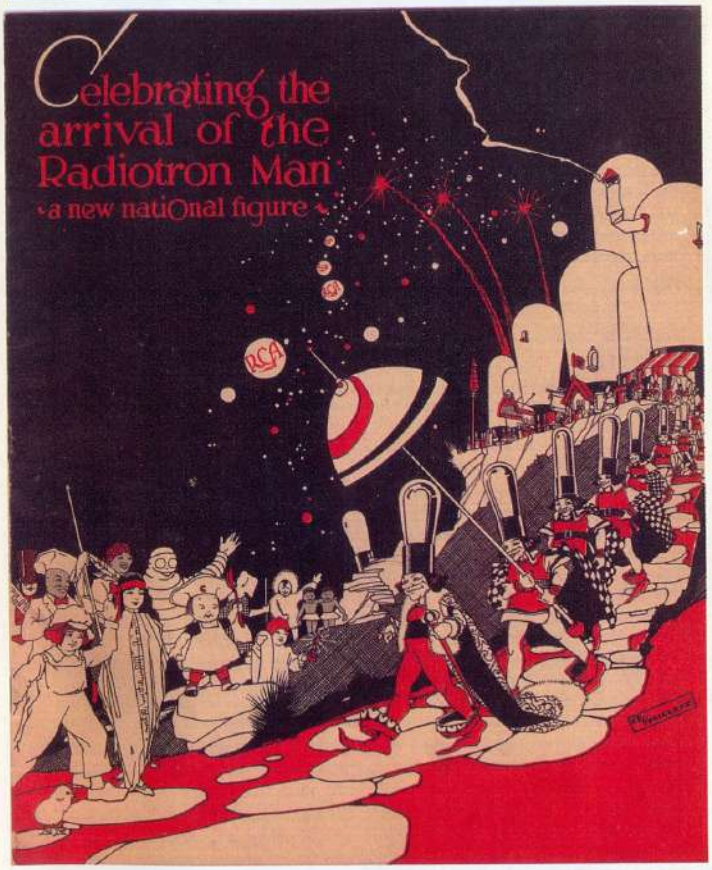

# TUBE COLLECTOR


**TUBE COLLECTORS ASSOCIATION**

*"HISTORY • PRESERVATION • APPLICATION"*

Vol. 11 No. 1 February, 2009


**Tenth Anniversary Issue**

# 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.




**Web Site**: *www.tubecollectors.org*

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Group moderator: Ron Lawrence, W4RON, *w4ron@carolina.rr.com*

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 *Tube Collector*. 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**.

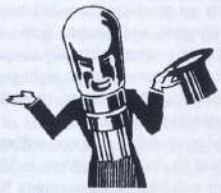
Renewals, changes of address, and other membership business should go to Bob Deuel at *tca@jkasystems.com* or **PO Box 636, Ashland, OR 97520**.




**FRONT COVER**: Illustration from an RCA dealer-promotion brochure of ca. 1926, "rolling out" a new symbol for RCA tubes, the "Radiotron Man." He was expected to join the, er, pantheon of logotypes for U. S. consumer goods: the "Argo Starch" Indian-maiden figure, the "Dutch Boy Paints" youth, the "Gold Dust Twins," the "Campbell's Soup" cook, etc. The goofy Radiotron Man appeared in three-foot high cardboard cutouts for display in radio showrooms. However, unlike his cohorts, he was apparently a one-season wonder. *Image: Joe Knight*

**REAR COVER**: See Editor pages. *Photos: Abel Santoro*

# *MICROPHONICS FROM THE EDITOR*



## "TEN YEARS OF TCA"

Well sure enough, TCA is celebrating ten years of supporting tube collecting, history, and use. It all began when heavy-duty collector Al Jones recruited Bob Deuel and Ludwell Sibley to form the initial staff and get the organization going. Other thermionically prominent individuals soon joined in as officers and writers. Meanwhile membership has approximately doubled from its initial level, and maintains a satisfyingly high level of foreign participation (about 14% from outside North America).

The TCA publications program has yielded 16 Special Publications so far, with more in the works.

Phil Rheinschild established the association's Web site early on. Jim Cross ran it for some years, and lately Norm Wilson has taken it over and has been adding improvements. The most important of these is a new "tube search" button that yields masses of Web references. Norm has also added links to a great variety of other tube-oriented Web sites.

A valuable service devised by Ron Lawrence is the email reflector (see inside cover for details), which has grown to 379 users and provides a powerful means to swap information on tube-related topics.

## THE REAR COVER

Abel Santoro has supplied scans of a huge variety of tube cartons as found in Argentina. As a sort of crossroads of the tube trade, South America harbored tubes of a wide variety of national origins. The samples shown here include local brands (SAIRA, Lumitron), the Philips empire, and Philco's line of private-branded replacement tubes.

The "K-R tubes" carton from New York City is unfamiliar in the U. S. The trade name sounds like a play on the "Ken-Rad" brand. The 15 Moore St. address puts the location at the extreme southern tip of Manhattan, not in the Canal St. zone where most low-budget electronics companies operated.

The RSD brand is apparently East German ("Röhren von Weltruf" = "world-renowned tubes").

## 2009 MEMBER MEETING

Thursday, July 9, at the Causeway Bay Inn (formerly Holiday Inn), Lansing, MI, 1 PM. Format similar to the 2007 meeting at the same site. Details will follow.

## FACTOID ON THE WE 224C

A fair amount is known regarding Western Electric's pioneering 224A cathode-ray tube. However, printed sources on WE tubes do not explain how the "B" and "C" versions of the tube differ from the prototype.

Joe Knight has lately come up with a brochure on the 224C. It turns out that

## IN THIS ISSUE


**More on the Tune-a-Lite**
Ludwell Sibley ..... 4
**Electronic Tubes in Wire Telegraphy**
Alder F. Connery ..... 4
**A Stereophonic Sound Transmission System**
Ifor Jones and Henry C. Knutson ..... 7
**Weird Tube(s) of the Month: the HI-PO 567; the Brach Vacuum Arrester** ..... 12
**The New Philips Rectangular Picture Tubes (A 1954 View)**
Contributed by Abel Santoro ..... 13
**Want Ads** ..... 17
**Four Related California Tube Makers**
Ludwell Sibley ..... 18
**National Radio Tube Co. Catalog** ..... 25
**Recent eBay Results** ..... 33
**1999-2008 Index** ..... 38

## WEIRD TUBE(S) OF THE MONTH

### I. THE HI-PO 567

We had a story on the Sheldon "HI-PO" 6S78, a premium 6SN7GT for TV use, in the October *TC*. This was said to be one member of a family of TV-upgrade tubes. At the time, no related tube was known. However, Bill Wagner has come up with a new-looking HI-PO 567, a rectifier built quite like a 5U4G but with gas fill.

Bulb. "HI-PO 567" appears on top

*Photos: Bill Wagner*

The gas, from the color of its glow, appears to be argon, xenon, or a mix. It does not seem to be mercury, as the bulb is completely clear and does not fog-up when the tube is placed in a freezer. The forward drop of the tube measures 25 V at 100 mA, vice 33 V for a vacuum 5R4GY.

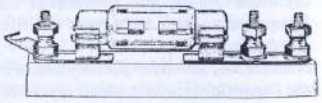

Base of 567

The October article reported that no advertising had been seen for the HI-PO line. Well, even after "trying harder," nothing has turned up. In 1951, Sheldon ran four ads in *Radio-Television Service Dealer*, and two each in *Radio-Electronics* and *Radio & Television News*, promoting their "Telegenic" picture tubes, but there was nothing before or after. There was also nothing in *Service* or *Successful Servicing*. Their page in the 1952 *Radio's Master* catalog offered picture tubes and power plugs, with no mention of the HI-PO line. Sheldon was gone from the 1954 *Radio's Master*.

### II. THE BRACH VACUUM ARRESTER

Previous issues of *TC* (Feb. 2003, June 2006) celebrated the VAC-M line of vacuum lightning protectors for telephone and telegraph lines. However, this brand was not the only player in this field. An ad in *Telephony* from 1914 shows a tubular glass-cartridge with fuse-clip ferrules. The vendor was the L. S. Brach Company of Newark, New Jersey, maker of telegraph keys and other apparatus. There is no statement of whether the device is a gas or vacuum type, but the 1921 *Railway Track and Structures Cyclopedia* specifically identifies it as being a vacuum type. The 1914 ad copy states:

> Brach Arresters have been victorious wherever put in service. They have overcome the forces of nature by keeping telephone lines clear of trouble. Our customers have written us, stating that they are well satisfied with the instruments, and the instruments have done all that we claim for them. Why not let Brach Arresters do the same for you? Our prices are lower than they ever have been, owing to improved facilities, without sacrificing the quality of our products.



The same company made "Vis-O-Glo" neon lightning arresters for radio antennas in the '20s, as well as a vacuum version. It later produced the "Vincent Rare Gas Relay," a two-electrode device for isolating ringers on multiparty telephone lines from ground to prevent noise.



## THE NEW PHILIPS RECTANGULAR PICTURE TUBES (A 1954 VIEW)

Contributed by **Abel Santoro**

Experience gained with the older types of picture tubes (the all-glass type with a round screen and the different types with metal cones) has led to the development of rectangular all-glass picture tubes, which are now in common use. This type has proved to be the most suitable form of picture tube, especially with respect to the dimensions and pleasant appearance of the receiver cabinet.

The most important features of the tubes described are: wide-angle deflection, magnetic focusing, and a heater suitable for series or parallel supply. These features, and the fact that this series comprises three tubes of different sizes, render the series very valuable to the set-making industry, since at all times a tube can be chosen which will meet the requirements of a certain set in all respects. In addition to the features mentioned above, these tubes have a gun of special design which ensures a very good picture quality over the entire screen area.

### DESCRIPTION

The MW 36-44, MW 43-64 and MW 53-20 (Fig. 1) are rectangular picture tubes with an outside screen diagonal of 36 cm (14"), 43 cm (17") and 53 cm (21") respectively. The tubes are all-glass types, and the heater voltage is 6.3 V at 300 mA, suitable for either series or parallel supply. Magnetic deflection is used with these tubes, the deflection angle for scanning the full width of the screen being 70°.

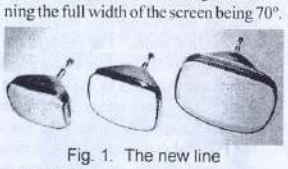


Fig. 1. The new line

### THE GUN

The gun is designed for magnetic focusing. This method of focusing has proved to give the best results up till now. The gun has an electron-optical system of special design, in which the accelerating electrode g4 is preceded by an additional electrode g3, so that the entire gun comprises a heater-cathode assembly, a first grid g1 for modulating the intensity of the electron beam, a second grid g2, a third grid g3 and an accelerating electrode g4 (Fig. 2).

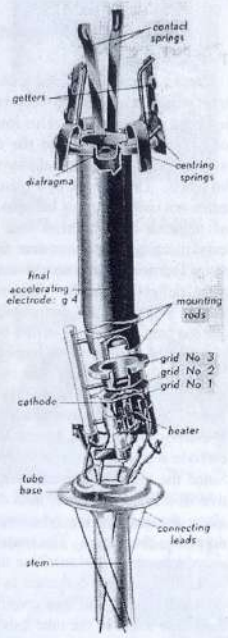



Fig. 2. The electron gun

When g3 has a positive potential of 400 volts, the beam of these tubes is 12% narrower than that of picture tubes having an electron gun of earlier construction, without g3. When g3 is connected to the cathode, the improvement is as much as 50%. A narrow beam offers the advantage that little trouble will be experienced from deflection defocusing. It may be deduced that the third grid g3 exerts a prefocusing action on the electron beam, so that, when the beam enters the main magnetic focusing field, the divergence is smaller than

with earlier electron-gun constructions.

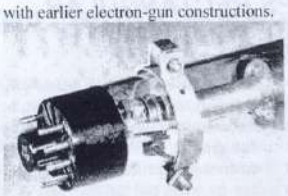


Fig. 3. Ion-trap magnet

## THE ION TRAP

These tubes are provided with an ion trap which prevents the occurrence of ion burn on the screen. This ion trap is of the bent-gun type, and the external magnet (Fig. 3), has a field strength of 60 gauss. The cathode of a picture tube emits not only electrons but also a beam of negative ions. These ions have a very much greater mass than the electrons and are far less sensitive to magnetic deflection fields. The result is that, in a conventional picture tube without ion trap, the centre of the screen is continually subjected to bombardment by the heavy ions, and this eventually leads to discoloration of that part of the screen. In the tube described, both the el-ectrons and the ion beams leave the cathode at a small angle to the tube axis. Since the electron beam is very sensitive to a magnetic field, it is deflected along the axis of the tube and passes normal to the screen. The ions, however, which are far less sensitive to a magnetic field, are not deflected to any appreciable extent, and thus continue on a line at an angle to the tube axis and are finally captured by the accelerating electrode. In this way the ions are prevent from reaching the screen.

## THE SCREEN

The face of the MW 36-44, MW 43-64 and MW 53-20 is made of filter glass and has a neutral grey color. This results in improved picture contrast, particularly when light from the illumination of the room impinges upon the surface of the tube. The incident light is reflected at the inner side of the tube face, and since this will also be the case in the dark parts of the picture, the contrast is thereby deteriorated.

By using a grey-glass face instead a clear one, a large proportion of the light is absorbed as it passes the face of the tube. It is true that this is also the case for the light emitted by the fluorescent screen, but the incident light must pass the tinted glass twice, resulting in a much larger reduction of intensity. The filter glass, moreover, advances the contrast in another way, by reducing internal reflections in the glass front of the tube.

The other way to obtain sufficient brightness with these large picture tubes, without the beam current becoming excessive, is by the application of a "Metal-Backing" process, coating the inner side of the luminescent screen with a very thin layer of aluminum of only a few hundredths of a micron thick. The electrons of the beam will still have ample energy, for an H. T. supply between 12.5 and 18 kV, which is used at the present, to excite the luminescent screen after having passed through this layer. In picture tubes not provided with this feature, a large portion of the light radiated by the screen is directed to the inner side of the tube, so that the brightness of the picture is reduced. Thus a tube having a "Metal-Backed" screen is about 70% higher than the light out put of a similar tube without the "Metal-Backing" process.

## CONE

The outside of the cone of these tubes has been provided with a conductive coating. This coating shields the tube against external electrostatic fields and reduces electromagnetic radiation from the electron beam. The capacitance between this outer coating and a conductive layer connected to the anode on the inside of the cone can act as a reservoir capacitor for the H. T. supply. For this, the external conductive coating must be connected to the chassis, otherwise it may attain a high potential and become a source of danger. The H. T. supply for these tubes varies between 9 and 18 kV. Failure of the deflection circuits may result in damage to the screen, unless provision is made to reduce the beam current automatically when the scanning fields are no longer present, by



an graduated arrangement of the H. T. supply, which is obtained from the line flyback, making sure that the anode voltage drops to zero when the line-output circuit ceases to function. A stationary horizontal line which would occur upon failure of the vertical deflection is far less serious than a stationary spot.

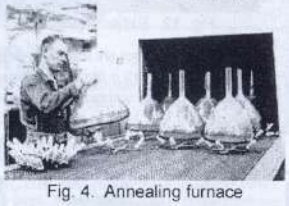


Fig. 4. Annealing furnace

## MANUFACTURE

The manufacture of these tubes in a big Philips factory involves several steps. The glass component parts of the tubes having been sealed together, the tube passes to a 20-meter-long tunnel furnace to remove contingent stresses in the glass (Fig. 4). Now the glass envelopes leave the glass furnaces, traveling through the entire factory by means of a specially designed conveyor belt (Fig. 5).

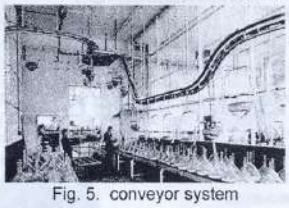


Fig. 5. conveyor system

The electrodes of the electron gun are fixed by fusing them to porcelain rods (Fig 6).

Fig. 6. Assembling the gun

Later the electrode system is carefully inspected through a magnifying glass before being sealed into the tube neck. The large box on the table contains a microscope for checking the distance between the cathode and the first grid of every electrode system (Fig. 7).

Fig. 7. Checking a gun

The screen is settled on the faceplate in a slowly rotating machine (Fig. 8).

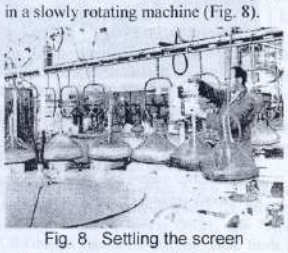


Fig. 8. Settling the screen

After the screens are settled, the tubes are dried by means of infrared lamps (Fig. 9).

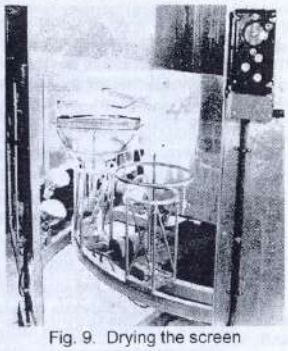


Fig. 9. Drying the screen

Fig. 10 shows the setup for aluminizing the screen of the tube. The flame in

the bulb is caused by the heating element by means of which the aluminum is evaporated. The electrode system is sealed into the tube neck in a slowly rotating machine (Fig. 11).

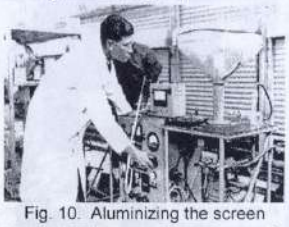


Fig. 10. Aluminizing the screen

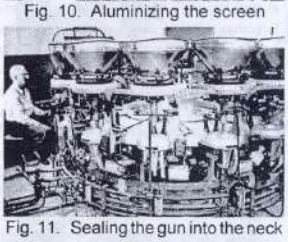


Fig. 11. Sealing the gun into the neck

The tubes are evacuated on individual pump systems. During this process the pumps travel with the tubes through a large tunnel where the tubes are heated to remove residual traces of gas (Fig. 12).

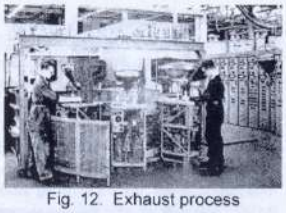


Fig. 12. Exhaust process

The finished tubes are tested for definition; the test pattern is obtained by means of the flying-spot scanner at the extreme right (Fig. 13).

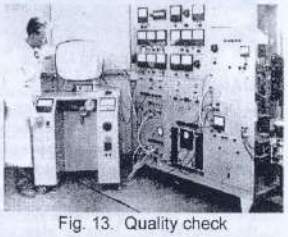


Fig. 13. Quality check

These new types of picture tubes were released to the market circa 1954.

**ACKNOWLEDGEMENT**

To Philips Electronic Tube Division, Eindhoven, Holland.

## NEW SYLVANIA TUBE LINE

*Radio Service Dealer*, April 1949

A new line of specially processed receiving tubes for replacement service in television receivers has been announced by Sylvania Electric Products Inc.

The new line of tubes is being offered to meet the critical needs of television receivers. They were designed to reduce the number of service calls required for tube replacement.

The new line includes miniature, GT, and Lock-In styles, including: 1B3GT, 6AG5, 6AL5, 6BG6G, 6J6, 6K6GT, 7B4, 7B5, 7C5, 7F7, 7H7, 7N7, and 7Z4.

The new tubes are identified by an orange branding, "Sylvania television Tube," and new orange and green cartons.

*[Has anyone ever seen one of these? - Ed.]*




## WANT ADS

Ads are offered for TCA members' (and nonmembers') convenience, in parallel via the bulletin and the club's Web site. We expect ads to be related to tube collecting / history / use and noncommercial in nature. We may reject any not meeting this standard and may edit ads for space. Ads may be emailed to n6jv@n6jv.com or mailed physically to Ludwell Sibley at 102 McDonough Rd., Gold Hill, OR 97525-9626.

We have a one-year automatic-timeout plan, so if you want an ad continued (or an old one reinstated), please advise.

### FOR SALE

U. S. Navy vacuum tube, type CFT-15E. Box says "Accepted Sept. 15, 1943. Mfg. by Federal Telephone & Radio Corp., Newark, N. J." $75. Virginia Chen, 2609 Dudley Rd., Kilgore, TX 75662, (903) 984-4259. *New 8-08.*

Books: THE CATHODE-RAY TUBE (Keller), a 314-page, hard-cover, 1991 comprehensive history of the CRT with approx. 300 photos and drawings and extensive references to 100 years of CRT literature. Covers television, oscilloscope, radar, avionics, photorecording, and computer CRTs. WINNING WITH PEOPLE: THE FIRST 40 YEARS OF TEKTRONIX (Lee), 326-page hardcover,1986. Prepaid price for either $69.50 ($62.50 to TCA members) + $6 S/H in the US. Peter A. Keller, 7445 SW Bayberry Dr., Aloha, OR 97007, peterke1@comcast.net. *(Rev. 4-08)*

Pair of candelabra screw (Audion size) to British B4 tube adaptors. These are two of six that the long time San Francisco collector, Floyd Lyons, acquired from Phil Weingarten back in the mid 1960s. Photos available. I have checked all connections and the screw base on both for continuity and there is none. There are flying leads for the plate and grid connections. I would take $40 for them including air-mail postage. Fin Stewart, 38 Primrose St., Wingham, NSW 2429, Australia, ferrowatte38@bigpond.com . *(Rev. 6-08)*

### WANTED

I am always looking for different transmitting tubes for the Virtual Transmitting Tube Museum. Tubes don't need to be good, but photogenic would be nice. More common types needed include the 100TL, 250TL, 152TL, HK354C, HK354D, HK354F as well as the less common 100TS and the 500T. Norm Wilson; n6jv@n6jv.com *(New 2-09).*

Two US Navy 38233 double-triode tubes as used in RU-series receivers ca. 1940. Richard Stoodley, G3UNW, Ragged House, Egerton Ashford, Kent, TN27 9ER, UK; brstood@waitrose.com

I am searching for a Chatham VC-1257 tube. Joshua Wurman; jwurman@cswr.org *(Rev 2-09)*

GE type 6355 tuning eye. Also, these globe-type tubes, any brand, prefer good, but will discuss duds: types 19, 28,48, 53, 64A, 65A, 68A, 75, 76, 78, 83V, 86, 87, 90, 291, 293, 94, and 96. Also, Eveready Raytheon types, not all globes: ER-1(V), ER 200A, ER 2525, ER 234, ER 42, ER 43, ER 44, ER 247, ER 48, ER 57, ER 59, and ER 84. Also Raytheon 4-Pillar types 00A, 01A, 1A6, 1C6, 6A8G, 6C5G, 6F6G, 15, 34, 49, 50, X99, WX-12. Jim Cross, 5260 Chiswick Cir., Orlando, FL 32812, (407) 816-8495, jim@vacuumtubesinc.com *(Rev. 2-09)*

DeForest 520 series tube for display. I know there was a 520B with water-cooled jacket, but let me know what you have. Also different brands of the 201A-series tubes for display. Also tube boxes, tube literature and very early tube testers for complementary display. Hal Kravig, PO Box 341361, Memphis, TN 38184 or call toll free (800) 859-4436. Email; hkravig@bellsouth.net. *(Rev. 2-09)*

Pandicon ZM1206, which has 6 Nixies inside one bulb (have a new ZM1202 for exchange); Inditron, National Union GI-21; any "NIMO" CRT-based Character Display Tube from IEE. Udo Radtke, radtke@tubecollection.de. *(New 4-08; run 6-08 also)*

Fermilab engineer (and TCA member) seeking plate curves on RCA type 7835 and/or RCA Technical Bulletin and Application Guide for RCA Super Power Tubes ICE-279A. These tubes are used at Fermilab in one of the accelerator systems. Have HB-3 datasheet but it is not detailed enough. I'd run the curves myself but I don't have a 20-kW power supply to heat the filament. Contact Daniel Schoo, KB9PYD, Fermilab, PO Box 500, Batavia, IL, 60510-0500, or email schoo@fnal.gov *(New 4-08)*

De Forest DV and DL Audion tubes in VG condition with FOK. Also De Forest tube cans. Ross Wollrab, 229 N. Oakcrest Ave., Decatur, IL 62522-1810, (217) 428-7385, REWollrab@aol.com. *(New 2-08)*

Collins C-100D info: pinout, ratings, schematics, applications,. Email: Jerry Brumm, N0LCD, baronscarpia@earthlink.net. *New2-08*