



Fig. 2A. Office space

About 500 workers with above-average skills, intelligence and knowledge were engaged in the manufacture of Rauland electronic products.



Fig. 2B. Engineering area

Production was geared to the manufacture of high quality products, with quality control as an integral part of production to maintain high standards.

This plant had hydrogen, oxygen, fuel gas, city water, and purified water piped throughout the facility in stainless steel pipes and tanks. The plant had a fully equipped final inspection laboratory with air-conditioning, maintained to facilitate governmental inspection of the CRTs made there (Fig. 3).

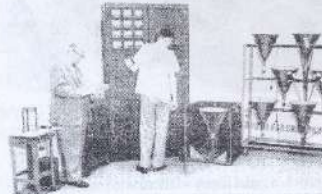


Fig. 3. Final-test area

RAULAND'S DEVELOPMENTS

Rauland made a complete line of cathode-ray tubes for TV sets and other applications, having an output of several thousand per day. These tubes were built to rigid specifications embodying many important features pioneered by Rauland and used widely throughout the tube industry. The capacity of manufacture was 3,600 tubes per day.

TYPES OF TUBES

Aluminized picture tubes: afford increased picture quality and brilliance which are used in television and in the entire tube industry.

Rectangular tubes: provide the largest picture in the available space. These tubes long ago became standard in the industry.

"Black" picture tubes: as developed by Rauland, provided a darker screen with improved picture contrast, clarity and detail.

Low-voltage electrostatic tubes: during the Korean War, cut the requirements for a critical material like cobalt to a minimum.

Travelling-wave-deflection tube TW-11 (Fig. 4): was a wideband oscilloscope tube with a balanced 125-ohm travelling-wave vertical-deflection system. The tube had a large field of view, approximately 4" x 1 3/8".



Fig. 4. TW-11 wideband display

Shutter image-converter tube (Fig. 5): This type of tube is used for ultra-fast photography with exposure times in the microsecond range. The tube uses electrostatic focusing and magnetic deflection.



Fig. 5. Shutter tube

Flat-face tubes (Fig. 6): Rauland research made tubes available with diameters of 12", 16" and 22" utilizing magnetic deflection.

High resolution picture tubes (Fig. 7): tubes of extremely fine definition for displays and closed-circuit television.



Fig. 6. Flat-face tube

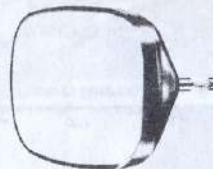


Fig. 7. High-resolution tube

FACTORY TOUR

Figures 8 through 18 (beginning next page) give a "virtual tour" of the factory.

THE MANAGEMENT IN THE '50S

The Vice President in charge of Rauland research was Dr. C. S. Szegho (Fig. 19). With the firm since May 1942, he held more than 50 patents, and had at least 20 technical papers published. His research staff included other highly skilled and experienced personnel. Dr. Szegho was promoted to Vice President in 1953.



Fig. 19. Dr. Szegho

The vice president and general manager of Rauland was W. E. Phillips (Fig. 20).



Fig. 20. W. E. Phillips

Fig. 21 shows the logo of the Rauland Corporation and the logo of Zenith (Fig. 22) after 1948.



Fig. 21. Rauland's ambitious slogan



Fig. 22. Post-1948 tag

RAULAND-BORG TODAY

Rauland-Borg is dedicated to communication-systems product lines like the: "Responder," designed for the healthcare industry and "Telecenter" systems which serve the educational market.

ACKNOWLEDGEMENT

To the President of Rauland-Borg, Mrs. Norm Kidder, for sending information about the company and allowing its use for this article.



Fig. 8. ConveyORIZED screen bake-out oven.

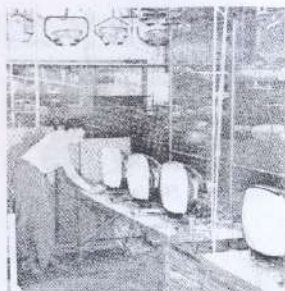


Fig. 11. Focusing check.



Fig. 9. Overhead conveyors virtually "double" the plant's floor space.

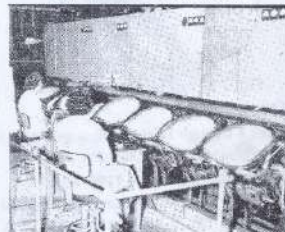


Fig. 12. A 17-point test procedure on the picture tubes.

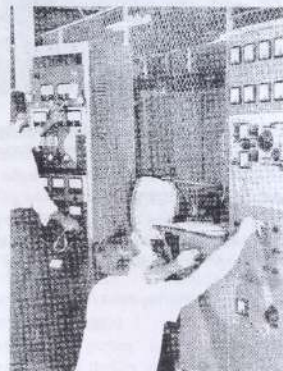


Fig. 10. Tubes off the production line get thorough engineering check



Fig. 13. Rauland machine shop.

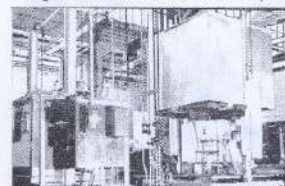


Fig. 14. Exhaust ovens for special tubes are typical of the complete facilities available for testing and experimentation.

Continued on p. 26

MORE ON RAULAND
Ludwell Sibley



Elegant doorway at the entrance to the Knox Ave. plant, ca. 1943.

Rauland's first company, the Rauland Manufacturing Co. of Chicago (maker of radio parts and sets under the "All-American Mohawk" brand) and its later history in the '20s, are detailed in Alan Douglas' first book [1].

Surviving the Depression the company acquired the Webster Electric Co., maker of "Amplicall" intercommunication units and Rauland-Webster PA systems, operating it as a division.

During WW II, the company held second-source contracts to make SCR-194 walkie-talkie radios. It produced equipment units of the AN/TRC-1, AN/TRC-3, and AN/TRC-4 microwave radio-relay systems. It received substantial praise within the Signal Corps for its performance [2]:

[Signal Corps inspectors] cited the Rauland Corporation as an example of active, progressive management. Rauland had

gathered together a supply of most of the critical materials and items under its own roof or at nearby plants. Unable to get critically short variable air condensers for the SCR-211s [*heterodyne frequency meters*] it was building, Rauland built its own condensers, and had enough to supply Zenith Radio Corporation as well, relieving the strain on the principal supplier.

The company bought GM Laboratories, another tubemaker in Chicago, and introduced a line of phototubes in late 1944 under GM's existing "Visitron" brand.

During the war the company, besides making radar indicators like the 12DP7 CRT, heavily advertised its capabilities in picture tubes, including quite a range of large projection types. A central theme was "Electroneering Is Our Business." One gets the impression that it was planning to make complete TV sets after the war. It was not strongly active in the consumer market in the early postwar years,

but did produce the 546T "All-American Five" table radio ca. 1946.

The company, both standing alone and during the Zenith years, registered about 220 CRTs, mostly B&W and color picture tubes but a good number with "radar" and other non-TV phosphors. The registrations extended from 1945 to 1980. On the theory that when registrations of new tubes end, the company is "over," that might give an idea of when activity slowed. One non-entertainment tube type that originated there was the 8098 dual-gun scan converter, for uses like remote narrow-band transmission of radar video. The company did, however, produce a good many nonregistered types, some of them quite bizarre, like light intensifiers / night-vision tubes, shutter tubes, and a data-recording display tube with oval face. The tube plant and its equipment were auctioned off in late 1999 [3] as part of the general liquidation of Zenith.

Peter Keller's CRT book [4] covers various innovative picture-tube designs that came from Rauland. The company's official history claimed that it was the sole source of picture tubes for Zenith TV sets.

The company offered a line of receiving tubes to the renewal trade under its own name. These were almost exclusively of RCA manufacture, and carried the "274" source code. Zenith apparently caused this line to be dropped, ca. 1960, in favor of a "Zenith" brand that was largely of non-RCA origin. As of 1961, the Zenith line comprised 533 types, a typical breadth

for a renewal vendor.

The Rauland-Borg operation, in addition to commercial sound and intercoms, produced some consumer goods. Their products in Sams Photofacts range from 1947 to 1958. An example is the HF-355, an 18-tube AM-FM receiver of substantial circuit design from 1956 (Folder 332 Set 13).

E. N. Rauland died in 1977, aged 77.

REFERENCES

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2. G. R. Thompson et al., United States Army in World War II - The Technical Services - The Signal Corps: The Test (Dec. 1941 to July 1943) (Washington: U. S. Govt. Printing Office, 1973 reprint), p. 171.
3. "Hard Times at Rauland," Tube Collector, Feb. 2000, p. 9.
5. P. A. Keller, The Cathode-Ray Tube - Technology, History, and Applications (New York: Palisades Press, 1991).

FURTHER READING

- G. E. Hausske, "Another Unsung Hero: E. N. Rauland," Old Timer's Bulletin, May 1992, p. 19.
- L. A. Sibley, "Rauland, Zenith, and Tubes," Radio Age, Oct. 2004, pp. 1-5. - - "The Rauland Story" Tube Collector, Feb. 2000, p. 9.
- A. W. Schmidt, "Work Activities (1941-1988) at Rauland," Tube Collector, Feb. 2000, p. 13.

NAMING THE TRANSISTOR

The Bell Labs memo below has been circulating around the Web lately. It illustrates the group dynamics of coming up with a name for a then-revolutionary invention. It involves some very high-powered talent, names familiar to anyone who has spent time with the Bell System Technical Journal. Besides the obvious Bardeen, Brattain, and their supervisor Shockley, we see H. S. Black (doubtless the same Black who brought us negative feedback), L. A. Meacham (namesake of the Meacham oscillator), and J. R. Pierce (well known for his work on the traveling-wave tube). There are plenty of other "famous figures." Thanks go to Mike Bach for forwarding this item. - Ed.

BELL TELEPHONE LABORATORIES B. T. L. CONFIDENTIAL
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COVER SHEET FOR TECHNICAL MEMORANDA

SUBJECT: Terminology for Semiconductor Triodes - Committee Recommendations - Case 38139-8

COPIES TO:

1 - Dept. 1000 File	MM-	48-130-10
2 - R. Bown - Case File	Date	May 28, 1948
3 - R. K. Potter	Author	L. A. Meacham
4 - J. R. Wilson		C. O. Mallinckrodt
5 - G. w. Gilman		H. L. Barney
6 - J. W. McRae		
7 - H. S. Black		Surface States -
8 - H. C. Hart		Terminology
9 - R. C. Mathes		
10 - C. B. Feldman		
11 - W. E. Kock - R. L. Wallace		
12 - J. A. Becker - J. N. Shive		
13 - W. Shockley	20 - J. R. Pierce	
13 - J. H. Scaff - W. G. Pfann	21 - J. G. Kreer	
15 - J. A. Bardeen	22 - J. O. Edson	
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19 - F. Gray	26 - H. L. Barney - E. Dickten	

ABSTRACT

Recommendations are made for an equivalent circuit representation, and terminology relating to semiconductor triodes.

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MEMORANDUM FOR FILE

This memorandum is a report of the recommendations of a committee which was set up* for the purpose of standardizing the terminology relating to semiconductor triodes. The need for such standardization is apparent, and it is hoped that these recommendations will be useful either in providing a