The Radio Collector

May, 1994

Evolution of the Broadcast Receiver

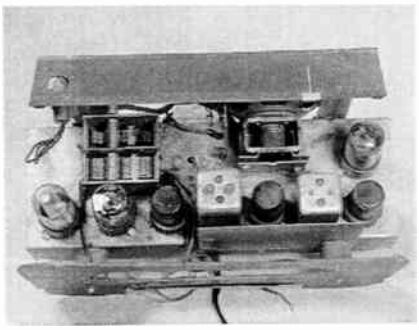
Part 5 - The A.C.-D.C. Set Comes of Age

In last month's installment of this series on the evolution of the broadcast receiver, we saw how the imposing living-room radio of the late 1920's was scaled down to create the "a.c.-d.c." set, a type of compact, affordable receiver better suited to the lean years of the 1930's. These radios were a wonderful entertainment investment for families on tight, depression-era budgets, and many thousands were sold. Over the years, this popular design continued to evolve both technically and aesthetically, and by the early 1940's, the a.c.-d.c. set had changed quite a bit.

Streamlining the Cabinets

Cabinets were now more often made of plastic -- molded into the rounded, "streamlined" forms so strongly favored during the era -- rather than wood. Generally that plastic was Bakelite, either left in its natural deep-brown color or with a painted finish applied. Catalin plastics, which could be produced in a variety of glowing colors were also used. Relatively few Catalin sets have survived to the present day. They are now much prized by collectors, and good examples sell for hundreds of dollars.

1940's a.c.-d.c. sets typically had Bakelite cabinets molded into "streamlined" shapes.



New family of compact high-voltage heater tubes saved space, eliminated ballasts and series resistors.

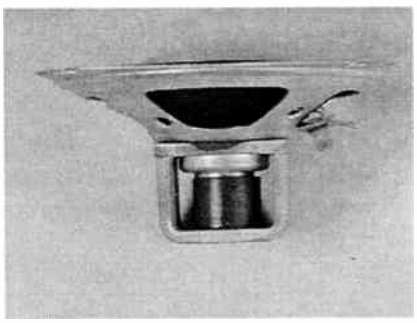
New Circuitry and tubes

Whereas the earlier a.c.-d.c. radios could be found in both TRF (tuned radio frequency) as well as superheterodyne versions, the TRF was now rarely built. The typical a.c.-d.c. set now incorporated the more efficient superheterodyne circuit, its chassis sporting the two square-topped aluminum i.f. transformers that are a hallmark of this design. And, thanks to the development of a whole new family of high-voltage heater tubes designed for series-string work, ballast and line-cord resistors went the way of the dinosaur, .

One particular set of the new tubes: the 12SA7, 12SK7, 12SQ7, 35Z5 and 35L6, was so commonly used that it became known as the "all-american five." Note that the heater voltages (first two digits of the type number) add up to 106, a value close enough to the nominal 110-volt line voltage so that no series resistor was needed.

These new glass and/or metal tubes were much more compact than their tall glass predecessors. Height was reduced by about 50%, and the envelope itself was also slimmed down, now taking a straight tubular shape in contrast to the former bulging curved profile.

With the development of more efficient permanent magnets, the loudspeaker no longer needed a d.c.-powered electromagnet and therefore lost its field coil. The coil's function in the power supply filter circuit was taken over by a heavy-duty resistor, which served well enough as a choke thanks to the much larger filter capacitors that



Speaker field was now provided by a permanent magent, eliminating the field coil and its associated wiring.

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had now become available. Finally, it was no longer necessary to deploy a hank of antenna wire under the rug or toss it out the window. Thanks to improved design, increased sensitivity and more powerful radio stations, most receivers picked up a more than adequate signal from a neat self-contained loop antenna mounted in the back of the cabinet.

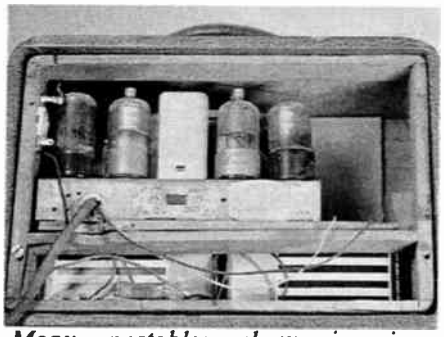
The 3-Way Portable

The development of yet another tube family made it possible to free the a.c.-d.c. set from the power line and place it in a portable case that could be carried anywhere. The new tubes were similar physically to the glass types in the "high voltage" family just mentioned, but had reduced power requirements as well as 1-volt filaments that could be lit from dry batteries. Common types were the 1A5, 1A6, 1A7, 1H5 and 1N5.

Though the tubes in the two new families just mentioned were certainly compact for their era, they shouldn't be confused with the still-further-scaled-down glass types that appeared a few years later. The latter have much smaller envelopes and are baseless, the connecting pins passing directly out through the tube's glass bottom. The former have an attached metal or plastic base equipped with an octal (eight-prong) plug.

The new portables, in their airline-luggage cases, gave their owners a wired-in, "on the go." image.

The new portables began appearing in the late 1930's. There were even radio-phono models incorporating a spring-wound turntable. Most could be operated from the a.c. or d.c. line as well as from a compact internal battery pack, and hence were called "3-way portables." These sets, enormously popular with teen-agers, soon became ever-present at picnics and beach parties. Adults liked them too. Housed in their distinctive airplane luggage cases, the little radios lent a romantic image to their owners. The carrier of such a set was obviously a person who needed to stay wired in while traveling the city or the world on mysterious and important errands.



Many portables show ingenious organization of interior space.

The portables of this era are fun to study today because they often incorporate interesting mechanical features such as flip-up dials, removable loop antennas and cleverly-designed compartments for holding batteries and stowing line cords. Many were marvels of space utilization, housing the radio chassis and a set of filament and plate batteries in a cabinet comparable in size to (or maybe even smaller than) an ordinary a.c.-d.c. table model.

It's important to keep in mind that, though a.c.-d.c. sets and 3-way portables were being made in great numbers during the 1930's and 1940's, plenty of full-featured table models and consoles were also being produced. So next month, I'd like to talk about some developments of the 1930's and early 1940's centering around the more expensive sets.

MARC F. ELLIS

VACUUM TUBE HISTORY - CONCLUSION

Last month, we discussed vacuum tube development during the decade of the 1920's, ending with introduction of tetrode ("screen grid"") tubes. A major advance in tube technology occurred in 1931 with the issue of the Type 47 power pentode, containing yet another grid (called the "suppressor"). This tube was a real improvement over the type 71A triode then in general use as a power output tube, having greater output and reduced drive requirements.

Filament Voltages

Like the previous cathode-type a.c. tubes, the 47 had a 2.5-volt heater. However, the year 1931 also saw the release of the first 6V tubes for automobile radios. They quickly displaced 2.5V tubes, no new ones being issued after 1933. Had 6V tubes not been needed for auto radio, 2.5V would have probably remained the standard filament voltage.

Although RCA held all the basic tube patents, they had licensed others. Many companies were developing new tubes, but these developments were mostly incremental. More elements (and more base pins) were added, characteristics were improved and tubes became more efficient. High voltage filaments were developed for series tubes in AC/DC radios (1933).

Type Numbering

In 1932 the prefixes in the tube type number were dropped. Only the last 2 digits (as well as any letter suffix) were kept for identification. For example the type UY224A became simply the "24A." By 1933 2-digit numbers were exhausted so the industry came up with a system of numbers and letters.

The first number was the filament voltage rounded off, then came a letter designating the tube function, and the final number was related to the number of active elements in the tube. Letters low in the alphabet denoted amplifiers, the middle letters were used for RF tubes and W, X, Y, Z were used for rectifiers. For example, the 2A3 is a triode audio amplifier with a 2.5-volt filament. The system was never consistently applied except for filament voltage numbers and rectifier designation letters.

Physical Innovations

In 1935 RCA brought out a completely redesigned series of tubes with metal shells and octal bases. The design was so well-conceived that it was quickly adopted by everyone. Glass versions, designated by a "G" or "GT" after the type number, were also made to satisfy some radio manufacturers, notably Philco, who refused to use metal tubes.

The Loktal tube and the single-ended tube (no cap on top) were introduced in 1939. Although a 6V tube, the Loktal series was distinguished by a "7" in the type number. Loktals were extensively used by Zenith and Philco. The single-ended tubes were designated by an "S" in the type number. Thus a single-ended 6K7 is a 6SK7.

The last tube innovation before World War II was the 7-pin miniature, all-glass, baseless tube for battery portable radios in 1940. I arbitrarily define antique radios as those produced before World War II, so we will close the tube development story here.

On June 10, 1993, the last receiving tube made in the Western Hemisphere came off the line at the former

(Continued on p. 6)

ISSUE DATES OF RECEIVING TUBES

TYPE	DATE
WD-11	1922
WD-12	1923
WR-21	1922
WX-12	1925
UX112A	11/25
UX120	"
UX171	8/26
UX171A	1927
UV199	7/23
UX199	9/25
UV200	12/20
UX200	1925
UX200A	8/26
UV201	12/20
UV201A	3/23
UX201A	9/25
UX210	11/25
UX213	1925
UV216	1921
UX216B	1925
UX222	12/27
UY224	6/29
UY224A	1930
UX226	9/27
UY227	"
UX240	7/27
UX245	6/29
UX250	5/28
UX280	9/27
UX281	1/28
10	11/25
11	1922
12 =	WX-12
12A =	UX112A
15	1933
19	11/33
20	11/25
22	12/27
24	6/29
24A	1930
26	9/27
27	9/27
30	9/30
31	"
32	"
33	6/31
34	1932
35	6/31
36	"
37	"
38	"
39	2/32
39/44	1935

TYPE	DATE
40	1927
41	9/32
42	"
43	"
44	"
45	6/29
46	5/32
47	6/31
48	11/33
49	8/32
50	5/28
51	6/31
52	1933
53	12/32
55	9/32
56	6/32
57	"
58	"
59	12/32
71A	1927
75	11/33
76	3/33
77	"
78	"
79	"
80	9/27
81	1/28
82	5/32
83	9/32
83V	1934
84	1932
84/6Z4	1933
85	9/32
89	"
V99 =	UV199
X99 =	UX199
00A	1926
01A	1925
0Z4	2/36
1A5	1938
1A6	1/34
1A7	1938
1B5	1/34
1C5	1938
1C6	1934
1F4	1937
1F6	"
1H5	1938
1L6	1951
1N5	1938
1R5	1940
1S5	"
1T4	"
1V	1932

TYPE	DATE
2S/4S	1931
2A3	6/33
2A5	"
2A6	12/33
2A7	1/34
2B6	12/33
2B7	1/34
3Q5	1940
5U4	1937
5V4	"
5Y3	1936
5Z3	6/33
5Z4	10/35
6A4/LA	6/35
6A5	1937
6A7	1/34
6A8	6/35
6B5	"
6B7	1/34
6C4	1942
6C5	6/35
6C6	1/34
6C8	1940
6D6	1/34
6E5	1935
6F5	10/35
6F6	"
6F7	1933
6G5	1936
6H6	6/35
6J5	1937
6J6	1942
6J7	6/35
6J8	1937
6K6	"
6K7	6/35
6K8	1938
6L6	1936
6L7	10/35
6N6	1937
6N7	1936
6Q7	1/36
6R7	4/36
6S7	1937
6T5	"
6T7	"
6U5	1939
6V6	1937
6X4	1945
6X5	3/36
6AD7	1940
6AF6	1938
6AG5	1942
6AL5	1944
6AL7	1947
6AQ5	1945

TYPE	DATE
6AT6	1945
6BA6	1945
6BE6	"
6SA7	1939
6SC7	1940
6SN7	1945
6SJ7	1939
6SK7	"
6SQ7	"
7A7	1939
7A8	"
7B6	"
7B8	"
7C5	"
7J7	1940
7Y4	1939
12A5	1933
12A7	1934
12K7	1939
12Q7	"
12Z3	1933
12AT6	1945
12AU7	1947
12AX7	1948
12BA6	1945
12BE6	"
12SA7	1939
12SK7	"
12SQ7	"
25A6	3/36
25A7	1936
25L6	1937
25Z5	6/33
25Z6	6/36
32L7	1940
35C5	1947
35L6	1939
35W4	1945
35Z4	1939
35Z5	"
50C5	1945
50L6	1939
70L7	1940
B	1925
BA	1926
BH	"
BR	1932
PZ (47)	1931
BAKELITE BASE	10/24
UX BASE	8/25

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CORRESPONDENCE FROM OUR READERS

Letters may be be paraphrased, shortened, or otherwise edited so that everyone gets a chance at the floor!

More on Alton's Airline

Last month, we showed a nice looking Airline Model 15 belonging to Alton Dubois (Queensbury, NY). That brand name, of course, is associated with Montgomery Ward. But since the set is not included with the Ward's Airline sets listed in Rider's, there was some doubt as to its real origins. However Alan Douglas (Pocasset, MA), author of the 3-volume encyclopedia *Radio Manufacturers of the 1920's*, confirms that the set is a Ward's product. Alan kindly sent some photocopied illustrations from the M-W instruction sheet for the Airline 26. Unlike the single dial 15, the model 26 has two-dial tuning. But the cabinet is the same, as is the manufacturer's logo. I'm forwarding the photocopies to Alton. Case closed!

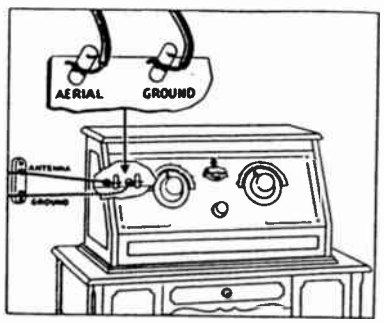

Illustration from Ward's Airline Model 26 instruction sheet.

Mini-Quiz Philosophy

Author Julian Jablin (Skokie, IL), who originated our Mini-Quiz series, writes that he appreciated Alan's detailed response to last month's question (See the Dubilier item in April's Correspondence column). Says Julian:

. . .my intention with the "Mini Quiz" idea was just to give the reader some feeling for the scope of radio's history. In a brief sentence one cannot do more than that. However, such a sentence may stimulate a few readers to investigate some aspects of radio history more thoroughly. Other readers may have information to share on a subject which was briefly referenced in a "Mini Quiz." Thus, Alan Douglas added something to our knowledge about an important pioneer in the development of radio. . .

A.C.-D.C. Perspectives

C. Orval Parker (Pocono Summit, PA) has given us an interesting addendum to last month's installment of *Evolution of The Broadcast Receiver:*

It would seem quite necessary to include in the "EVOLUTION" article the information that most AC-DC sets made after the middle of the 1930's did not have one side of the power line connected to the chassis but had it connected to a "common or negative bus" isolated from the chassis to comply with the requirements of Underwriters Labs for a safety label. While the line was "isolated," there generally was a high resistance or inductance/capacity net connecting the chassis and the "isolated" circuit. Also, the AC/DC type was more feasible after the development of the pentode. as the early tetrodes functioned poorly with the low plate voltages available in the AC-DC configuration.

And commenting on Steve Kalista's treacherous Silvertone as discussed in this column last month (You'll recall that the model looks like a transformer set, but employs an autotransformer power supply having one side of the line grounded to the chassis.), Orval adds:

Steve Kalista only touches on the many unique aspects of Sears's sets: the autotransformer power supply, the variable inductance tuner, the variable coupling i.f. transformer volume control, "left handed" control construction, copper plated chassis -- to identify a few of the Sears "specials."

Microphone Mixup

It's interesting to note that, in responding to last month's mini quiz, more than one reader guessed that a personage named "Skinderviken" might have been the inventor of the first microphone. And I can understand why. Many of the 1920's (and probably pre-1920's) electrical experimenter magazines carried prominent ads for a high performance carbon microphone button invented by J. Skinderviken.

The button was claimed to be not only unobtrusive, but extrordinarily sensitive. It could be mounted on a windowpane, or other "stiff" surface that vibrated well, to bug a room. Other suggested uses were as a contact mike for musical instruments, to "electrify" the acoustical phonographs of the era or -- of course -- to build telephone transmitters.

It's a tribute to the power of a 75-year-old advertising campaign that some folks still think of J. Skinderviken as the inventor of the carbon microphone. However, the gentleman we were looking for was a much more low-key individual by the name of Emile Berliner.

AK Gets New Gear

This month's mailbag yields another letter from Steve Kalista (Jim Thorpe, PA), who has just put a neighbor's Atwater Kent Model 55C back in running order. The set has three tuning capactors ganged together with brass bands, as was common in AK sets of this era. Often the drive pulleys on such sets break, but this time the problem was a missing dial drive gear and shaft. Steve was able to located a machinist willing to make the necessary 18-teeth-per-inch replacement, and now the neigbor's prized relic works just fine.

(continued on p. 6)

Skinderviken advertisment from February, 1920 "Electrical Experimenter."

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.

QUESTIONS AWAITING ANSWERS

The following excerpt from a letter sent by Allan Brown (Woodlawn, Ontario, Canada) raises a number of interesting questions. The floor is open for comments, so let's hear from you during the coming month!

Dear Marc,

I am an Antique Radio collector and have about 55 radios ranging from a 1926 Philco to modern but unique sets. One thing I have not seen in publications to date is an article on "how are these old radios supposed to sound"!

Most of my radios sound just like any modern radio however, there are a few sets that are different.

For example, with my 1926 Philco there is a faint rumbling noise present in the background. The amplitude of this noise appears to vary with the volume setting. Also after a few hours it becomes a lot more noticeable and eventually distorts the audio. It is definitely not mains hum. I presume it to be thermal noise.

My question is this: Is this a characteristic of radios from that time period? Is it due to the age of the radio or would this noise have been present when the radio was new, resulting from the design of the components?

Some of my 40's and 50's radios have a whistle present. This changes as you tune in a station. I am aware that defective capacitors can cause this condition, but did some radios have this whistle present due to poor design or construction?

When listening to my 1949 Motorola battery portable, I notice faint microphonics from the tubes. Sometimes, depending on the musical content of the signal, the microphonics become fairly loud before fading away. Why are these tubes (1R5, 1U4, 3S4, 1U5) more prone to microphonics compared to tubes from AC / AC/DC sets such as 12SK7 12SA7 etc?

I, and I am sure others, would like to learn more about this. Repairing and restoring a radio is fine, but is the resulting audio normal, due to old age or caused by a defect? That requires not only knowledge but experience.

I have also noticed the volume level on occasion will suddenly change from being quite loud to very faint or vice versa. Occasionally it will fade away then slowly return. Some times this can happen by switching on a lamp or some other device in the house. It is most notable on one station. However, it is not limited to my old radios as I get the same effect on my new communications receiver—but never in any of my cars.

I read the letters in the March issue but I think there is more to the phenomenon. While the reasons described in the letters would cause the effect, they do not explain why radios that are operating on batteries and not connected to anything also exhibit the same effect. As I mentioned above, my "new digital" battery operated communications receiver is also affected — while it is inside the house. Also the effect is most noticeable on one particular - but not limited to one station on the AM band. I have not noticed the effect on the Shortwave

I suspect that the magnetic field generated by the house wiring may be the cause. I think it is the same principle as the wire strung along the top of hydro towers. If there is lightening, this wire tends to attract any discharge before it can cause damage. However, if struck, then an electromagnetic field is generated preventing any more damage by other discharges occurring at the same time. I.E. a force field is created for the duration of the discharge.

As current in the house changes then so does the electromagnetic field. Any spikes coming in from outside would also result in a change. Any variation in the local electromagnetic field would also cause a change. I also think that it affected by the configuration of the house electromagnetic field as I did not notice this effect in my other house and as I said above, not in my car.

To demonstrate the effect of the house electromagnetic field, use one of the older portable phones. While talking to someone, listen to the background noise as you walk around the house. You will hear changes in the hum level. I believe that this field creates a damping effect either to the incoming signal, the radio tuned circuits or both.

ANSWERS TO QUESTIONS

Last month, Alton Dubois (Queensbury NY) was looking for ideas on how to obtain crystals ground to a specific frequency, how to determine the capacity of an unmarked variable capacitor and what to do with a non-working vintage home-built battery set that had been poorly assembled using inappropriate construction practices. Here are comments received so far:

• Try JAN Crystals at 1-800-JAN-XTAL. They should be able to make anything you need.

Find the closest electronic electronic or ham flea market and buy a Heath or Eico capacitor checker. I bought two a year ago for $5.00 each. They are invaluable if you are into old tube gear repair. -- Bob Zinck, Halifax, N.S., Canada

For a little more money, maybe $25.00 or so, you can pick up one of the higher quality checkers (Solar and Sprague made many models) made for the radio service trade).

Bob also suggested a circuit for an "emergency" capacitor checker that can be assembled very quickly if you already own an audio oscillator; reference capacitor box; and VTVM, scope or audio amplifier. We'll present it in a forthcoming column.

• Use one of the new solid state digital capacitance meters or, at much lower cost, pick up one of the older tube-type capacitance checkers.

On the home brew radio: First step is to draw a schmatic of the set as it now exists to see if there are any obvioous errors. Check grid leaks. Many old units will check open! Check antenna coil to see if open. Many were hit by lightning! If set can be made to work with original wiring, do not destroy originality by replacing with modern wire.

Finally, old sets did not have the benefits of shielding. Placing one's hand near the tuning dial would add body capacitance to the circuit and detune it.

By moving the inductance of the tank circuit away from the capacitance, only one element is affected and de-tuning is lessened. -- Dick Maciewicz, Coventry, CT

Dick's final comment was evidently in response to Alton's concern, mentioned last month, that the tuning capactor in his "haywired" radio seemed abnormally far from the coil.

• In regard to Alton A. Dubois "horror" set, I would vote to select a suitable circuit and rebuild. "Part out"; never! Just be sure there is no bad part or circuit error now. -- C. Orval Parker, Pocono Summit, PA

GENERAL INFORMATION

Brightening Up an Eye Tube

Regarding Bob Zink's tuning eye substitution (*see last month's column*), a simpler solution might be to wire the transformer from an old black-and-white CRT booster into the filament circuit of the fading tuning eye tube. It will increase the emission, and the brilliance. -- Dick Mackiewicz, Coventry, CT

Instant Isolation Transformer

Line isolation transformers are a must for avoiding contact with line voltage while working with a.c.-d.c. radios. Such transformers can be expensive, but you can easily make your own if you can get your hands on a couple of heavy duty 115-volt filament transformers with similar secondary voltages.

Just tie the secondary windings together, ignoring any center taps that might be present. Connect an a.c. plug to the primary of one of the transformers and an a.c. receptacle (to which you will plug in the set under test) to the other. Use your own ingenuity to mount or package this assembly into an easy-to-use form. -- Julian Jablin, Skokie, IL

Inexpensive heavy-duty filament transformers are often available from surplus sources. Pick out a pair having secondary ratings of at least 60 watts (volts multiplied by amps) each. The resulting assembly might be a bit heavy and clumsy, but if you can get the transformers cheap enough, it might be worth it.

One good source is Fair Radio sales, P.O. Box 1105, Lima, Ohio 45802. And by the way, Fair often has surplus isolation transformers. Write for a catalogue.

Database Tracks Collection

. . .Since I have dBase 4, I use it to track my collection. I record information such as type of radio, make, name, model #, s/n, date bought, cost and tubes. I also have a listing of tubes in my stash. By using the relational feature of dBase, I can determine what tubes I use in my collection and the number of spares in stock. This info is very useful when I go to a Ham Fest. -- Alan Brown, Woodlawn, Ontario, Canada.

Tips for Coil Constructors

A battered electrodynamic speaker from a junk console is an excellent source of magnet wire for winding crystal set coils. Even if the speaker field checks bad, it will usually be open only in one place. Unwind the field coil and get started on your crystal set!

Heavy cardboard tubing suitable for use as coil forms can usually be obtained free of charge by visiting your local floor covering dealer. Carpets, padding, etc. are shipped on this tubing, which comes in several different diameters. Just cut to length, coat all surfaces with shellac and you have a sturdy, long-lasting form. -- Dick Mackiewicz, Coventry, CT.

Send For These!

Gary Schneider, proprietor of Play Things of the Past has just issued a new catalogue (#3). The 54-page volume contains thousands of radio parts, magazines, books, tubes, speakers, and other things of interest to the radio collector/restorer. In fact, this book contains more items than any other catalogue or parts list I have seen.

While the majority of the material is related to battery sets, the collector of AC sets will also find much of interest, including a large selection of replacement power transformers. The only complaint I have about the catalogue is that some categories of parts and paper are located in more than one section.

This is one catalogue every radio set and paper collector should have. To get yours, send $3.50 to: Gary Schneider, Play Things of the Past, 9511-23 Sunrise Blvd., Cleveland, OH 44133. Retail store at 3552 West 105th St., Cleveland, OH (Phone 216/582-3094). Answering machine picks up on 5th ring; due to large volume of calls, long-distance phone messages cannot be returned. -- Paul Bourbin, San Francisco, CA.

Send an SASE to Dick Mackiewicz for a copy of his latest 4-page flyer, offering crystal detectors, headphones, experimenter and restoration supples, test equipment and more. Many items are listed at close-out prices because Dick is re-shaping his inventory to concentrate on supplies for crystal set builders. Write Dick at 1549 North River Rd., Coventry,CT 06238. Phone 203/742-8552. No machine. No charge for information! -- Marc Ellis

PLAY IT AGAIN!

(continued from p. 3)

Ken-Rad plant in Owensboro, KY, and the plant closed. This was our last radio tube factory - all others having closed years ago. A few audio types are still being made in China and Russia.

The world's stock of receiving tubes is now fixed. There will be no more unless somebody goes into business again. Early types like the UV199 are already very scarce and expensive. Take very good care of your tubes! When they are gone, our radios will fall silent.

The accompanying chart of release dates for radio tubes was assembled from a number of sources. It is useful for estimating when a set was built. You will need reference books to determine the exact year, but the table will let you come close. Some examples: the Type 26 was first used in 1927 and was nearly obsolete by 1929. Most sets using it were built in that 2-year range. A set with octal tubes could not have been built before 1935, etc.. You get the idea.

Next time we will launch into tube theory. (*Ken Owens, 478 Sycamore Dr., Circleville, OH 43113)*

CORRESPONDENCE

(continued from p. 4)

Series String heaters

In response to last month's "Evolution" article, Reader Ray Larson (W. Los Angeles, CA) calls our attention to some important points relating to the fact that current through each heater in a series string is always identical.

. . .While exact filament voltage is important in parallel heaters, it's current that is key in series sets. The first such tubes were all rated at .3 amperes; tube designers worked it out so tubes took the correct voltage at the designed current.

The type 43, which was rated at 45 volts, not 6 as incorrectly stated in the article (Oops! -- Ed.) would take its proper voltage when used in series with 6-volt tubes such as the 6A7, 6D6, 6Q7, etc. because all had the same (.3 ampere) current rating

VINTAGE BOOK REVIEWS

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

AN HOUR A DAY WITH RIDER ON AUTOMATIC VOLUME CONTROL, by John F. Rider Publisher, Inc. New york City, New york. 1936. 94 pages. Hardbound.

This is another useful book in the *An Hour a Day With Rider* series. While few TRF sets had AVC, the rapid increase in popularity of the superheterodyne in the 1930's prompted the development of automatic volume control circuits. A faulty AVC circuit can cause strange, hard-to-troubleshoot symptoms. Furthermore, many AVC circuits used very low currents and voltages, making them difficult for the repair technician to test with the measuring equipment then commonly available. Since many servicemen were trained before the advent of AVC, and since even more complex forms of AVC were being developed, Rider wrote this book to help those in the service profession gain a thorough understanding the new technology.

The first chapter gives a general overview of the reasons for the development of AVC and of the various types used in the mid-thirties. The next three chapters cover the three types of AVC then available: simple, delayed and quiet. The last chapter is devoted to troubleshooting. Many troubleshooting techniques had to employ indirect methods because of the unique nature of AVC circuits.

This book, like almost everything Rider wrote, is written in a clear and easy to follow style. The math is quite simple and, unlike some technical authors, Rider never talks down to his readers. This book is recommended for those who want a clear explanation of AVC circuits and for the advanced collector-serviceman who wants to be able to diagnose and correct AVC problems. However, I'd recommend that a person who is just getting into radio repair hold off on studying this book until he has developed a good basic background.

Conducted by Paul Joseph Bourbin

COMPANY CHRONICLES

Brief Biographies of Classic Radio Manufacturers

GAROD

The Garod brand name had its origins in 1921 when Laurence Gardner, who had been in the jewelry business, and Isaac P. Rodman, an electrical engineer and a former associate of Edison's, joined forces to enter the radio business. The Gardner-Rodman Corporation's first product was the Heliphone, a $5.00 crystal set using a cleverly-designed helical coil. The set sold well, but by the following year the crystal set boom had passed its peak. In addition, the Wireless Specialty Apparatus Company was driving crystal set manufacturers out of business with threats of patent infringement lawsuits.

Gardner and Rodman now joined the Independent Radio Manufacturers, a group put together by Freed-Eisemann to fight WSA. Like Freed-Eisemann they also went into the manufacture of tube radios utilizing the Neutrodyne circuit developed by Hazeltine. Reorganizing their business under the name "Garod Corporation" in 1923, the organization began selling Garod brand Neutrodyne sets. Unlike Freed-Eisemann, Garod did not manufacture its own parts -- but purchased most, if not all, of them from other manufacturers.

At first Garod did well, paying Hazeltine royalties on sales of $350,564 in 1923 and reporting a pre-tax profit of $85,323 in 1924. Sales declined, however, and in 1926 the company decided to take a flyer on a revolutionary a.c.-operated set designed by
Benjamin Meissner, who had joined the company in March of that year. The set (Model EA) proved to be a disaster because the Dubilier capacitors used in its power pack developed a failure rate of 100%.

Though Garod sued for $250,000 in damages, the short-term effects of this setback were devastating. At about the same time, Garod itself was being sued by RCA and GE as part of an infringement action against Hazeltine's patents. The company finally went into receivership in February, 1927.

Though the company's resources were now quite limited, Meissner proceeded with the design of an improved a.c. receiver (the Model EM) using a specially-built directly-heated a.c. tube known as the Armor AC-100. A few were made, but by August, 1927 Garod was sold for $45,000. The new owners got the organization out of receivership but their assets, in turn, were auctioned off a few months later after Garod failed to obtain the RCA license now necessary to manufacture its designs.

The Garod brand reappeared in 1933, and sets were manufactured under that name for the next fifteen years or so. The

company was then bought by Majestic, which merged with Wilcox-Gay in 1950. Garod continued to operate for a few years after that time as a subsidiary of the new organization.

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

CLASSIFIED ADVERTISING

A Clearinghouse for Buyers, Sellers and Swappers

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 and are not renewable. However, a new free ad may begin in any subsequent issue.

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

Circuit diagram for Knight KG-220, a 30-50 mc FM monitor made by Allied Radio, Chicago. Alton A. DuBois, Jr., 67 Peggy Ann Rd., Queensbury, NY 12804.

Car radios, AC-DC sets, etc. using 5 pin 6 volt tubes 36-37-38-39. Ray Larson, 12241 1/2 Gorham, W. Los Angeles, CA 90049-5214.

Send SASE for new flyer with crystal detectors, headphones, experimenter and restoration supplies, test equipment and much more. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

An original AM (+FM?) radio for 1965 Chevy P/U. Pay cash or trade tubes, other parts. David, 4016 Texana Way, Beale AFB, CA 95903. (916) 788-0624.

Graybar 310 receiver (like RCA Radiola 60) in decent working condition. Ed Doughty, 3865 N. Thomas Rd., Freeland, MI 48263.

Any Rider manuals or any Radio College of Canada manuals. Shayne Trowsse, R.R. 3, Box A3, Casselman, Ontario, Canada, KOA 1MO

Antique radio headphones. Also want any junk Tuska radios or parts. Highest prices paid. Dick Mackiewicz, 1549 N. River Rd., Coventry, CT 06238. (203) 742-8552.

FOR SALE

SERVICE DATA AND HARD TO FIND PARTS Original SAMS photofacts, TSM, CB, MHF, TR and AR. Manufacturer's Data, FREE Catalogue. A.G. Tannenbaum, P.O Box 110, East Rockaway, NY 11518. Phone (516) 887-0057. 24 hour FAX (516) 599-6523.

Radio Parts. New and used tubes, test equipment, service data, 1000's of parts. Write your wants. SASE for reply. Krantz, 100 Osage Ave., Somerdale, NJ 08083-1136. (609) 783-0400.

Buying WWII military surplus radio sets and accessories. Highest prices paid. Over $6,000 cash paid in 1993. America's WWII radio surplus leader. Sam Hevener, W8KBF, "The Signal Corps," 3853 Everett Rd., Richfield, OH 44286-97623. (216) 659-3244 before 8 p.m.

CALENDAR OF EVENTS

Planning an auction, swap meet, convention or show? Send us a brief rundown for a free announcement. Be sure to include date, location and contact information. Plan on getting the information to us two months in advance for timely insertion of your item.

May 28. Joint Antique Wireless Association - New Jersey Antique Radio Club May Swapmeet. 7 a.m.-3 p.m., Hightstown Country Club, Hightstown, NJ. Features luncheon with antique radio program, catalogued 350-piece indoor auction. Outdoor swapmeet: $12.00 per table for AWA or NJARC members; others, $15.00. Indoor tables $20.00. Take NJ Turnpike Exit 8. Go east on Rt. 33 about 200 yards (past "Mom's Peppermill" Restaurant); continue 1/4 mi. to the first "jughandle" and come back west. At the first traffic light, bear right onto Monmouth St., then 300 yards to the country club on the left. Contact Marv Beeferman (609) 693-9430, Tony Flanagan (908) 462-6638, or Ludwell Sibley (908) 782-4894.

June 9-10-11. Antique Radio Club of America 1994 Convention hosted by Arkansas Antique Radio Club. Riverfront Hilton Inn, 2 Riverfront Place, North Little Rock, AK. (501) 371-9000. Swapmeet, seminars, contests auction. Activities too numerous to mention in detail!

July 8-9-10. Extravaganza '94 sponsored by the Michigan Antique Radio Club and the Antique Wireless Association. Holiday Inn South/Convention center, 6820 South Cedar St., Lansing, MI. (517) 694-8123. Another major event offering swapmeet, seminars, contests and an auction. You have some lead time on this one, so write Extravaganza '94, P.O. Box 585, Okemos, MI 48805-0585 for complete info!.

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 French inventor of the "coherer," which converted electrical impulses into audible sounds, received the Nobel Prize for his work.

Answer to last month's quiz: Emile Berliner (German/US) 1851-1925. Correct answer sent in by Alan Douglas.