

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), 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, \$38 for two years or \$56 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.

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COVER: Some thermionic jollity for the season, by courtesy of Bengt Svensson.

MICROPHONICS FROM THE EDITOR



PLEASE RENEW NOW!

This is the beginning of renewal season. If your address label says EXP=12/09, please sign up for 2010 before the holiday distractions start. That'll let us get ready for the upcoming late-January mailing. Use of PayPal is welcomed warmly, and the dues schedule now gives greater discounts for two- or three-year memberships.

We are planning a great Special Publication for February: a technical bulletin from the AT&T Company from mid-1922 on public address systems. It's packed with information on Western Electric audio gear: mikes, amps, horn speakers, etc. It will be a big one, about 60 pages. Renewing now will make sure you get this product on time!

TCA TO INVADE CHARLOTTE

Ron Lawrence, president of the Carolinas Chapter of AWA, has invited us to participate in the annual Antique Radio Conference that the chapter is planning for March. The venue is the Sheraton Charlotte Hotel (704) 392-1200. The schedule is Thursday-Saturday, March 25-27. TCA will meet on Thursday morning. Details on the overall conference, and photos of a remarkable collection of early radios and tubes that will be auctioned at the event, are available at <http://charlottearc2010.homestead.com/index.html>.

DILKS: 10 YEARS OF QST

December's issue of QST will carry John Dilks' 120th "Vintage Radio" column. This is a remarkable record of service, with a great variety of writing from origi-

nal historical sources. John deserves congratulation for this feat!

AWA SITUATION EVOLVES

Since October's report on the dismemberment of the Antique Wireless Association, the members received proxy ballots to legitimize the decision of the club Board, reported in its "Official Journal," to disband and be absorbed by the Museum, and to fig-leaf the Museum Trustees' election of members to their group. (Someone must've read the bylaws.) The expected Board / Trustee elections ran true to form: X candidates for X positions, take it, leave it, or abstain. The secrecy continues as to the Association's financial troubles. The questions remain: how bad is the loss, and where'd the money go?

This affair is reminiscent of the 1994 action of the Antique Radio Club of America when it shut down and surrendered its member list and treasury to AWA. The club mailed out its *Gazette*, emblazoned "Final Edition," and enclosed a card for the members to retro-ratify the decision of its board.

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meets. The "best" ones are those that were not properly groomed of their obsolete sheets, and preferably include update packets that were never filed. A truly comprehensive HB-3 occupies far more binders than originally intended. When one assembles a good selection of pages over the whole span of the manual's life, it

is possible to fill ten of the high-capacity binders, or twice the "official" size. Sorting the pages requires a fairly long attention span for boring tasks.

Some binders have an odd aspect: they stink. That is, they exude a sweetish, cloying smell. The effect varies from one to another but can be quite noticeable. - LAS

REVIEW

HB-3 HANDBOOK ON CD-ROM

A new version of the RCA HB-3 Electron Tube Handbook is available, scanned and edited by TCA member Adri de Keizer. It should compete well with the currently available versions: the 10-volume / five-binder (i. e., modern-types-only) CD from Radio Era Archives in Dallas (www.radioera.com, \$80), and the farther-reaching but gap-ridden version on the Web at www.pmllett.com.

The HB-3 is a slippery item to nail down. Because new sheets appeared every quarter or so, and obsolete sheets were to be discarded to make room, there were perhaps 40 editions over the years.

The new product, with about 11,000 pages, is the "vector sum" of five (!) HB-3 sets and about 6 inches of obsolete sheets. No claim is made of absolute completeness, but the sheets included range from the earliest (1935) to the end (1972). Unlike the Web version, it includes photodevices, CRTs and picture tubes. It is cumulative, a "longitudinal study." While the paper HB-3 grew to about 1350 tube types, the new scanned version has about 2400.

An advantage of the scanned HB-3 over

other data sources (e. g., bound manuals, or TCA Data Cache) is that it covers RCA's 4000-series of nonregistered tubes. The Web version has only five of these.

A general index has been built up, because none of RCA's printed indexes cover the full contents. The auxiliary sheets on bulb shapes, bases, caps, etc. are included. There is a helpful "Readme" file.

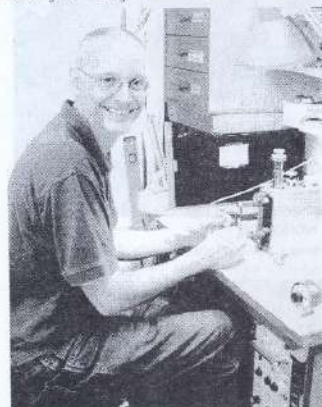
The author reports spending considerable effort on optimizing the PDF scans and cleaning-up the results. This parallels his successful clean-up effort expended on scans of British CV-valve specifications (TC, April 2009). He was able to keep the file size down to CD-ROM level at about 505 megs.

The disc is available from Rod Burman's Valve and Tube Supplies, www.valves.uk.com. It appears to give about twice as many tube types as the Radio Era Archives disc, at about a third the price. The scans are crisp and clean (no soldering-iron burns!). While esthetics shouldn't matter much for a product likely to be copied to a hard drive and then filed, the jacket design is quite professional and attractive.

HOME-MADE VACUUM TUBES THE WORK OF DR. RÜDIGER WALZ IN GERMANY

Abel Santoro, LU8DXI

How many people in the world have made vacuum tubes in their homes? This is a good question. The best documented case I have seen was that of Sam Diaz Punara. I found him in an article that appeared in *QST* magazine for April 1965, in which Sam shows some tubes made in a complete workshop in the basement of his home in Pennsylvania. [The article is reprinted in the August 2003 issue of TC - Ed.]



Dr. Walz at the spot-welder in his shop

According to John Stokes, one of the first individuals to home-make vacuum tubes was the radio amateur Harold Ross, W6IS, in Baldwin Park, California, U. S. A., in the '60s. Also in the U. S. A., the late Phil Weingarten reproduced some old valve types. Between 1986 and 1989 O. Künsel and G. Bogner made some type WD-11 tubes in Ulm, Germany. In England, Gerald Wells and Peter Brian build up a small workshop for this purpose. Also in England, Philip Beckley was reported to replicate some R-type tubes in 1979. In France, M. Beaujean too tried to rebuild valves at the end of the '80s. In the nineties the "Vaie" laboratories started to make TM replicas in the Czech Republic. These same replicas are made today by "KR Audio Electronics."

One of the few people still making vacuum

tubes as a home hobby is Dr. Rüdiger Walz. Dr. Walz was born in Germany in 1956; he has a Ph. D. in chemistry and has worked in that industry since 1985. Today he is general manager of a chemical company.

In June 1983, Walz and his friend Franz Pemmerl started to rebuild old radio valves as people did in the '20s.

Dr. Walz informs us: "A lot of things had to be learned, and a lot of failures resulted in a certain know-how. For all those who imagine building valves as hobby, I would like to give an insight into my hobby workshop.

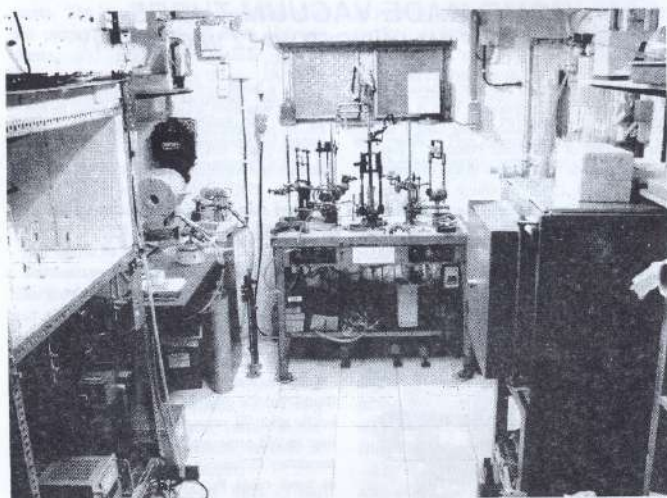
RECREATE OR REPAIR?

Repair is more difficult. By experience we found that the glass of an old valve becomes brittle after 70 years, so it is very difficult to join an old press with a new bulb. When is necessary to remove the base of an old valve, in most cases the copper wire breaks just where it comes out of the press.

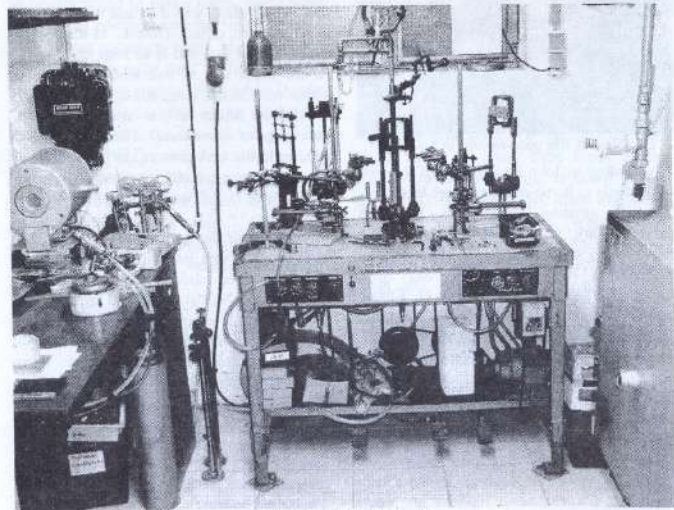
To recreate an old valve, one needs a lot of special materials. The press is made with a special lead glass, with a unique wire melted-in. This wire, called "Dumet," is formed of copper-plated iron and is as long as 12 mm. At the upper end of this wire is welded a nickel wire 30 mm long, and at the lower end is welded a copper wire as connection to the base pins of the valve. The Dumet wire adheres to the lead glass of the press, so that no cracks occur and making an air-tight joint. Dumet wire is still used in light-bulb manufacturing.

The glass of the bulb has to be so-called "soft" glass which joins to the lead glass of the press. The modern glass compositions have a higher melting point and are not easy to handle in our machinery. With this glass, the wire for the press would have been a special wire, very difficult to obtain. Then the materials to make valves are glass tubing of different sizes for the press and the bulb, nickel as sheet for the anode and wire for the grid, which was not easy to obtain. Tungsten wire for the filament could be bought from companies still producing for the light industry, but to determine its shape in old books makes every order a risk.

After three-fourths of a year telephoning,



General view of workshop



Vertical-lathe bench

we got all the materials and started building valves.

When we started, it was not clear if it would be possible to build valves as a hobby. Will this work will be successful? How to get the know-how? Where to do it?

Dr. Walz tells us: "I am a chemist and have used vacuum technology in handling very sensitive chemicals, and I have had some experience in glassblowing too. The rest I learned about valve construction was from books of the '30s. My friend Franz Pemmerl had experience in metal-working and electronics. The workshop was built in the garage behind Franz's house.

The first prototypes were made together with a glassblower and were pumped in the chemistry department at the university where I was studying at the time.

The first valve type we decided to make was the British "R," similar to the French "TM," which is a simple valve with a pure-tungsten filament. The bulb is a good "fit" to our machine, which had been used for repairing light bulbs.

First we built the British type with a vertical mount, later the French type with horizontal mount, which is easier to make.

The first specimens we made used light bulbs as glass envelopes, but these bulbs were unfortunately of a diameter of 60 mm, compared to the original valve with its diameter of 55 mm. Believe it or not, the human eye can determine this difference easily, and the first prototypes of replicas look wrong. Some of them are still in use today.

The glassblowing turned out to be easy compared to the construction of the original step-shaped brass base, until we found a company to do this job for us. The turned metal bases that we used at first do not look well. Today the bases that we make of brass, with ceramic carrying the pins, look very well as original.

THE WORKSHOP

The workshop consists of two rooms of the size of a garage, with electricity, gas and water installed. Here a lot of devices and machines are necessary. All items are self-made or salvaged from discards of companies active in similar businesses. I will explain this, leading you through the building of one valve:

Starting material is glass tubing which must be cut into small pieces, using for this purpose a locally made machine. The small tubes are formed to a so-called disc in one end of the tubing. At the opposite end the Dumet wire is melted into a press and the mount is attached on this side. At the beginning we did not have a spot welder, and affixed the mount by soldering with copper solder, which resulted in nice red valves at the end due to copper vaporized onto the glass bulb. Later we got an old spot welder from a light-bulb company.

The stem with the mount is fused to the bulb and has to be cooled down slowly; therefore one needs a cooling oven. The valve now has to be pumped-down. During pumping the assembly has to be heated to 250 °C to remove the water film from the glass bulb, because water vapor reduces the lifetime of the valves. This process is done in a special oven which was locally made.

After two hours of pumping, a voltage of +200 V is applied to the plate and grid, with the current measured at 80 to 100 mA. In use later the valve will run with 50 V at 1-2 mA. The anode becomes red-hot and all occluded gases are removed with this process. The valve glows a nice blue due to ionized oxygen molecules in the bulb. After that the bulbs are melted from their exhaust tubes, forming the characteristic "tip."

Now the base is glued to the bulb, and the wires are soldered to the pins. After this the valves are tested for 24 hours and boxed.

GETTING EXPERIENCE

A lot of experience had to be gathered until "production" worked well. The first lot of valves were destroyed in an overheated oven because the failure of a thermostat.

As I already explained, light-bulb envelopes can not be used for the replicas, so special bulbs had to be produced by a professional glassblower because collectors like to have perfect replicas.

To get reliable seals the press has to be heated in a certain way; otherwise it is not tight. After a few years the old Dumet wire we got from a lamp works was corroded and the press was not tight anymore. It cost a lot of research to find the problem and order new wire.

We also started to build the Telefunken RE11 and RE71, and TM, valves with brass

bases, for which we developed in 1986 a special tool to insert and mount the ceramic which carries the pins in the bases.

Our valves have a marking "TM" or "Type RE 11" and a number, it is done with a rubber stamp and a special dye which is fixed by heating to 500 °C.

Inside, the word "Replica" and the year of building is pressed into the soft hot glass of the press so that the replica can be identified as such. Until the death of Franz Pemmerl in 1993, the year was signed as "19PWxx"; after 1993, "19Wxx" or now "20Wxx."

NEW DEVELOPMENTS

Besides the "R" or "TM" valves, we planned to make some usual German bright-emitter valves like the "RE11" (with Telefunken base) and "RE71" (identical but with European or Philips base). This was not very difficult: we needed only different bulbs, a little modification of our machines, and some support tools for making the mount and for making the anodes which have a special form and are stamped from nickel sheet with a special tool.

The next step was the development of more "modern" cathodes like thoriated tungsten or oxide-coated. We managed to get some special filament wire and are able to make valves like the Telefunken RE83 (Telefunken base) and RE89 (European base). These are universal tubes which can be used in every stage of radios up to 1927.

The more filament-current-saving counterparts "RE78" and "RE79," I could also produce but the filament is so thin (0.011 mm) that it is very difficult to handle and place in the middle of the grid. These valves with modern cathodes require a better vacuum and require the use of getters, in this early case magnesium, and special forming of the filament before use.

In Germany the company Blaupunkt (Blue Spot), supplied blue valves to the market in

1926, which were produced at Huth and later at Valvo. Due to the fact that these are very rare and decorative, we decided to rebuild them. Unfortunately, the blue glass is not easy to handle. The exhaust tube is located in the press, not at the top of the bulb, which results in a lot of waste. A lot of trials would be necessary to solve all the problems but for my hobby time it is a problem. Also, producing valves with oxide-coated filaments would require a lot of experiments which are costly and time-consuming.

In 1993 my friend Franz Pemmerl died, and I moved the workshop to my home near Frankfurt.

LOOKING TO THE FUTURE

I have a lot of desires: to make a Lieben valve, or rebuild Loewe multiple valves, or make neon lamps, etc., but all this requires time which is absorbed by the job and family leaving little time for my hobby.

I am proud to have succeeded in making valves on my own; to keep a small piece of this old know-how is my goal. In 1987 my friend Franz Pemmerl and I made a presentation to the Antique Wireless Association annual meeting and I was proud to receive the Tyne Award for contributing to valve history.

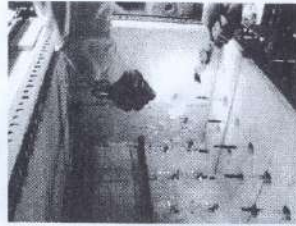
Today the demand for TM valves from my workshop is low and my job does not allow to spending much time on my hobby.

I also collect and restore radios from the 1920s to the 50s, especially those of interesting technical construction. I am also collecting literature about radios and valves.

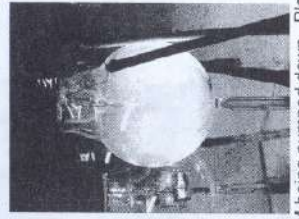
Twenty-six years after the start, I am still making valves in my home. I like this hobby and it gives me pleasure!

ACKNOWLEDGEMENT

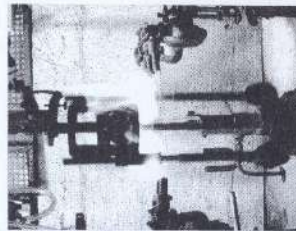
To Dr. Rüdiger Walz who sent me the photos and printed matter to make this article possible.



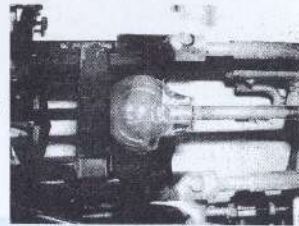
Tipping-off a TM in the pumping oven



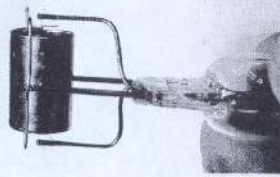
TM being pumped down. Plate bright red, gas glowing blue.



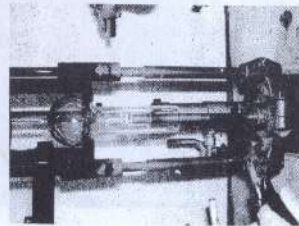
Bulb of TM being joined to stem



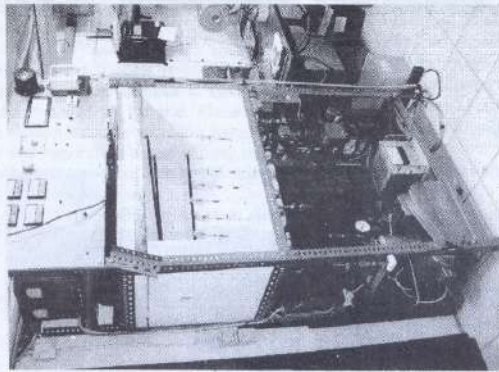
TM with stem joined to bulb



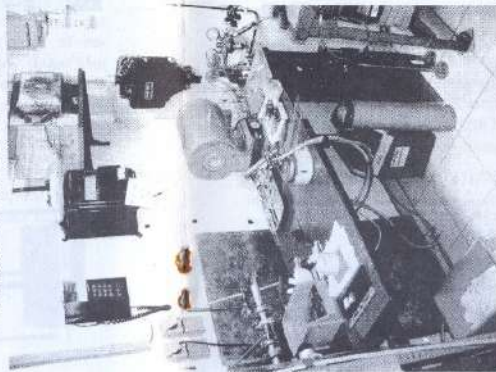
Mount for a TM valve



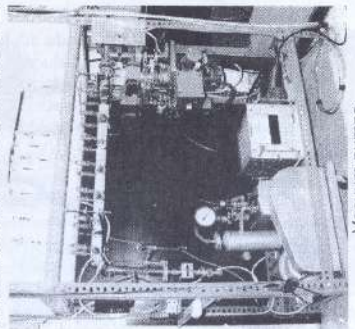
TM valve in vertical lathe



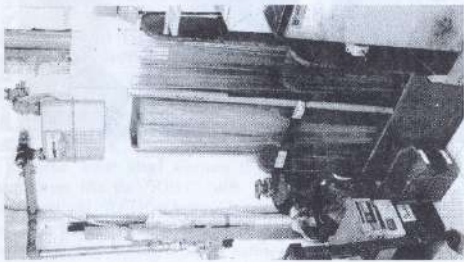
Pumping oven with a group of TMs



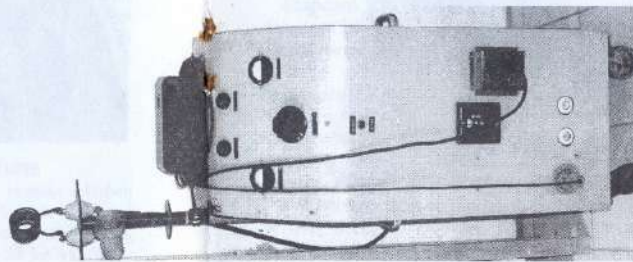
Glass-blowing burner with tray of TMs on bench



Vacuum pumps



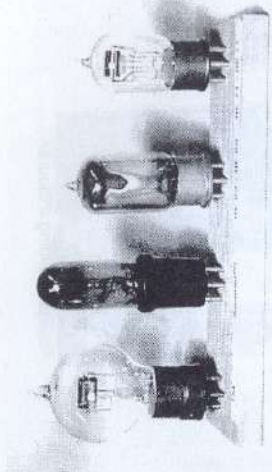
Rack of glass-tubing stock



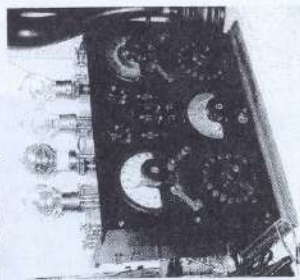
RF-heating generator with work coil at top



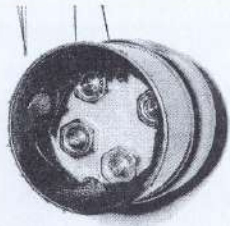
Spot-welding a mount



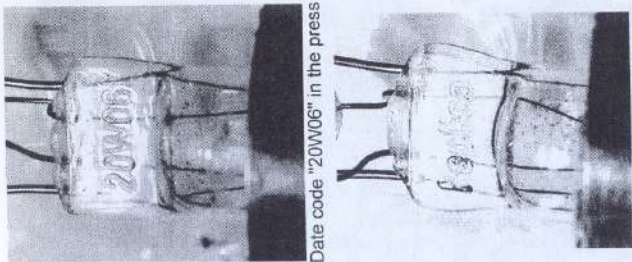
Early valves replicated by Dr. Watz



Vitus "Mondial" receiver with TM replicas



TM base with basing cement



Date code "20W06" in the press

"Replica" in the press

STC "WESTERN ELECTRIC" TUBES

The following information is excerpted from a 1991 letter answering an inquiry from now - TCA-member Attila Balaton, regarding the numbering of WE-originated tubes made in Britain by STC, the former Standard Telephones and Cables. There is no surprise here, but some of this may give useful insight.

Standard Telephones and Cables was formed in 1925, previously being part of Western Electric. The valve manufacturing factory in the UK is believed to have been using the 4000-series numbering since 1920 but no such early records are to hand. We enclose a copy of the Standard valve listing dated 1947 which shows a considerable number of valves equivalent to the WE types coded by the addition of a 4 in front of the WE code.

The 4000-series coding system was discontinued for new types in 1938 with the introduction of a picture code system to improve grouping of valve types, i. e., triodes, tetrodes, pentodes etc, in the catalogues.

We enclose data on the types that you list in your letter, i. e., 4101G, 4102G, 4104G, 4300A and 4310A. We can find no reference to a 4274B but do have a 4274A and a copy of the data for this is enclosed.

Note that although STC may have initially produced a direct equivalent to the WE type, development took place thereafter at STC which may have changed characteristics and outline. Thus the 4212E was replaced by the 4212H for a certain part of the public address/radio relay power amplifier market

Our records show that the last of the WE equivalent types and their developments were discontinued around the following dates:

4101G, 4102G, 4104G, no record	4300A, 1970
4104G, no record	4297Z, 1977
4274A, between 1971 and 1974	4304CB, 1972
4300B, 1977	4304CB (CV315) matched pairs, 1978
4310A, 1970	4313C, 1976
4212E, 1973	4328A, 1978
4212H, 1979	4328D (CV245), 1978

STC do not carry stocks of any of the above types although wholesalers in the UK may still have some available. Manufacture of vacuum tubes of a comprehensive modern range for the communications, military and industrial heating markets are currently being made by STC Electron Tubes at Paignton although the intention is to completely cease manufacture in the very near future.

The STC Electron Tubes letterhead (from Brixham Rd., Paignton, Devon) carried a tiny secondary identifier at the bottom, "Northern Telecom Limited." Evidently Nortel had some transatlantic partnership relationship with STC.

Much more detail on the STC - Micromesh - Standard - Brimar lines is available in Chapter 9 of Keith Thrower's *British Radio Valves / The Classic Years: 1926-1946*

The respondent at STC included a xerocopy of a small (5" x 7-1/2") pamphlet conveying a talk given long ago by an officer of the International Standard Electric Corporation, STC's parent within the International Telephone & Telegraph conglomerate. While not directly dealing with tube manufacture, it certainly covers some famous tubemakers like Nippon Electric or LMT and some obscure ones like Czija, Nissl, & Co. The original was stamped "HISTORICAL MUSEUM" and "MAR 7 1930." It is of general interest. Thanks go, of course, to Attila Balaton for providing this material. - Ed.