The Radio Collector™

October, 1994

Collecting Radio Peripherals

Part 4 - Vacuum Tubes

Last month we completed our coverage on books and periodicals, and from there it seems most appropriate to move on to vacuum tubes. What on earth might the two have in common? It's simply that any antique radio collector will need to be interested in these categories whether or not he or she is into collecting other radio-related items. One needs literature to help understand circuitry and carry out restorations; one needs tubes to keep the radios working.

Of course, just as with literature, tubes can easily become collectibles in their own right. They are interesting both as objects in themselves and because the evolution of the radio receiver is inexorably tied to their evolution.

The very earliest tubes are rare and expensive, but the ones manufactured after the introduction of radio broadcasting were mass-produced and are more available. Even the very early such types are obtainable at reasonably affordable prices. It's still possible to put together a definitive collection without being independently wealthy.

Ken Owens has provided us with a very fine basic history of the vacuum tube in the April, May and June issues. And we'll be taking a look at the evolution of the vacuum tube from a somewhat different perspective in a future series of articles. But, since no discussion of radio peripherals would be complete without some coverage on tubes, we'll now do a "once over lightly" orientation to the subject. Our goal: to explain the major changes that have taken place in the physical design and nomenclature of vacuum tubes over the years.

Colorfully-lithographed vacuum tube containers evoke the eras when they were designed. Many collectors find them just as interesting as the tubes they were intended to hold.

Physical Appearance

The most obvious feature of a vacuum tube is its physical appearance, and this has undergone many changes over the years. The first tubes widely used in broadcast receivers (early 1920's) had glass envelopes similar to those in the light bulbs of their time. They were pear-shaped (though some cylindrical styles were also in use), with the sealed-off air evacuation tube coming to a point at the top. A few years later, paralleling similar changes in light-bulb design, the tip was moved to the bottom of the envelope--where it would be protected inside the base.

Towards the end of the 1920's, a metal "grid cap" appeared atop the envelope of a couple of new tube types. This cap was the connection point for the control grid--moved to this location to free up a base pin for an additional element--the screen grid--that made possible a higher degree of amplification without danger of feedback and oscillation.

In the 1930's, the envelope changed once again--to the familiar double-curved shape technically known as the "ST" style. A little later in the decade, thanks to more compact tube designs, many new tube types (and some older ones) were released in a straight-sided, rounded-top envelope (the "GT" or "bantam" style) that was much shorter than the previous designs.

Metal-shelled tubes, having roughly the same shape and dimensions as the "GT" types also appeared, becoming available from many manufacturers as alternates to the glass types. Among the advantages of the metal tubes were that they were self-shielding--not requiring the sometimes-intricate metal shell assembly used with glass tubes in certain critical applications.

As Ken Owens points out, the last innovation prior to World War II (which marks the end of the classic period of radio development) was the 1940 introduction of a series of miniatures for battery portables. The new tubes were basically cylindrical in shape, like the "GT" types, but were significantly shorter and smaller in diameter. Since they were baseless (the tube pins protruding directly from the bottom of the envelope), the evacuation seal was moved back up to the top of the tube--where it had been on the earliest tube designs.

After the war, this type of envelope began to be used more widely--even on non-portable types--and eventually all but replaced the "GT" style.

The other obvious feature of the vacuum tube is its base. The earliest tubes used in broadcast receivers had brass bases but, by the mid 1920's, brass had given way to the more inex-

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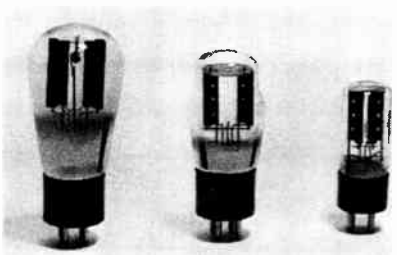
pensive and easier-to-shape Bakelite. Around the same time, the method of tube socketing also changed.

The early tubes had stubby pins and bayonet-mounted into their sockets like a present-day auto turn signal/taillight bulb. The modification involved lengthening the pins so that they could slip down through matching holes in a simplified socket equipped with spring-metal wiping contacts. For a time, the metal locating/locking pin used in the bayonet-mount system was retained on the base of the long-pin tubes so that they could be installed in either type of socket.

During the mid-1930's, as tubes became more complicated and required more electrical connections, the octal (8-pin) base was introduced. It was equipped with a central guidepost carrying a molded-on positioning key. Inserted into a mating opening in the tube socket, the post effectively prevented the tube from being inserted with the wrong orientation. A little later a variant of this system, the Loctal base, was introduced. The last major change in tube basing prior to World War II came with the introduction of the baseless miniature tubes already discussed.



Changes in type 80 show evolution of envelope style. Pear shape at left; "ST" (double curved) in center; "GT" at right.

The Tube Numbering Systems

At first a serial numbering system was used, with the basic type number carrying a prefix (one or two letters and a number) assigned by the manufacturer. For example, the UV-201 made by RCA and Cunningham's C-301 were both "01" tubes, identical in design.

RCA's letter prefixes referred to the style of tube base (for instance, "UV" was used for the original short-pin, bayonet-mount base and "UX" designated the later, long-pin base). Eventually, the RCA letter designations came to be used generically in referring to the style of a tube base--whoever the manufacturer. But about 1930, the prefix was dropped from tube type numbers, and such tubes as the UX280 and the UV201-A became simply types 80 and 01-A.

As the number of tube types began to proliferate during the 1930's, the serial numbering system became inadequate, and a somewhat more sophisticated system replaced it. In the new system, a tube "number" contained three designators: (1) the filament or heater voltage of the tube--with any fractional quantity dropped; (2) a letter related to the tube function--chosen from the early part of the alphabet for amplifiers and from the later part for rectifiers; (3) a number indicating the number of active elements in the tube.

Good examples are the 6C6 and the 5Z3: the former being a 6-volt amplifier containing 6 active elements (filament, cathode, three grids and a plate); the latter a 5-volt rectifier with three active elements (a filament and two plates). Tubes with similar construction and functions but different operating characteristics are the 6D6 and 5Y3; the differing letters in the designator indicating that these are different tube types from the two first mentioned.

Where the same tube was available in either the double-curved ("ST") style or the bantam ("GT" style) an identifying suffix was often added to the tube designator: "/G" for the "ST" style and "/GT" for the bantam style. Later tube developments caused further modifications to the system. When the top cap connection on some tubes was replaced by a pin connection on the base, an "S" (for "single-ended") was added to the type number of the new tube. For instance, the single-ended version of the 6J7 was called the 6SJ7.

Another variation on the system is the designation assigned to the "Loctal" style tubes. To indicate their special base design, Loctals bore type numbers beginning with "7," even though they had standard 6-volt heaters. Other modifications and inconsistencies too numerous to mention crept into the system over the years

See you next month, when we'll continue our discussion of radio peripherals.

Marc F. Ellis

COMMENTS FROM THE EDITOR

We Need to Hear From You!

Like our last issue, this one comes to you a couple of weeks later than I had intended. Our several appearances on the antique radio meet circuit this past summer threw us off schedule--and as Editor, Publisher, Advertising Manager and Sole Employee, I'm having a hard time catching up!

One of the unfortunate results is that here it is the beginning of November and I'm just starting to bug you about subscription renewals. Many of you are charter subscribers, and have been with us since the beginning. That means your subscriptions will expire with the December or January issues (depending on whether or not you took advantage of the "extra issue" deal we offered during our start-up publicity).

You'll all receive individual post-cards reminding you of your expiration dates.

(Continued on p. 6)

PLAY IT AGAIN!

A No-Nonsense Course in Radio History, Evolution and Repair

THE PARTS PROBLEM

Cosmetic Parts

One of the most difficult tasks for the antique radio restorer is finding parts, especially "cosmetic" ones such as knobs, dials, dial escutcheons, and ornamental hardware. When you are considering buying an antique radio, examine it carefully for damaged or missing cosmetic parts.

Some parts are unobtainable because they were of such poor quality initially that no usable originals exist, and there is not enough demand to warrant making reproductions. An example is the acetate dial bezels on certain large RCA and GE consoles of the late 1930's. The plastic in them deteriorated over the years. Since all of these models were similarly affected, you have little chance of finding a good bezel. I don't buy a radio unless I think I can restore it to its original appearance.

Scoping out a Set

When I buy a radio, I assume it doesn't play no matter what the seller says. Unless the set is plugged in and running when I first see it, I don't let the seller power it up either. The price I'm willing to pay doesn't depend on whether the set plays. Too many radios have been ruined by applying power before checking them out. After noting the cosmetic aspects, inspect the chassis carefully before you buy. Is there excessive rust suggesting the set may have gotten wet? Smell it. Is there any burned odor suggesting the power transformer might be bad or any discoloration indicating it might have overheated? Is the speaker cone mostly intact? Small holes and tears can be mended, but a replacement speaker may be hard to find. Are there empty holes in the chassis where parts are missing? All of these conditions are red flags - buy with caution if at all.

I don't buy "orphan" radios for my collection. These are house brand sets like Truetone, Firestone and others made for large retailers by unknown manufacturers. Cosmetic parts are too hard to find for them. You'll have an easier time restoring your set if you stick with the major manufacturers. Original or reproduction cosmetic parts for radios such as Philco, Zenith, Atwater Kent, etc. are easy to find.

Electronic Parts

Getting the set to play is usually easier than restoring the cabinet. Modern parts can often be substituted for unavailable antique ones. Many antique radio components have no resemblance to their modern counterparts. The photographs will help you recognize some of the parts commonly used in antique sets.

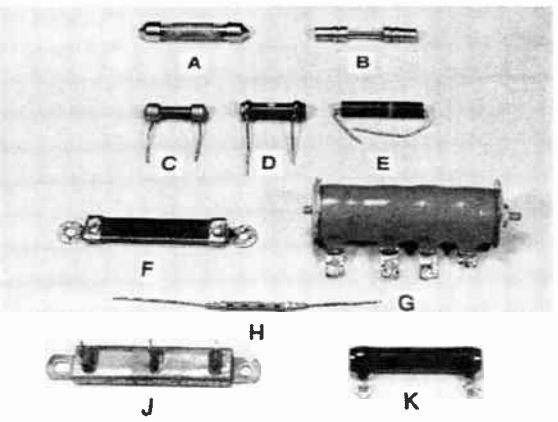


Fig. 1 Assortment of Vintage Resistors.

Figure 1 shows some resistors. A and B are glass encased grid resistors common in 1920's battery sets. C and D are pre-1930 carbon resistors with radial leads. These are *not* insulated. E is the more familiar insulated carbon resistor used from the mid-1930's on. F is a flat wirewound resistor and G is a tapped, wirewound voltage divider. H is a flexible wirewound resistor. J is a tapped, wirewound resistor encased in metal for cooling and K is a fairly modern 10 watt resistor.

Figure 2 shows capacitors. A-C are mica capacitors used in detectors. A has integral clips to hold a glass grid leak as shown. D is a paper bypass capacitor and E is a large paper filter capacitor in a metal case. F is a Philco "block" capacitor and G and H are the more familiar tubular paper capacitors.

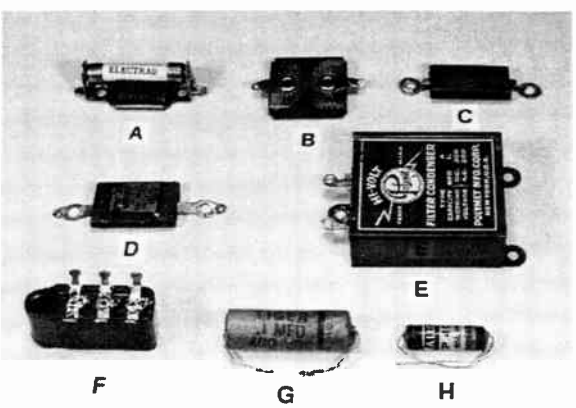


Fig. 2 Assortment of Vintage Capacitors

Parts Sources

Below is a selection of parts sources. This is by no means all of them, but I have dealt satisfactorily with most of those listed. For scarce parts, you may need to run an ad in this or other publications such as *Antique Radio Classified*. When writing for information, always send a SASE.

Reproduction Grille Cloth

- John Okolowicz, 624 Cedar Hill Rd., Ambler, PA 19002
- Michael Katz, 3987 Daleview Ave., Seaford, NY 11783

Reproduction Dials

- Antique Radio Restorations, 635 S. Lincoln Ave., O'Fallon, IL 62269

Vintage parts, literature, mostly 1920's

- Playthings of the Past, 9511-23 Sunrise Blvd., Cleveland, OH 44133 (Catalog $2.00)

Reproduction Knobs, Misc Tubes & Parts

- Vintage TV & Radio Supply, 3498 W. 105th St., Cleveland, OH 44111 (Catalog $1.00)

Manuals, Lit. Especially Scott & McMurdo-Silver

- Puett Electronics, P.O. Box 28572, Dallas, TX 75228 (Catalog $5.00)

Tubes, Modern & Repro Parts, Books

Antique Electronic Supply, P.O. Box 27468, Tempe, AZ 85285 (Cat. free)

Used Test Equipment, Parts, Books

- Olde Tyme Radio Co., 2445 Lyttonsville Rd., Silver Spring, MD 20910

Schematics

- A.G. Tannenbaum, PO Box 110, East Rockaway, NY 11518 (Catalogue free)
- Radio Road Map, 8429 Via Linda, Scottsdale, AZ 85258 (pre-1945 only, $4.00 each)
- Alton H. Bowman, 4172 East Ave., Canandaigua, NY 14424 (1920 to 1970, $5.00 each)

Battery Eliminators

- Peptronics, 103 Rio Villa Dr., Punta Gorda, FL 33950 (kit)
- Antique Radios, Inc., P.O. Box 6352, Jackson, MI 49204 (prewired)

Next time we will begin a study of radio circuits starting with the grid leak detector.

Conducted by Ken Owens
478 Sycamore Dr.
Circleville, OH 45113

Align as you Troubleshoot!

How to coax top performance from a superheterodyne as you diagnose and correct its problems.

By Steve Kalista, Sr.

This is the conclusion of a two-part article begun last month, and assumes that the preliminary work recommended in Part 1 has been carried out.

1. Don't work in a basement having concrete floors. Such floors are good electrical grounds, especially when damp. You could get zapped if you accidentally come in contact with the "hot" side of the a.c. line while working on a set.

2. A.C.-D.C. sets (those with no power transformer) are a special shock hazard since they often have one side of the line grounded to the chassis. Never work on such a set unless it is unplugged or plugged in via an isolation transformer (115 volts in -- 115 volts out). Suitable transformers are available new (contact Antique Electronic Supply--see back page of this issue), through surplus sources and at radio swap meets. You can also make one by wiring together the secondaries of two heavy-duty low-voltage transformers (from Radio Shack or surplus sources). Connect a line plug to one of the primaries and an a.c. outlet to the other.

3. Sometimes what appears to be a standard power transformer is actually an autotransformer (see my letter in the April, 1994 issue). Autotransformers have only one winding and provide no line isolation. An isolation transformer must be used!

4. Turn set on. I usually wear safety glasses when turning a set on for the first time--especially if the underside of the chassis is facing up.

5. If the set now operates in a satisfactory fashion, this may be as far as you wish to go. Replace the set in its cabinet and put it on display! If the set doesn't work or you want to adjust it for optimum performance, continue with step 6.

6. For the following steps, you'll be needing a standard r.f. generator with audio modulation. If the generator doesn't have an audio output jack, you'll also need a separate audio generator. Note: Many older generators have drifted from their original calibration. If you are not sure of yours, take steps to check it or ignore the dial calibration and use an inexpensive frequency counter to reach the proper settings. Let the r.f and audio generators (and the frequency counter if you'll be using one and it is tube operated) warm up for a half-hour before your work session.

7. If the set is not working, first check to see that the tubes are lit. If it is an a.c.-d.c. model, the tubes should definitely be lit because you've already checked out the heater circuit during your pre-power workup (see last month's issue). If it is a transformer set, use a multimeter to see that line voltage appears at the transformer primary when the power switch is turned on and that the secondaries are delivering filament and plate voltages. If not, you might have a bad transformer or power switch. If the set is a clock radio, be sure that the alarm switch hasn't cut the power!

8. If the tubes are lit and the set is still inoperative, connect the "hot" lead of your audio generator (set at about 400 Hz if adjustable) to the grid of the final audio amplifier tube. Connect the ground lead from the generator to the chassis. If no sound is heard, check this stage for trouble--including output transformer; speaker; plate, screen and bias voltages. Refer to manufacturer's service data.

Bias on the control grid should be measured with a VTVM or other high-impedance voltmeter (the Radio Shack FETVOM is good--as are most digital voltmeters). Voltage should be negative. If not, and you haven't replaced the coupling capacitor from the plate of the previous stage, do it now; it's probably leaky. This problem will also cause set to hum. Other possibilities are open cathode or grid resistor, bad cathode bypass capacitor.

9. Once you've established audio in the step above, connect the audio generator to the grid of the previous stage (first audio amplifier). The easiest connection point is usually at the center terminal of the volume control. If no audio, check tube voltages and troubleshoot discrepancies.

10. Check manufacturer's literature for the intermediate frequency of your radio. (Usually 455 khz, but will vary on older sets.) Set your r.f. generator for this frequency--using your frequency counter if necessary--and turn on its audio modulation. Connect the generator's ground lead to the set's chassis and the "hot" lead to the grid of last i.f. amplifier tube *(There may be only one i.f. amplifier tube). Also, A .1 mfd capacitor in series with the "hot" lead is a good idea--ed.).*

11. You will need some method of measuring audio output level as you adjust the trimmers on the i.f. cans. You can use your ear--simply listening to the sound from the speaker--or you can connect an a.c. meter across the speaker voice coil.

12. Turn the signal generator output control to minimum and the set's volume control full on. Advance the output control until you just hear a sound in the speaker or see an indication on the a.c. meter (set on its lowest range). If no sound, check for proper voltage at tube pins and troubleshoot any problems.

13. When this stage is operational, adjust the trimmers on the following i.f. transformer, using a tool made of insulating material. Trimmers may be located on the top and/or bottom of the transformer can. As the adjustments increase the signal strength, reduce the output of the generator for minimum audible volume or minimum meter indication. Adjust the trimmers alternately several times to obtain maximum output.

14. If there is a previous i.f. amplifier tube, connect the generator to its grid as in step 10 and repeat the troubleshooting and alignment procedure.

15. Now connect the signal generator "hot" lead, through a .1 mfd capacitor, to the signal grid (pin 8 on a 12SA7) of the mixer tube. *(It's also a good idea to disable the oscillator by connecting a clip lead between the stator and the rotor of the smaller section of the variable capacitor--ed.)* Adjust generator output as low as possible for an audible signal or a minimum meter indication. Then adjust the trimmers on the i.f. *input* transformer (the one between the mixer first i.f. tubes) as discussed in step 13. If no audio is heard, check voltages on mixer tube against manufacturer's specs and troubleshoot as necessary, then carry out above procedure.

16. Remove signal generator *(and clip lead used to disable oscillator--ed)*. Check position of tuning dial pointer at open and closed positions of tuning capacitor; pointer travel should be well centered on scale.

(continued on page 8)

Though a radio industry veteran, Steve Kalista has not been collecting antique radios for very long. He specializes in small table models and has put together a group of about 19 so far.

Like many of us Steve became interested in radio through working on discarded sets as a boy. He graduated from the United Radio and Television Institute (Newark, NJ) and later joined the U.S. Army Signal Corps, graduating from the Radio Repairs School in 1942. During the war he served in northeast India, near the Burma border, where he repaired airborne radios and electronic equipment.

At war's end, Steve entered Penn State University, earning a B.S. in electronic engineering in 1953. After spending a few years in private industry, he became a civilian employee of the Army Signal corps in its research development facility at Fort Monmouth, NJ--retiring in 1982 after a 21-year career there. Much of his work was highly classified, dealing with voice warning systems and the development of "counter jamming" techniques.

An active radio amateur, (WB2LKN), Steve operates in all voice modes, packet and slow-scan TV.

INFORMATION EXCHANGE

This is an open forum for interaction among our readers. Here you can ask questions about some aspect of our hobby, answer a question that's been posed or pass along other information of general interest. Send your questions, answers and information to **The Radio Collector**, P.O. Box 1306, Evanston, IL 60204-1306. Submissions may be edited or paraphrased.

ANSWERS TO QUESTIONS

Microsynchronous Info

Last month we ran a photo, sent in by Alton Dubois, Jr. (Queensbury, NY), of the unique dial from a Victor Microsynchronous radio. Alton wondered if the set was really tuned by sliding the knob in a slot as it appears from the photo. He also wondered about the model number of the radio. Paul Bourbon, conductor of our "Vintage Book Reviews" responded by phone as follows:

The Microsynchronous was made by Victor, and the original model was the R-32 (RE45 in the radio/phono version). It was on the drawing board at Victor when RCA bought out the company about 1928. One of the purposes of the buy-out, so the story goes, was to shut down Victor's manufacture of "Orthophonic" (acoustical) phonographs--which outperformed RCA's electrical ones.

Paul considers the Microsynchronous to be the finest Neutrodyne set made, though its intricate electro-mechanical tuning arrangement makes neutralizing difficult. And, yes, one did slide the knob in the slot for coarse tuning. This knob could also be turned in the conventional manner for fine tuning. Note the vertical line on the dial indicator in Alton's picture. This is actually a slit through which you could make a pencil mark on the parchment-like surface below, indicating the position of your favorite station.

At one point, RCA was turning out about 5,00 of these sets per day, and many felt that they outstripped RCA's contemporary superhet design (the Model 60) in both quality and performance.

GENERAL INFORMATION

Pre-Power Workup Comments

I will eventually cover the points mentioned in Steve Kalista's article, *A Pre-Power Workup For That Flea-Market Radio*, in my *Play it Again* column. We both follow essentially the same procedure with one exception that you might want to share with your readers: if the set has a power transformer, it should be tested first. Check the primary for continuity then remove all tubes and connect the set to power through a 100-watt lamp. When the set is turned on, the lamp should not glow at all. Replace all tubes *except the rectifier* and repeat the test. The lamp should glow dimply and the tube filaments light. If the set fails this test, stop right here, the transformer is bad. Finally, if it passes, measure both halves of the high-voltage secondary to see that the voltages are present, and equal.

There is no point in doing all the work Steve outlines unless the transformer is good. I once restored a Westinghouse which played fine when I got it, but I noticed that the power transformer became extremely hot after 30 minutes or so. One of the halves of the high-voltage secondary evidently had some shorted turns because there was a 15-volt difference between them. I had not run the lamp test because the set was playing, but when I finally did, the lamp glowed with no tubes in the set.--Ken Owens, Circleville, OH.

I received another comment on Steve's article (or rather on one of the notes I made following it) from Paul Bourbon during the phone conversation mentioned earlier. It involved the method for recapping a set. I had suggested that, as an alternative to the messy, and sometimes destructive, practice of taking apart the original solder joints, one should simply clip out the old component, leaving short lead stubs in place. The leads of the new component could then be supported next to these stubs for soldering.

While generally agreeing with the technique, Paul suggested a far superior method of executing it. Find a length of stiff wire a bit bigger in diameter than the stubs of the original leads. Then, after cutting the leads of the replacement capacitor a little long, form a spring-like "pigtail" at each end by wrapping it around the stiff wire. The pigtails will slide over the stubs, neatly supporting the replacement component while it is soldered. It will be a better joint, and one that doesn't require three hands to execute. Paul added that a solder-covered spiral wire, branded "Quigs," was once marketed to make such splice joints.-ed

Bakelite Caution

Paul made another interesting point during that conversation -- this one relating to Dick Maciewicz's suggestions for cleaning panels in last month's "Dick's Corner." While Dick recommended mild detergent solutions and a technique as careful and conservative as a museum curator's, Paul was concerned about the use of detergent should the panel happen to be made of Bakelite.

Bakelite owes its polished appearance, Paul tells us, to an infinitesimally thin surface layer. This layer can be attacked by alkaline substances, such as detergent. In extreme cases (hard scrubbing and the use of high concentrations), a brown deposit may appear on the scrubbing rag--fooling the "restorer" into thinking he is removing surface scum. What he is actually removing is that thin surface layer--exposing some of the filler material and permanently dulling the surface.

So how can you clean Bakelite, I asked Paul? One possibility he suggested is to a pH-balanced (neither acid nor alkali) polish such as "One Grand." Of course, the use of a polish on silk-screened panel decoration, such as Dick was concerned about cleaning, isn't a good idea. We're open for more comments on this point!

Better start-Up Voltage Control

When first applying power to a long-disused radio, we are always cautioned to use a variable voltage source to raise the line voltage gradually. The old electrolytic filter capacitors might well short out if full voltage is applied suddenly; but they might also be "healed" (a process called "re-forming") and returned to useful service if the voltage across them is raised slowly during the first start-up.

What is usually forgotten is that the rectifier tube cannot conduct and deliver voltage to the filter network until its filament reaches a certain temperature. Thus, even though you are gradually increasing the line voltage, no voltage reaches the capacitor until the rectifier filament finally receives enough voltage to conduct. Then the capacitor might receive to an initial voltage that is too high.

A way around this is to temporarily replace the rectifier tube with a couple of solid-state diodes, which require no warm-up. This can be done through the use of an adapter built into an old tube base matching that on the tube to be replaced. I make up each diode by wiring two 1N4007 diodes in series (cathode to anode), thus ensuring a 2kv rating--which is high enough to withstand voltages encountered in most receiver power supplies. Each of the 1N4007's is paralleled by a one-megohm resistor to equalize the voltage drops across the pair.

To make up the adapters, refer to your tube manual. If the tube to be replaced has a cathode (either independent or internally wired to one end of the filament) connect the free cathode leads of both diode pairs to the pin on the base that would normally receive the tube cathode connection. Connect each of the two free anode connections to one of the plate pins. If the tube to be replaced has no cathode the procedure is similar, except that the cathodes are wired to one of the pins normally connected to the tube filament (choose pin 1 when working with 4-pin tubes such as the 80).

With one of these adapters substituted for the rectifier tube, the voltage across the electrolytics will closely follow the line voltage you apply to the set, allowing you to increase voltage on the electrolytics

(continued on p. 6)

DICK'S CORNER

Tips and Tidbits from the World of Antique Radio Collecting and Restoring

Conference and Auction News

I attended this year's A.W.A. conference in Rochester, New York. The weather on Wednesday and Thursday, the two big days at the flea market was fine, with either a wide-brimmed hat or sun screen a definite necessity. Attendance appeared to me to be similar to last year, ditto for the number of vendors. The variety and quality of early battery sets seemed quite diminished from a year ago. Conversely, the quantity and variety of horn speakers appeared up a good deal. There were not a lot of nice small Bakelite sets or an over-abundance of interesting transistor sets. Tubes were in good supply. One vendor had used, tested tubes in white boxes labeled with the type *and* manufacturer. This is a great aid in re-tubing a set to "as new" condition, and the vendor, whose prices seemed very fair, is hereby commended for the extra work!

I urge all RC readers to try to attend as many radio meets and auctions as their time permits. Simply noting trends, both in equipment *and* prices is very important.

Although I didn't buy much at Rochester, I had the pleasure of meeting Marc Ellis in person and also managed to win a third place in one category of the equipment contest. Please, to all; don't hesitate to enter contests; don't adopt the attitude that all the other entries will be better than yours. Remember that the real purpose of the contest is to provide a display for other people to enjoy. Providing enjoyment for others seems to me to be more important than winning or losing.

I also attended the Cunningham auction in Barre, Vermont on October first. Here are some highlights from that auction: (1) Two AK model 10 breadboards with tubes and tags, $860, $950 (2) AK20 w.t. $80 (3) AK20 n.t. $55 (4) AK21 n.t. nice $130 (5) Browning-Drake Regeneformer kit $30 (6) Crosley 51 n.t. $50 (7) Crosley 51 n.t. missing audio xfmr. $40 (8) Grebe Synchrophase 7 w.t. $95 (8) Metrodyne 5 n.t. nice $30 (9) Remler capacitor mike original floor stand nice $260 (10) Rider 1,2,3 three binders original Philco paper 46-50 $85 (11) Silvertone Neutrodyne n.t. nice $55 (12) Sonochorde cone speaker $20 (13) Tom Thumb portable, good leatherette $60 (13) Victory superhet kit n.t. $75 (14) Zenith Model 11 n.t. $45 (15) Zenith shutter dial console, working $235 (16) eight large boxes used tubes $85.

Protect Your Phones and Speakers!

In many early battery sets, the earphones or speaker (either cone- or horn-type) was wired in series with the B+ supply and the plate of the output tube. When the output tube shorted (which was frequent) the full B+ voltage appeared across the speaker or phones, causing immediate burn-out. Today, vintage phones are still reasonably priced, although you wouldn't want to burn out your favorite set. Cone speakers are fairly high priced and horn speakers are very high priced.

Here's an inexpensive way to protect your phones and speakers from output tube shorts. Salvage the audio output transformers from two "junker" a.c.-d.c. table radios. Connect the secondary windings (the ones originally connected to the speaker voice coil) to each other. Connect the primary winding of one to a standard phone plug and the primary winding of the other (now serving as a secondary) to a phone jack.

You have just made a 1:1 transformer that will isolate your phones or speaker from the high voltage in the output circuit. For neatness, mount the whole assembly in a small plastic case. Insert the phone plug into the radio's output jack and plug the speaker or phones into the phone jack mounted on the case. Now if anything burns out, it will only be the transformer connected to the phone plug--quickly and easily replaced with another salvaged unit.

Conducted by Dick Mackiewicz

COMMENTS FROM THE EDITOR
(continued from p. 2)

And if I get around to modifying our database in time, the expiration date will also appear on your mailing label beginning with the current issue. To further focus your attention on this important milestone, I'm enclosing a coupon offering a special inducement to *anyone* who sends in a one-year subscription extension. It's a modest offer (this is, after all, still a low-budget operation), but one that will certainly be worth taking advantage of if you enjoy *The Radio Collector*.

Originally, I was going to extend the offer only through the end of November but, since I'm late with this announcement, I'll honor it until the end of the year.

You'll notice that the coupon is included on a form that contains a some other blanks. These are to encourage you to take advantage of our free classified advertising service, participate in our *Information Exchange* column, or just write us a letter!

I enjoy putting out this magazine, and so do the dedicated columnists who send me material month after month. Together, we're bringing you an interesting and very readable publication. But it will be a lot more interesting if *you* participate too. You may have noticed that much of our reader correspondence has been coming from the same handful of people.

Last month, we ran our first reader article (Steve Kalista's *A Pre-Power Workup For That Flea market Radio*). And Steve is back this month with a sequel. I'd like to encourage more reader articles, and have included on the enclosed form a section for you to complete if you're interested in doing one. I'm ready to add more pages to *The Radio Collector* any time they are needed!

MARC ELLIS

INFORMATION EXCHANGE
(continued from p. 5)

in a controlled manner as you monitor current draw to make sure that they aren't leaking or shorting.

For rectifier tubes (such as the familiar 35Z5) in a.c.-d.c. sets with series filaments, the adapter above won't work because there would be no tube filament to maintain continuity in the series string and the set would not light. Instead, we have to improvise a gadget called a tube socket extender. Essentially this is an octal plug (to be plugged into the set) with its pins wired to the corresponding ones on an octal socket (for the tube to plug into). The diodes are wired into this assembly as already discussed so that they are in parallel with the tube elements.

Keep these adapters on file for future use as you make them, and you'll eventually have a set to cover all eventualities. But don't be tempted to use an adapter as a permanent substitute for a rectifier tube. For reasons that would have to be the subject of another letter, that can be very destructive to the set.--Jack Iverson, Palatine, IL.

MONTHLY MINI QUIZ

Match wits with our quiz editor! See next month's issue for the answer, as well as the names of all readers who responded correctly.

This U.S. manufacturer of model trains switched tracks during WWII, converting to the manufacture of automatic keys ("bugs") for the armed forces.

Answer to last month's quiz: Dr. Mahlon Loomis, 1826-1886. Correct answer sent in by Ken Owens.

VINTAGE BOOK REVIEWS

Books from the era when vintage radios were new! Look for them at swap meets, flea markets and used book stores.

MODERN RADIO RECEPTION by Charles R. Leutz. Published by Experimenter's Information Services, Inc.., New York, NY. Copyright 1924, printed 1925. 340 pages. Hardbound.

This book might just as well have been called "Modern Radio Receivers" because most of it is devoted to the state-of-the-art receivers of the era. It was written at a time when many of the best circuits were available only in kit form or had to be assembled from individually selected components. Leutz believed in designing the most effective circuits possible without compromise, and in putting them together using the best possible components.

A note at the beginning of the book (whether you agree with it or not) makes interesting historical reading and sets the tone: "The facts presented in this book prove conclusively that Charles R. Leutz was solely responsible for the successful introduction of the Superheterodyne System to the Broadcast listeners."

The first chapter discusses the regenerative receiver and shows the assembly of a couple of fairly advanced versions. The second chapter, which encompasses half the book, is devoted to the superheterodyne receiver.

Chapter two goes into great detail on all aspects of the superheterodyne receiver. Most of the sets are of Leutz's own design, but a few are from Western Electric. The many diagrams and pictures explain how each set was laid out, how each component was chosen and used, and what reception results were obtained.

There is also a complete analysis of the Cunningham receiving and transmitting tubes then available. Many charts and graphs show the characteristics of the sets, tubes and components discussed in the book. Leutz also recommends certain speakers, chargers and wavemeters to be used with his designs.

The third chapter covers adaptors and accessories for receivers, including antenna adapters (tuners) and radio frequency amplifiers. This is followed by a chapter discussing the Pliodyne circuit (an improvement on the Neutrodyne) developed by Leutz and Farrand. The circuit offered better neutralization, more radio frequency amplification and simplified tuning.

The fifth chapter, a fairly long one, is devoted to laboratory equipment. It features the "Maginniss Radio Control Table," a monster desk-like organizer that holds a battery-operated radio receiver together with all of the batteries, chargers and other parts and accessories needed to operate it. Coverage is also offered on General Radio test equipment, Weston meters, Willard storage batteries and Dubilier products.

Chapter 6, on transmitters, is cursory--showing little of the attention to detail lavished on the previous chapters. Pictured are various commercial and marine transmitters, as well as Cunningham and Western Electric transmitting tubes. A short section on amateur transmitters, with a few schematics and specifications, concludes the chapter.

The seventh and final chapter, "General Data," will fascinate those interested in the 1920's legal battles relating to RCA's control of the superheterodyne patents and that company's attempts to control the radio industry. It contains several documents relating to Leutz's struggles with Westinghouse and RCA, as well as testimonial letters praising the quality of his sets. There is also an exhaustive look at the life of various "B" batteries.

While this book is difficult to find, and can be expensive, it is an extremely worthwhile addition to the radio historian's library. Anyone who is fortunate enough to own one of Leutz's sets will find the volume indispensable in understanding and operating it. And for a set builder who wants to try one of the "big ones," (some have panels over forty inches long), this is one of the best references around.

Next month we'll look at Leutz's 1928 rewrite of this classic radio text, reflecting dramatic changes in the radio industry.

Conducted by Paul Joseph Bourbin

COMPANY CHRONICLES

Brief Biographies of Classic Radio Manufacturers

GOLDEN-LEUTZ, Inc.

"Manufacturers of the Highest Class Radio Apparatus in the World"

Charles R. Leutz showed twin interests in radio and entrepreneurism early in life. He obtained his amateur license in 1913 at the age of fifteen. While still in high school in Boston, Massachusetts he formed the Eastern Scientific Apparatus Company to sell radio equipment to yachtsmen. However, he almost immediately ran into trouble with the Marconi Wireless Telegraph Company of America, which wrote and told him to stop. This incident foreshadowed Leutz's later conflicts with RCA over the sale of Superheterodyne radio kits.

After high school, Leutz worked briefly for the Clapp-Eastham Company and the Fore River Shipyard, then left the Boston area to take a job with American Marconi in New Jersey. There he worked throughout World War I, gaining valuable experience in radio receiver design.

In 1921, he and Claude Golden formed the Experimenter's Information Service to sell plans for superheterodyne circuits designed by Leutz. The following year, Golden-Leutz, Incorporated was formed to sell parts and kits for some of the designs. RCA tolerated this infringement on its patents for a while, but sued in 1924, about the time its own Radiola Superheterodyne was ready for market. Soon, the Leutz interests were enjoined from selling superhet kits, being restricted to plans and parts.

The Golden-Leutz superhet set business was taken over by Norden-Hauk, a Philadelphia concern that--for some reason--was never the target of an RCA suit. Perhaps it was too small; perhaps it was in a poor location for suit (Philadelphia judges were thought to be poorly-disposed towards RCA). In the meantime, Golden-Leutz switched over to TRF models. In 1923 Leutz, together with Clair Farrand, had designed the Super-Pliodyne 9--which was first advertised in March, 1924. This was followed by a succession of bigger and more powerful TRF models, which were claimed to be far better than the superheterodynes the company was forbidden to market.

Golden-Leutz changed its name to C.R. Leutz, Incorporated in 1929--moving to Altoona Pennsylvania. It was last heard from in late 1930. Leutz eventually went into radar and missile work for the U.S. Navy and retired from the Johns Hopkins Applied Physics

(continued on next page)

CLASSIFIED ADVERTISING

Subscribers may place one free classified ad, up to 30 words long, in each issue. Count your name, ham call (if desired), complete address and one phone number as six words. Additional words are 15 cents each per issue. Non-subscribers pay 30 cents each per issue for all words. Free ads will be automatically run in two issues, but expire after their second insertion unless renewed by mail or phone. Those wishing to run the same ad for extended periods of time may want to use a "business card" space (see Display Advertising Dimensions and Prices table elsewhere in this issue). This is a boxed area in which we can print your business card or any advertising message that will reasonably fit (no charge for setting type). We reserve the right to make editorial adjustments in classified ads without advance notification and to refuse advertising at our discretion. We will reprint, without charge, any ad containing typographic errors, but assume no other financial responsibility.

Wanted Crest escutcheon for Zenith 7-H-921Z; good drawing/tracing of Hallicrafters winged logo (5-T Sky Buddy); Bunis one; Any info re. Eico Company. Bob Perry, 131 E. High St., Painted Post, NY 14870. (607) 962-1351.

Wanted 1944 Philco console chassis with the 4 big tuning wheels. Repairable, reasonable. F.E. Oswald, 711 Carl Ave., Altoona, PA 16602.

★ WANTED ★

Classic Radios & TV's

- Pre-1940 Console radios by Zenith, Lincoln, E. H. Scott, McMurdo Silver
- Glass or Mirror radios by Sparton, Troy, Radio Glo, others
- TV's - Spinning Disk Type by Jenkins, Baird, Western, others
- Pre 1941 CRT TV's by RCA, Andrea, GE, etc. (all have 1 to 5 channels)

DON HAUFF (612) 374-9759 24 hrs.

Wanted Good clean copy of Rider's Vol 19, 20 and 21. Top price paid. Charles F. Brett, 5980 Old Ranch Rd., Colorado Springs, CO 80908. (719) 495-8660.

Wanted old radio headphones and headphone plugs. Highest prices paid. Examples: I will pay $20 for BASCO headphones, $25 for Long Distance headphones, $25 for Bronston headphones. Will pay $10 each for Federal headphone plugs. I will buy bulk assortments of headphones, plugs and parts. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

For Sale excellent reproduction of 1920's S.S. Kresge crystal set blueprint $4.00 including postage. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

For Sale 215A $20, VT-1 $60, 300A $12, 371A $12. All good filaments, 300A and 371A test good. Send for free list of radios, books, tubes, parts, etc. Can rejuvenate 01A, 99, 20, 10, 71A for $1.50 per tube. Stan Lopes, KB6LGV, 1201-74 Monument Blvd., Concord, CA 94520. (510) 825-6865.

For Sale Vintage radio parts, test equipment, crystal detectors. We have a new open type adjustable detector! SASE for list. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

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COMPANY CHRONICLES *(continued from previous page)*
Lab about 1963. He died the following year.

Those interested in obtaining technical data on Leutz's designs can find quite a bit of information in his four books: *Super-Heterodyne Receivers* (paper, 1923), *Modern Radio Reception* (1924 and 1928 editions) and *Short Wave* (With Gable, 1930).

The information for this Company biography was obtained from Alan Douglas' three-volume encyclopedia "Radio Manufacturers of the 1920's," published by The Vestal Press, Ltd., Vestal, NY and copyrighted 1988, 1989 and 1991 by Alan Douglas.

ALIGN/TROUBLESHOOT *(continued from p. 4)*
Chances are, your radio will now be operating well. But if reception is weak, check tubes with a transconductance-type tester (I use the military TV-7 model) and replace weak ones. If reception is still weak and/or dial calibration is significantly off, proceed with oscillator/r.f. alignment. This procedure varies from model to model and a complete discussion is beyond the scope of this article; refer to the manufacturer's service notes for the set you are working on.

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Editor's Notes:

Step 1. If your shop *must* be in the basement, it is strongly recommended that you set up an insulated platform (perhaps made of plywood or heavy rubber matting) to stand or sit on while you work. I know this is a little bit of trouble, but it *could* save your life.

Step 8. Steve begins injecting the test signal at the last i.f. stage and proceeds backwards--one stage at a time--because he is troubleshooting as well as carrying out an alignment. If the set is known to be operating normally and *only* in need of alignment, it is more efficient to couple the signal generator to the antenna, or antenna terminals, of the set and leave it there for the entire alignment process. Check standard service texts for the procedure.

Step 16. A basic oscillator/r.f. alignment procedure *for simple sets only* is as follows: if the radio has an antenna terminal, connect the "hot" lead of the signal generator to it through a .00025 mfd capacitor and the ground to the chassis *(Remember: You must use an isolation transformer with a.c.-d.c. sets!).* If the radio has a loop antenna wind a 5-foot piece of hookup wire into a 4-turn loop (tape the turns in place), place it near the antenna, then connect the "hot" and ground leads from the generator across the ends of the loop.

Tune the receiver to a quiet point on the dial near 1,500 khz and set the generator for the same frequency (modulation on). Adjust the oscillator trimmer capacitor (on the side of the capacitor--next to the smaller section) for the loudest signal in the speaker, then reduce the output of the generator for minimum audibility or meter indication. Readjust the trimmer for maximum output by ear or meter. Now tune the receiver to a quiet point near 1,400 khz and set the generator to the same frequency (modulation on). Adjust the r.f. trimmer (on the side of the capacitor--next to the larger section) exactly as described for the oscillator trimmer.