



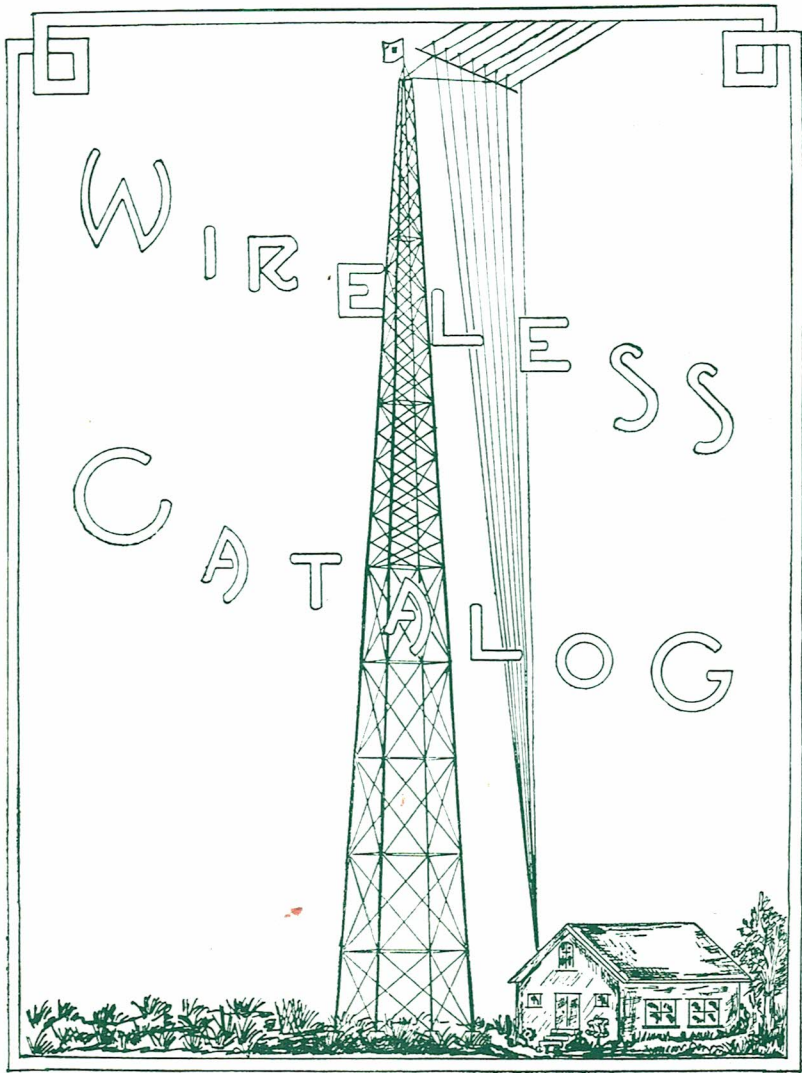
ANTIQUE RADIO CLASSIFIED



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NUMBER 5



A.R.C. — THE NATIONAL PUBLICATION FOR BUYERS AND SELLERS OF OLD RADIOS AND RELATED ITEMS — PUBLISHED MONTHLY

ANTIQUE RADIO CLASSIFIED

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STAFF

Publisher and Editor:	John V. Terrey
Production Manager:	Scott J. Young
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The deadline is the first of the month for display and business card ad artwork, payment and repeat requests.

Advertising is accepted only for early items related to radio, communication, etc. All items must be described fairly; reproductions, reprints and not-original items must be so identified. Advertisers agree to respond promptly to inquiries and orders, to resolve problems promptly if the buyer is not satisfied, and to comply with a buyer refund request on unaltered returned items.

Advertising must be prepaid, except as noted below; see "Payment" paragraph above for details. Late ads will be run only if space and time permit. Since artwork is reduced to 63% in the printing process, originals must be the artwork size listed below. Do not send in artwork on art board or send negatives. Ads should be typeset or typed neatly with a carbon ribbon, black printing on white. No reverse type if A.R.C. is to make up the ad. If you want us to prepare your ad, include the one-time cost below for A.R.C. to make up the ad.

Photos should be at an 85-line screen; otherwise, add \$10.00 per photo for screening. Do not cut or trim photos or glue photos to artwork; submit separately.

If you are confused by these requirements and terms,

Page	ARTWORK SIZE (SEND IN THIS SIZE)		As Printed (size in magazine)		Cost for 1-month	Cost for 3-months	Cost for 6-months*	Cost for 12-months**	One Time to make up Ad
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Full	12 3/16	(or 10 1/2) x 7 1/2	7 3/4	(or 6 5/8) x 4 3/4	\$188.00	\$499.00	\$869.00*	\$1580.00**	\$60.00†
1/2 H	5 1/4	x 7 1/2	3 5/16	x 4 3/4	94.50	252.00	435.00	790.00**	30.00†
1/2 V	12 3/16	(or 11 13/16) x 3 9/16	7 7/16	x 2 1/4	94.50	252.00	435.00	790.00**	30.00†
1/4	5 1/4	x 3 9/16	3 5/16	x 2 1/4	47.75	127.00	220.00	399.00	15.00†
1/8	2 5/8	x 3 9/16	1 5/8	x 2 1/4	24.50	65.00	112.00	199.00	7.50†
Business Card	2	x 3 3/4	1 1/4	x 2 3/8	not avail.	34.00	59.00	107.00	5.50†

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† For 6 and 12 month ads, no ad make-up charge if no change is made to ad for entire run.



ANTIQUE RADIO CLASSIFIED



EDITOR'S COMMENTS

Spring is a time for new growth, and A.R.C.'s latest record is right in keeping with the season. In this issue, we've reached a new high in total classified advertising — over 830 classified, photo and boxed classified ads. Our list of subscribers has also grown to just over 7,750, about 300 more than the last report on this page six months ago. We can only come to two happy conclusions — interest in collecting is increasing and more ads are being read by more readers. Great news for all of us!

The J.H. Bunnell & Co. catalog is featured in our lead article this month. Ronald Oberholtzer reminisces about the radio "bible" of his youth. An early catalog tells the interesting story of how the collectible sets of today were touted in the 1920s. And the prices — imagine paying \$130 in 1922 dollars for a 3-tube Grebe CR-9, and then having to scrape up more cash for tubes, batteries, headphones and an antenna!

Besides being useful for documenting the sets we collect today, early catalogs are collectible themselves. In addition to Bunnell, many other early and popular manufacturers, such as Wm. B. Duck, Manhattan Electrical Supply (Mesco) and Electro Importing (E.I.) produced catalogs of interest.

Ron Boucher shares with us an overview of several eras of radio cabinet design. Beginning with the wooden "3-dialers" of the 1920s, he illustrates several steps leading to the push-button and plastic sets of the late 1930s.

When he first found the Silvertone Model 7038, Robert Haworth thought it was a particularly interesting radio. He expected the 8-tube set to be a super performer, but after studying it, he found that several of the tubes seemed unnecessary. In his article, he suggests that these extra tubes might have been added to boost the number of tubes for marketing purposes, rather than for improving performance.

Philip Whitney provides motivation for all of us to recognize that tubes themselves merit preservation and collection. His article illustrates a wide variety of tube types from an early Western Electric VT-2 to a 1B24A radar tube.

Restoration Topics this month features the restoration of an early ohmmeter. This article by Chester Gehman also describes different types of ohmmeter scales and touches on ohmmeter theory of operation.

A unique video presenting early electrical apparatus, which was produced by Jim Kreuzer and Jim Hardesty, is reviewed this month. This video — *In Quest of the Light: Visible & Invisible* — traces the development of vacuum tubes in the 19th century, culminating in Roentgen's X-ray tube. Many of the tubes, such as those used by Geissler and Crookes, are the beautiful creations of the

glassblowers of the times. Artistry and science are combined in this valuable historic resource.

The Ohio-based Larry Ruder Auction Service continues to hold interesting radio auctions. Its February 13th event, where over \$20,000 was bid for 400 lots, is reported this month.

Featured in the *Photo Review* this month are sets from the 1920s and later, including unusual sets from Carloyd Radio and Electric Co., as well as an ornate clock radio from U.S. Radio and Television. The popular but rare Emerson Mickey Mouse set is also shown.

The article on the Kenrad Model B-12 "Last Word" crystal set in the March 1993 issue prompted many letters. It seems that these sets are very popular and appear in collections in the U. S., as well as in collections from Austria to Canada. Several of these letters are included in *Radio Miscellanea* this month.

One short item supplied by Roger Hart includes photos of a late-1800s Wheatstone telegraph automatic punched-tape telegraph transmitter. Another contributed by John McGrath suggests how ham radio operators who are also antique radio collectors can communicate more about their hobbies. A third contribution, sent by John Hollowell, presents an amusing set of rules for repairmen of the 1880s. These rules might be considered a bit off-base today.

Late Ads. If you don't see an ad in the issue you expect it to be in, you have no doubt missed the deadline. Remember that our classified ad deadline is the tenth of the month, which for this issue was Saturday, April 10. Thirty-one ads were received on Monday, April 12 — too late for inclusion in this issue. The classified ad deadline is extended beyond the tenth *only* when the post office is not open on the tenth (such as a Sunday or holiday). Then the deadline is extended only until the next day that the post office is open. Also, mail early, because looking through the postmarks of the mail received on Monday, April 12, we found that several had taken a full week to arrive.

Club Events. May is a big month for collectors — over 40 activities are listed on our *Coming Radio Events* pages. In the coming months, A.R.C. plans to attend the major meets in West Virginia, Michigan, Illinois, New Hampshire, New York, and Birmingham, England. See you there!

Happy collecting.

John V. Terrey

ON THE COVER

The illustration on this month's cover is taken from the J.H. Bunnell & Company No. 44 catalog, dated January 1, 1922. The rather delicate line drawing is certainly different from the glossy catalogs of today.

WITH THE COLLECTORS

The Bunnell Catalog

BY RONALD L. OBERHOLTZER

Noting in A.R.C. that several collectors were looking for Bunnell telegraph keys, such as the one shown in Figure 1, brought me back to 1920 and the Bunnell Catalog — my radio bible as a young boy. How my father obtained this catalog I do not know, but it showed up in our stack of literature on the new science of radio.

The Bunnell Catalog was the greatest piece of radio literature at the time on the everyday subject of radio. Every practical piece of available radio gear was listed and priced within its covers. Although similar in format to A.R.C., the catalog was much thicker in order to accommodate the illustration and description of each and every product.

Whatever you wanted — a rotary spark gap (shown in Figure 2), a tube, a crystal, a rotary switch blade, or a Grebe radio (shown in Figure 3) — you checked it out in the Bunnell Catalog first.

Ever hear of a Meyers tube? Bunnell had it in three varieties. This tube was unusual in that it was shaped like a 250-volt, 60-ampere fuse. In addition, split fuse-type clips were used as a socket to mount the tube and provide the four connections — two for the filament and one each for the plate and the grid.

Want honeycomb coils (as shown in Figure 4), or a spark coil (as shown in Figure 5) — my first came from a Model T — try Bunnell. RCA's total list of tubes was five: a UV-200, a gas-filled detector; a UV-201, a hard tube amplifier; a UV-202, a 5-watt amplifier; a UV-203, a 50-watt power tube; and a UV-204, a 250-watt power tube for transmitters. See Figure 6.

Need headphones? The Baldwin, shown in Figure 7, was among several brands of head-

STANDARD WIRELESS KEY

A sturdy heavy key for carrying heavy currents.

All brass construction, with easily removable contacts. Beautifully finished in gold lacquer.

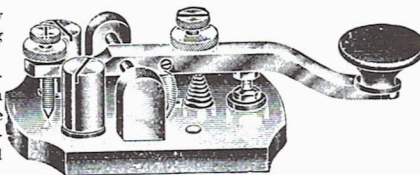
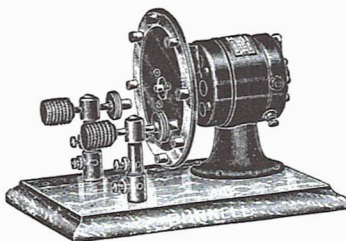


Figure 1. One of the many telegraph keys offered by Bunnell.

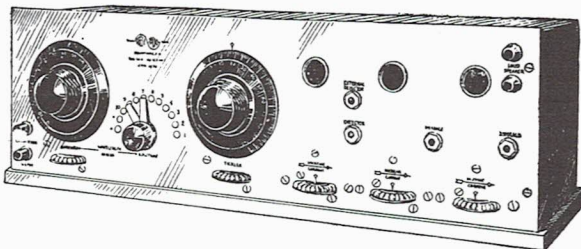
MASCOT ROTARY SPARK GAP



Has high speed universal motor. Polished Bakelite rotary wheel with eight $\frac{3}{8}$ inch zinc Electrodes. Standards are polished brass 3 inches high with knurled hard rubber knobs. Arranged for making rapid and permanent adjustment by just pressing raised button controlling concealed spring.

Figure 2. The Bunnell rotary spark gap.

GREBE APPARATUS

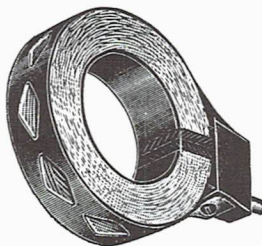


The CR-9 Receiver is a combination of the CR-5 Receiver and ROR-K, 2 Stage Amplifier in one cabinet. The wave length range of this receiver is 150 to 3000 meters. The Grebe Automatic Filament Control System makes it possible to use the amplifier section with external apparatus. This is done merely by plugging in on the jack marked "External Detector". This receiver includes all the latest features which have been used in the design of the CR-8 Receiver Phones, batteries or detector tubes are not furnished with unit.

List No. 4112—Type CR-9 Price each.....\$180.00

Figure 3. The Bunnell Catalog offered well known equipment such as this Grebe CR-9 receiver.

DE FOREST TYPE L "HONEY COMB," COILS
Highest Quality. No Varnish Used
GUARANTEED AGAINST ALL WEATHER CONDITIONS



List No.	No. of Turns	Max. Wave Length in Meters	Mounted	Un-mounted
3956	25	360	\$1.40	\$0.50
3957	35	510	1.40	.50
3958	50	720	1.50	.60
3959	75	1,050	1.50	.60
3960	100	1,485	1.55	.65
3961	150	2,200	1.60	.70
3962	200	2,875	1.65	.75
3963	250	3,650	1.70	.80
3964	300	4,465	1.75	.85
3965	400	6,000	1.80	.90
3966	500	7,600	2.00	1.00
3967	600	10,000	2.15	1.15
3968	750	12,000	2.35	1.35
3969	1000	15,000	2.60	1.60
3970	1250	19,000	3.00	2.00
3971	1500	24,000	3.50	2.50

Figure 4. The catalog offered DeForest honeycomb coils ranging in price from 50 cents to \$2.50

MASCOT SPARK COIL

The standard spark coil for small wireless sets.

Mounted in a neat case with brass posts.

List No.	Price Each
7758	¼ inch...\$4.20
7759	½ inch... 5.40
7760	¾ inch... 7.00
7761	1 inch... 8.00
7762	1 ½ inch...10.50
7763	2 inch...14.40
7764	3 inch...27.00
7765	4 inch...36.00

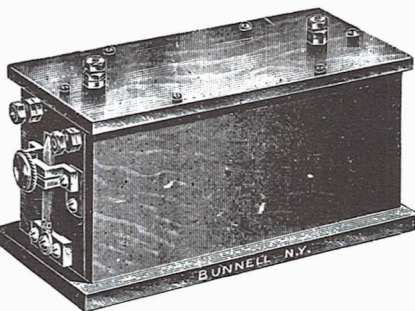


Figure 5. A typical spark coil offered in the Bunnell Catalog.

phones listed. Bunnell was one of the first suppliers to list the Magnavox speakers with an electromagnetic field and a low impedance voice coil.

For the spark enthusiast, there were plain spark gaps, rotary spark gaps and quenched gaps. Spark transformers were listed in several fractional kilowatt ratings. Various antenna insulators were listed according to their voltage ratings. Egg and other types of strain insulators were available to provide insulated guy wires.

Telegraph keys varied as to manufacturer and power ratings. One was listed as a "flameproof" key with totally enclosed contacts. Relays were also available to keep the high voltages in the transmitter assembly.

The first part of the catalog was enough to make any amateur drool over the variety of radio sets listed. Here I learned of the Grebe and other popular sets of the era. Then came the add-ons: amplifiers, speakers, headphones, and a wonderful variety of receiving transformers, as shown in Figure 8.

In all, this catalog, which unfortunately I no longer own, was the most exciting one in my small collection. While textbooks gave

(Continued on following page)

BUNNELL

The first issue of the J.H. Bunnell & Co. Illustrated Catalog was released 114 years ago in 1878. The eighth catalog, published in 1886 and containing 168 pages, noted the following:

"To Our Patrons

With this issue we complete the eighth yearly edition of our Illustrated Catalog. Each new issue, as it has come out from time to time, has included large additions of important matter, containing illustrations and descriptions of many new improvements, mostly our own, in Telegraphic and Electrical Apparatus, together with more detailed and extended lists of Materials and Tools pertaining to our general business.

This issue contains many pages of new matter in addition to that contained in the last issue of July 1885, and will be found interesting not only as a book of reference in regard to the latest prices, but also as a most

complete list and description of all that is newest and best in Telegraphic and Electric Apparatus and Supplies."

Over the years, Bunnell's extensive catalogs kept pace with the many significant developments in communications technology and electrical appliances. By 1924, the 241-page catalog, in addition to almost 50 pages on telegraph instruments and parts, advertised the very latest radio equipment and accessories.

But Bunnell didn't stop there. The same catalog also featured such diverse items as Eveready flashlights, Christmas tree lights, Lionel electric trains, electric irons and hair dryers, "handsome" electric percolators, electric heaters and vacuum cleaners.

Truly, the Bunnell Catalogs of the 1920s reflected the "Reddy Kilowatt" explosion of that era. (Editor)

(Bunnell Catalog, continued)

the budding technician his mechanics and theories, the Bunnell Catalog ads gave him a real-life aspect of the new, fast moving radio technology.

(Ronald L. Oberholtzer, 604 Winslow Ave, North Cape May, NJ 08204-3054)

Ronald L. Oberholtzer's memories of radio collecting go back to 1922 when he was ten years old and relatives and friends fired his interest with breadboards, crystal sets, superheterodynes, etc. For seventy years — thirty of which he worked for

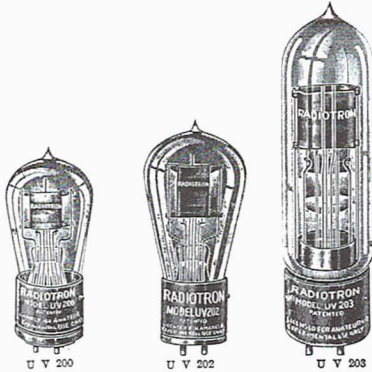
RCA — he has constructed every new bit of radio technology that came along. Today he continues to make it a rule to go to yard sales to find old radios to repair and sometimes resell.

References:

Bunnell, J.H. *Illustrated Catalogue No. 8*. New York: J.H. Bunnell & Co., September, 1886.
 — *Wireless Catalog No. 44*. New York: J.H. Bunnell & Co., Inc., January 1, 1922.

Credit:

Catalog from the collection of John V. Terrey.



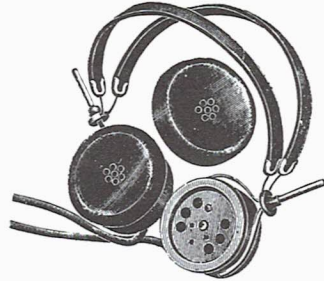
RADIO CORP. RADIOTRONS
(Vacuum Tubes)

For Detection Amplification and Power Work

List No.		Price Each
5688	U. V. 200 Detector	\$ 5.00
5689	U. V. 201 Amplifier	6.50
5690	U. V. 202 Power Tube	8.00
5691	U. V. 203 Power Tube	30.00
5692	U. V. 204 Power Tube	110.00

Figure 6. Major brand tubes were offered.

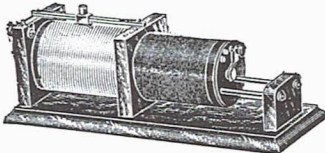
BALDWIN AMPLIFYING HEAD SETS



The Baldwin mica diaphragm telephones are the nearest to perfection in electromagnetic radio receivers. They are used by the U. S. Bureau of Standards, by the U. S. Navy and War Department, and by many foreign governments and private operators in various parts of the world.
 "They are the best and most efficient."
 "They are equal to two stages of radio amplification."

Figure 7. Baldwin headphones sold for \$14.

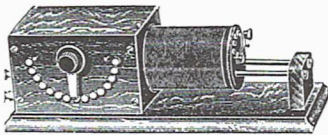
DANDY RECEIVING TRANSFORMER



A good, substantial, low priced coupler for amateur use. Wave length, 600 meters. Finely finished in cherry, metal parts are polished brass.

List No. 8833—(Postage weight, 6 lbs.) Price each\$11.00

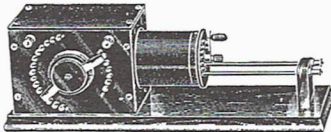
JOVE RECEIVING TRANSFORMER



Has 15 primary and 6 secondary taps and quick acting radial switches assuring rapid adjustment and positive contact. Wave length, 1800 meters. Handsome cherry case and nicked fittings.

List No. 8834—(Postage weight, 6 lbs.) Price each\$15.00

PREMIER RECEIVING TRANSFORMER



Will tune up to 3600 meters. 15 large and 6 small primary taps and 11 secondary taps. Hard Rubber cabinet, mahogany base, and polished nickel fittings.

List No. 8812—(Postage weight, 8 lbs.) Price each\$18.00

Figure 8. These loose couplers or receiving transformers were one of the highlights in the catalog.

WITH THE COLLECTORS

Radio Style — 1920s to 1930s

BY RON BOUCHER

When I got into radio collecting some 14 years ago, most of the interest from serious collectors was in battery sets. Some liked cathedrals and others early 1930s radios, but they were the "new kids on the block." The main emphasis was on the circuitry. Was it a superhet, a neutrodyne, or a regenerative???

That all changed in the 1980s when interest turned to the Bakelites, Catalins, and other plastics. Now the emphasis was on the artistry and

"When home receivers were first marketed, the designers were mainly interested in making the radio functional. Often, their only attempt at beautifying the cabinet was to arrange the knobs in an aesthetically pleasing way."

aesthetic value of the radios. Judging by the displays that are popping up in some museums, radio cabinet design has become almost an art form.

Have you ever heard anyone mention the circuitry in a Catalin radio you are looking at? Does it have shortwave — a tone control? Who cares, as long as it's blue or red!!

There are definite eras in radio cabinet design, and I have categorized some of them here. Keep in mind that I'm looking at what would be considered the "mainstream" designs — the radios that we, as collectors, find most often. Each era had its novelties and extra fancy designs in the high priced models.

See if you agree with these classifications.

EARLY 1920s — THE ERA OF THE CONTROL KNOBS

When home receivers were first marketed, the designers were mainly interested in making the radio functional. Often, their only attempt at beautifying the cabinet was to arrange the knobs in an aesthetically pleasing way. The radios were mounted in a wooden box, with a Bakelite panel and black Bakelite knobs. There wasn't much opportunity for the artistic touch, but the manufacturers at least tried to make sure the proportions weren't too grotesque. A good example is the Clapp-Eastham battery set shown in Figure 1.

Most battery sets had plenty of knobs and
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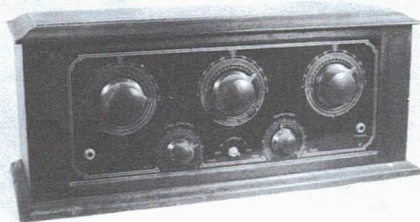


Figure 1. This Clapp-Eastham, Gold Star model was made in Cambridge, Mass., and is a typical 3-dialer in a wooden box. It may be one of the sets that Clapp-Eastham made in its waning years, possibly in 1926.



Figure 2. The Stromberg-Carlson Model 635A, an early AC set made in 1928. Note the introduction of nice paneled wood and a little fancy molding.



Figure 3. The Peerless Reproducer, a cathedral-shaped speaker popular in the late 1920s and still available in antique radio flea markets.

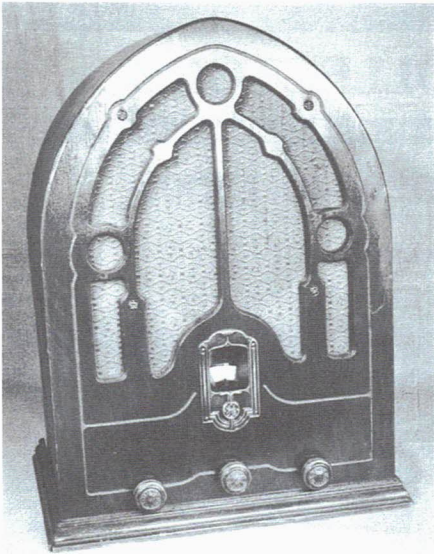


Figure 4. This 1932 GE Model J72 cathedral boasts the church-like arch typical of the early 1930s design era.

(Radio Style, continued)

were difficult to operate. Yet people still bought them and used them; some even made their own sets from kits or circuit designs found in newspapers and radio magazines.

THE LATE 1920s — THE ERA OF "USER FRIENDLY"

In the late 1920s, electric sets were introduced and the bulky batteries were eliminated. The controls were simplified, and radio was made "user friendly." These improvements came about because of advancements in circuit design. Radios had become more acceptable in the average home.

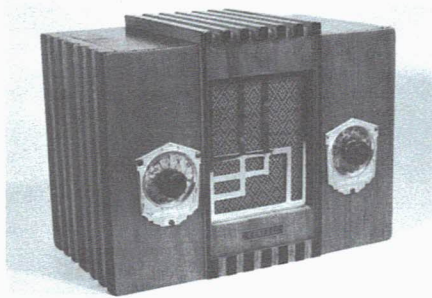


Figure 5. This Art Deco radio by General, model number unknown, represents some of the more unusual "compact" radio designs of the early 1930s. Note the twin escutcheons and the chrome grille work. This 4-tube radio used Type 6D6, 75, 43, and 25Z5 tubes, plus a 185 ballast tube.

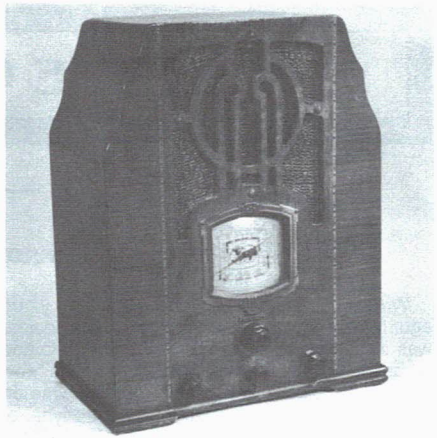


Figure 6. The era of the dial featured such radios as this "transitional" Monarch cathedral, model unknown. The year of manufacture is estimated to be circa 1936, since the 6 tubes are a combination of early 1930s tubes and the later metal octal tube types.

Cabinets for the most part were still square boxes but with perhaps a little fancy molding here and there, such as on the Stromberg-Carlson Model 635A shown in Figure 2. More nice wood was used in the cabinets and little, if any, Bakelite. The "fanciness," if any, was usually in the speaker that was often separate and sometimes even disguised to look like something else.

THE EARLY 1930s — THE ERA OF THE SPEAKER GRILLE

Then the thirties rolled around and for several years the cathedral "Gothic" and tombstone radio designs became dominant. The radio and speaker were now small enough to combine.

I've often heard it said that cathedrals were created when the speaker was put into the radio, but I've always seen it as the other way around. The radio chassis was put into the speaker cabi-

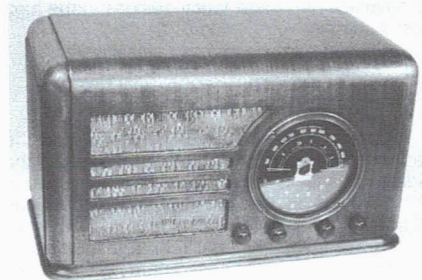


Figure 7. This low profile 1938 Delco Model R-116 shows a major shift in design by locating the dial on one side of the cabinet front and the speaker on the other side.



Figure 8. One attraction of the "gadget" era was push-button tuning, prominently shown in this stylish Zenith table model 6D-312, made in 1939.

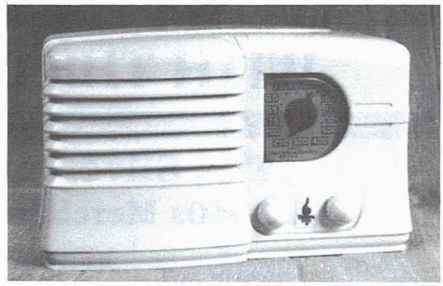


Figure 9. Radio design as an art form is represented in this 1939 Emerson Model CH-246. The common tube complement of this 5-tube set — Types 6A8, 6K7, 6Q7, 25L6, and 25Z5 — belies the uncommon cabinet style.

net! There were cathedral-shaped speakers long before there were cathedral radios, as indicated by the Peerless Reproducer shown in Figure 3. Some of these speakers were made to look like "arch top" clocks, a partial disguise to make them more acceptable in the home.

During this time, the design of the speaker opening played a major roll in the overall look of the cabinet. Even the pattern in the cloth was important. The grille work in cathedral and tombstone radios often has a design in it that you can recognize as a flower, a vase, a musical instrument, or church-like arches, as shown on the General Electric Model J-72 cathedral in Figure 4.

The dial was usually very small and functional. These radios were considered small, and they were, when compared to their weighty predecessors from the late 1920s.

During this time there were even much smaller, inexpensive, compact radios that also used the speaker opening and wood molding to create their individual "look." Some companies produced this style of radio cabinets with chrome-plated grilles for the speaker opening, as in the Art Deco radio by General, ca. 1933, shown in Figure 5.

MID-1930s — THE ERA OF THE DIAL

In the mid-1930s the designers decided that the dials had to get bigger and more prominent, to make them easier to read. The airplane dial was born. The advent of multiple tuning bands almost made the large dial a necessity. An example of transition radios that have cathedral cabinets and airplane dials is the Monarch cathedral shown in Figure 6.

MID-TO LATE 1930s — THE LOW PROFILE CABINET

As tubes, chassis and speakers got smaller, so did the entire radio. The designers began putting the dial on one side of the cabinet front and the speaker on the other side.

Usually the controls were put on the right side, to cater to the right-handed majority. Dials got a little fancier and were usually the focal point of the design. The speaker opening became less prominent and was less important than the dial, as noted

in the 1938 Delco Table Model R-116 in Figure 7.

THE LATE 1930s AND EARLY 1940s — THE ERA OF THE GADGET

In the late 1930s, an attractive dial wasn't enough so in came push buttons, built-in and rotatable antennas, and the familiar green tuning "eye." Dials were made rectangular so they would be easier to read. There were also motorized tuning, metal tubes, and combination radio/phonographs. The Zenith Model 6D-312, shown in Figure 8, is a good example of this era.

THE ERA OF PLASTIC

The introduction of plastic gave designers a field day. They were no longer restricted by what could be done with wood. They were, however, restricted by the realities of plastic mold making. We can imagine some of the battles that broke out between cabinet designers and mold makers. The unique Emerson Model CH-246 cabinet, shown in Figure 9, is a case in point.

In my early days of collecting, we spoke of plastic as something artificial. Most plastic radios were brown and seemed like an attempt to mimic wood. Plastic was lifeless; it had no grain or character, and you couldn't refinish it. A cracked plastic radio is broken for eternity.

Nowadays if you tell someone a radio is made of wood, it could just as well be made of particle board. Plastic, however, turned out to be the clay from which was sculpted some real "works of art".

Although there is little information in this article that an experienced collector would not already know, I hope we have looked at some aspects of radio design in a different way.

(Ron Boucher, PO Box 541, Goffstown, NH 03045)

After several years in the radio mail order business, Ron Boucher is now doing radio art work and cartoons for various publications. He is also updating his radio-related computer software for general distribution. Cathedrals and all-wave sets of the mid-1930s, as well as some novelties, are his radio-related interests.

WITH THE COLLECTORS

The Silvertone Model 7038 A 1940s Merchandising Shell Game?

BY ROBERT HAWORTH

Most of us have known the disappointment of a "great find" which turns out to be not so great. Robert Haworth shares with us a personal experience with a promising radio that failed to live up to his critical engineering standards. (Editor)

At a recent Antique Wireless Association (AWA) conference in Rochester, I had the fortunate experience of again meeting Bill Digell, an AWA flea market vendor of old radios. Bill had brought along his usual collection of "I don't know where he gets them" radios, one of which caught my eye. This radio, shown in Figures 1, 2, and 3, stood out from the rest because of the large (18" x 20") loop antenna that seemed to be wrapped around a quarter of the depth of the cabinet.

A closer inspection revealed that it was transformer-powered with 8 tubes and a 3-section variable capacitor. It also had 6 push buttons and sported both AM and SW bands. The set had the appearance of a "great" radio with all the better features of 1940 style consoles. Bill and I agreed on a price, and I brought the "Silvertone" home.

My first shock came when I tried to find the model in Rider's. It was not present or accounted for. A check of the tube complement in *Mallory's Radio Service Encyclopedia* suggested that my Model 72?? (per sticker in cabinet) was really a 7038.

The second shock came when I inspected the schematic and saw how the 8 tubes were used. The set had neither a tuned or untuned RF stage, as I had at first thought. Instead, the third section of the variable was used to tune the loop as a form of inductance capacitance (L/C) preselector. The first converter tube was just that — it required a 6J5 oscillator to provide the IF translation. A single stage IF fed the DET/audio tube (6SQ7). For the third shock, parallel 6K6 tubes were the audio output.

By this time, I had accounted for 6 of my 8 tubes. Allowing one for rectification (5Y3) left a "bias control" tube (6J5). I classify this tube function in the radio in the same category as the assist

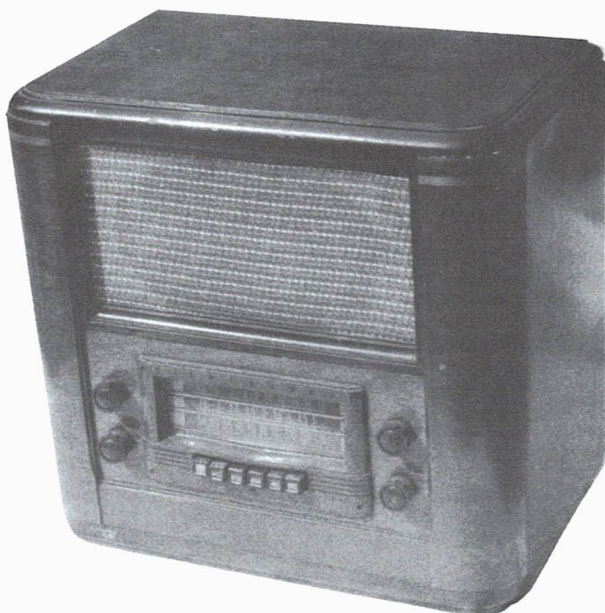


Figure 1. The Silvertone Model 7038 Radio.

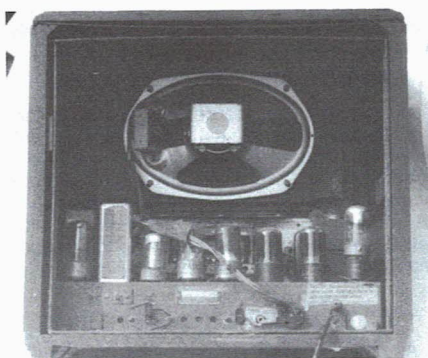


Figure 2. Rear view of the Silvertone Model 7038.

in automobile performance that a bumper sticker provides. Its sole function in life is to increase the bias on the 6K6s as the AVC voltage increases.

As I restored the radio to see just how well it would perform, it occurred to me that this radio (and others I'm sure) might be the "shell game" of

the radio merchandisers of the 1940s. I had visions of the salesman working under the pressure of a 3-day sale, extolling the features of this "8" tube set at such a low price. In reality, the set is the equivalent in performance to that of a late 1950s 4- or 5-tube Superhet.

It really hurt my engineering self-esteem to see so many great radio parts put to such poor usage. I'm convinced that the parts in this set could have produced an exceptional radio had a different tube lineup and functional system been used — but maybe that was merchandising in the '40s. I wonder if you readers have seen shell games similar to this, or was this radio just a spoke in the wheel of time that marches on?

*(Robert Haworth, W2PUA,
112 Tilford Road, Somerdale,
NJ 08083)*

Bob Haworth, a licensed amateur ham since 1941, is an electrical engineer who worked for RCA for 34 years. Since retiring in 1988, he has been collecting and

restoring old radios, ca. 1922 to 1960. He has a new interest, as he recently acquired a couple of old Hallicrafters transmitters.

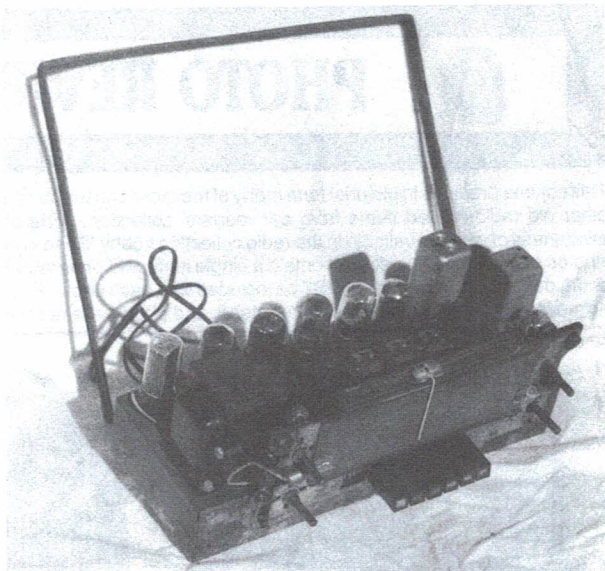


Figure 3. Chassis of the Silvertone showing the large loop antenna.

Rules for Troublemakers

CONTRIBUTED BY JOHN HOLLOWELL

Like Lloyd Spivey [A.R.C. January 1993], John Hollowell found the following set of "Rules for Troublemakers" in his archives. These maxims, dated April 6, 1880, were issued by James D. Tracy, General Manager of the Norfolk, Virginia, Telephonic Exchange. Servicemen today might conclude that a legal challenge would be in order if required to obey these codes of dress, etiquette, even animal care — and to accept the suggestion that overtime, uncompensated no doubt, should be expected. How times have changed! (Editor)

1. Put up a "good front." It is not necessary to advertise any tailor shop; neither is it necessary to go about your work looking like a coal heaver. Overalls can look as respectable as anything else, but they must at least show that they are on speaking terms with the laundryman; and shoes must have a bowing acquaintance with the boot-black.

2. Make the liveryman wash and oil your wagon and harness, and do not tie the harness up with wire longer than is necessary to get proper repairs. The same may be said of your suspenders and buttons.

3. Keep all unnecessary junk out of your wagon.

4. Go about your business cheerfully and quietly. When you enter a residence, don't overlook

the footmat.

5. Close the door when you go out, not forgetting to shut the front gate.

6. If you ever believe that a subscriber is a crank, forget it! All of them are wise enough to tell when a telephone is not working right. Not every troublemaker can do this.

7. Be courteous and polite, and don't be afraid to hand out a little jolly occasionally. It doesn't hurt anybody's feelings to be jollied a little.

8. Treat everyone as you like to be treated, not forgetting your horse; if you want to know the horse's side of it, just take off your coat and hat some zero day, hitch yourself to the same post with your belt, and stand there about two hours. Hereafter don't forget his blanket.

9. Don't idle away your time; there is always something to do if you will only do it.

10. Carry yourself with dignity, and others will accord it to you.

11. Study your business, and try to improve the quality of your work.

12. Report for duty promptly and don't be afraid of working overtime.

13. If you don't like your job, resign. It will be better for you and the company.

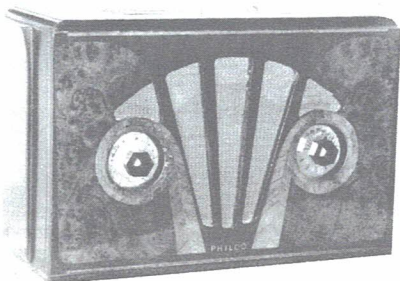
(John Hollowell, 2302 Arrowhead Rd., Port Republic, MD 20676)



PHOTO REVIEW



This column presents in pictorial form many of the more unusual radios, speakers, tubes, advertising, and other old radio-related items from our readers' collections. The photos are meant to help increase awareness of what's available in the radio collecting hobby. Send in any size photos from your collection. Photos must be sharp in detail, contain a single item, and preferably have a light-colored background. A short, descriptive paragraph **MUST** be included with each photo. Please note that receipt of photos is not acknowledged, publishing is not guaranteed, and photos are not returned.



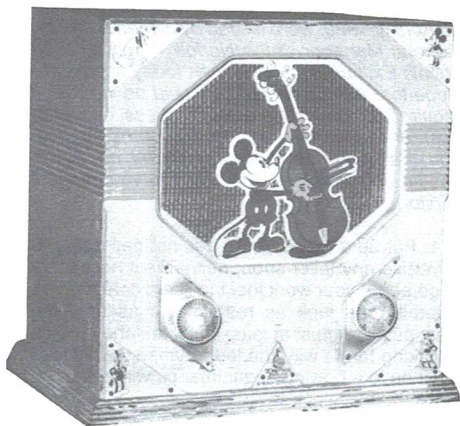
PHILCO MODEL 59 – A stunning early Deco set with mother-of-pearl colored dials and 2-tone burlped grain effect on the front, the Philco 59 is a smaller companion to the much larger 16-B of the same 1934 vintage. (*Barry Cheslock – Arlington, VA*)



AKKORD PORTABLE – This German portable in a leatherette case features AM/FM, SW/LW, a phono input, and a thumbwheel tone control. It runs on battery or 110 volts. (*Randy King – Lincoln, NE*)

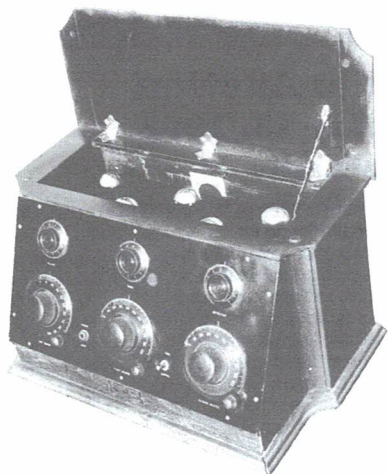


PHILCO MODEL 40-180 – Built in 1940, this 7-tube, 3-band, shortwave superhet has push buttons and frequency tuning ranges of 540 to 1550 Kc, 1.5 to 3.4 Kc, and 6.0 to 18 Mc. (*Albert D'Ambra – Rocky Point, NY*)

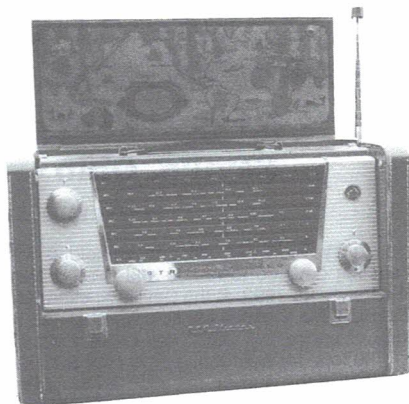


EMERSON MICKEY MOUSE RADIO – This rare 1933 set, with four tubes, is one of the three models made. This model has a painted ivory front with light green trim. (*Rick Yerke – Moscow, PA*)

PHOTO REVIEW



MALONE LEMMON MARK II – Manufactured by the Carloyd Radio and Electric Co., 342 Madison Ave., N.Y.C., this mid-1920s Neutrodyne uses five Type 01-A tubes. (Joseph Loubriel – New Milford, NJ)



RCA STRATOWORLD PORTABLE MODEL 7BX10 – RCA's answer to Zenith's Trans-Oceanic, this model has a virtually identical chassis and tube layout to the Zenith. With its brushed aluminum and imitation leather case, it features a BC band antenna in the lid, a colorful map on the inside of the lid, and operates on 110 VAC or battery pack. (Randy King – Lincoln, NE)



RADIO-CHRON CATHEDRAL – Although the model number of this ornate radio is unknown, the escutcheon and the thumb-wheel tuning capacitor drive are the same as those of the Gloritone Model 27, indicating that U.S. Radio and Television was the manufacturer. The tube layout is Type 80, 45, (3) 27s, and 24A. Help in finding the schematic for this radio would be appreciated. (Karl Stegman – Belleville, IL)



BRAUN FLOOR MODEL – This German floor model, circa 1950, has a 78 rpm record player beneath the curved front lid. Two swing-open doors below reveal storage space for records. The receiver has BC/SW/LW bands, a rotatable ferrite loop antenna, and a tuning indicator. It has 8 tubes, some of which are peanut tubes. (Randy King – Lincoln, NE)



AUCTION REPORT

Ruder Vintage Radio Auction Seville, Ohio — February 13, 1993

CONTRIBUTED BY RICHARD ESTES

The Larry Ruder Auction Service held its winter auction devoted to radios and related items on February 13, 1993, at the Seville Auction Barn in Seville, Ohio. Despite the cold weather and six inches of snow, 125 registered bidders bought over 400 lots, for a total of a little over \$20,000. Highlights of the auction included a MagicTone radio in a bottle selling at \$325, a 21-inch Philco Predicta floor model radio at \$650, and a Zenith console Model 12A58 at \$400. Communications receivers were especially strong items. Over 100 wood and Bakelite radios ranged in price from \$10 to \$100, while box lots of tubes ranged from \$20 to \$50, with box lots of books and magazines going for \$5 to \$45.

The next Ruder Vintage Radio Auction will be held on May 8, 1993, at the Seville Auction Barn, 8240 Wooster Pike Rd., Medina, Ohio.

A partial listing of items sold follows:

e=excellent, vg=very good, g=good, f=fair, p=poor, N.I.B.=New In Box, N.O.S.=New Old Stock

Admiral TV console, 10-inch, 1947, g.....	\$110
Aerial kit, ca. 1930, g.....	12.50
Airline Bakelite Deco, black, g.....	105
Airline Bakelite tabletop, g.....	75
Airline Bakelite, small, g.....	65
Airline Model 94, f.....	20
Amico novelty cookie radio, g.....	35
Arcturus tube advertising print, g.....	25
Arvin small metal case, white, g.....	65
Atwater Kent console, Model 55 chassis, f....	100
Atwater Kent Model 37, p.....	25
Atwater Kent Model 40, f.....	30
Canadian Research tube tester, f.....	15
Candlestick phone, e.....	90
Coronado table radio, f.....	70
Crosley cathedral, 32-volt, g.....	75
Crosley Model 124 cathedral, e.....	175
Crosley Model 666, f.....	115
Cunningham C300 BB tube, g.....	17.50

DeForest DV3 tubes in cans (3 pcs).....	25 ea.
DeForest training kit, f.....	15
DeForest tube box and tin, g.....	15
Emerson Model 56 tabletop, wood, g.....	50
Emerson roll dial radio, red, g.....	37.50
Eveready ad for batteries, 1920s, f.....	90
Fada Bakelite table radio, f.....	45
Fada Flashmatic console, f.....	55
Freed-Eisemann NR-5, f.....	75
Freed-Eisemann NR-7, f.....	75
Garod battery set, g.....	50
GE Model 50 tombstone, g.....	150
Gene and Glenn radio puzzle, f.....	15
Grundig radio, German, f.....	45
Grunow tabletop, wood case, g.....	140
Guild wall phone radio, copy, f.....	65
Hallicrafters S-20R receiver, f.....	75
Hallicrafters SX-25 receiver, vg.....	155
Hallicrafters SX28, f.....	95
Headphones, old, box, (6 pr).....	30
Heath capacitor checker, g.....	30
Hickok voltmeter, g.....	45
Home-brew battery set, vg.....	65
Jackson Bell cathedral, green, f.....	190
Jefferson tube rejuvenator, g.....	20
LaSalle Bakelite radio, small, g.....	35
MagicTone radio in bottle, f.....	325
Magnavox horn speaker, wrong base, g.....	90
Magnavox M1 horn speaker, e.....	135
Magnavox M3 horn speaker, g.....	130
Marlboro novelty radio, g.....	45
Motorola TV, Bakelite, 7-inch, f.....	45
National NC 98 receiver, e.....	90
National NC 300 & speaker, g.....	175
Nipper bank, cast iron.....	25
P.F. Reporter magazines, box of 95, g.....	27.50
Pathé Cone speaker, f.....	75
Peerless cone speaker, g.....	45
Peerless speaker, cathedral type, g.....	45
Philco Baradio, no accessories, g.....	325
Philco console, f.....	60
Philco Model 70 cathedral, f.....	160
Philco Model 511, g.....	55
Philco phono remote unit, f.....	50
Philco Predicta 21-inch floor model, g.....	650
Philco Predicta tabletop, 17-inch, blond, f....	200
Philco Transitone Bakelite tabletop, g.....	35
Pretest unit World War II vintage, e.....	45
Radio Boys books, (3), f.....	12.50 ea.
Radio fans adv. choice.....	7.50 ea.
Radio Service News, 1950-1960s, box, g.....	30
RCA console, motor dial, f.....	75
RCA Radiola 18, refinished, g.....	70
RCA Radiola Model 28, e.....	195
Remco toy crystal set, g.....	45
Rider manual, Vols. 10 & 12, g.....	17.50 ea.

A warning: Auction prices are not current values. A listing such as this cannot adequately include the condition of cabinets, chassis, transformers, tubes, the operating status of the set, and the inclusion of incorrect, restored or replica components, etc. Auction prices are the result of the excitement of the auction process, the skill of the auctioneer and the specific interests of the participants. Nevertheless, auction prices serve as useful references and as another element in the value determining process. The possibility of error always exists, and if we are notified, corrections will be reported.

Rocket crystal radio, Japanese, g.....	45
Spark coil, Model T, g.....	35
Sparton disc speaker, g.....	40
Sparton metal, chrome case, e.....	160
Stewart-Warner console, g.....	65
Stewart-Warner Model 300, f.....	50
Stewart-Warner Porto Baradio, f.....	75
Telex hotel radio, f.....	35
Temple speaker, 1928, g.....	185
Tram C.B., 40 channel, g.....	145
Transformers, box, N.O.S.....	60
TransVision TV magnifier, N.I.B.....	20
Tube, UV201-A BB, fil g, used.....	20
Tubes, old, used, flat of 30.....	17.50

Tubes, UV199 choice, (2 pcs).....	15
Victor oak tabletop phonograph, g.....	175
Zenith console, 10-tube, f.....	85
Zenith Model 9S367 shutter-dial, f.....	150
Zenith Model 10S130 tombstone, g.....	375
Zenith Model 12A58 console, p.....	400
Zenith Model 1005 tombstone chassis, f.....	105
Zenith radio knobs, old, bag.....	35
Zenith Royal 500, black, f.....	35
Zenith tombstone, model unknown, g.....	145
Zenith Trans-Oceanic, g.....	85

(Richard Estes, 6410 LaFayette Rd., Medina, OH 44256)

Calling All CARS — (Collectors' Amateur Radio Stations)

BY JAMES J. MCGRATH

Over the years, I have been fortunate enough to communicate from my ham radio station W2IOJ with hundreds of amateur radio operators throughout the world who are also antique radio collectors. It is enjoyable and educational to talk via ham radio with such noted radio historians as Bruce Kelley, W2ICE, one of the founders of the Antique Wireless Association (AWA) and curator of its radio museum. Bruce has shared with me and others his encyclopedic knowledge of antique radio and television.

Among the more interesting conversations I have had recently was with a ham/antique radio collector from Belgium who described his latest find, an Emerson Model 520 Catalin.

While talking from the mobile transceiver in my car I had a lively two-way QSO (conversation) with a ham/collector in Sweden about early Swedish radio stations. He sent me a postcard depicting a reconstructed Marconi shipboard spark wireless station at the Telecom Museum in Sweden. Still another contact was with a Japanese collector of Philco cathedrals; he was very pleased when I mailed five Bakelite block condensers to him in Japan.

I have also enjoyed talking to an Irish radio operator aboard a cables ship anchored at Hamilton, Bermuda. We reminisced about the days of wireless and cable laying.

We antique radio collectors subscribe to A.R.C., OTB (the *Old Timers Bulletin*, a publication of the Antique Wireless Association) and other related publications. Yet it seems we can never get enough information about our hobby!

These informal ham/antique radio contacts are just one way of exchanging information. Another resource you should know about is the exchange of information about antique radios at

regularly scheduled times and frequencies by AWA ham operators. Why not tune in and enjoy this "live" informational bonanza?

One of the latest net schedules for your use is reprinted here from the Antique Wireless Association Publication, the *Old Timers Bulletin*, November 1992, shown in Figure 1. (NCS refers to Net Control Station). You will know whether you are listening to an AWA "net" if you hear net control stations N4FS (Mike), W2SHN (Hoagy) or AA2CU (Bob). Use the lower sideband for 3867 kHz and 7274 kHz and the upper sideband for 14274 kHz. Nets may move frequency to escape interference so tune around a little.

In addition, there are buy/sell "nets" for old ham gear, radios, microphones, etc. The old equipment swap "net" meets on Sundays on 7275 kHz, 10 A.M. to 4 P.M. The Traders Net is on the air Monday and Friday on 3898 kHz at 7 P.M. Tune in and enjoy!

(James J. McGrath, 2 Centerview Ln., West Seneca, NY 14224)

AWA NETS (EST)

PHONE:

Sun. — 7247 kHz SSB, noon (NCS N4FS)

3867* kHz AM, 7 P.M. (NCS W21CE)

Tues. — 1427 kHz SSB, 2:30 P.M. (NCS varies)

3837* kHz SSB, 8 P.M. (NCS N4FS)

Mon.-Wed.-Fri. — 3867* kHz, 9:30 A.M.
(NCS W2AN/W21CE)

CW:

Daily, 4 P.M. — 7050 kHz (NCS varies)

First Wed. of each month — 8 P.M., 7050

*Go up 5 kHz if QRM is present.

2-M REPEATER: (Rochester Area)

Mon. and Wed. — 7:30 P.M. (NCS: W21CE)

Receive 146.820; transmit 146.220 (FM)

Figure 1. AWA Network Schedule.



VINTAGE VACUUM TUBES

Those Funny Old Radio Tubes

BY PHILIP WHITNEY

Philip Whitney gives us a brief overview of the history of the radio tube. No doubt his account will stimulate interest in tube collecting and perhaps other articles on more specific tube topics. (Editor)

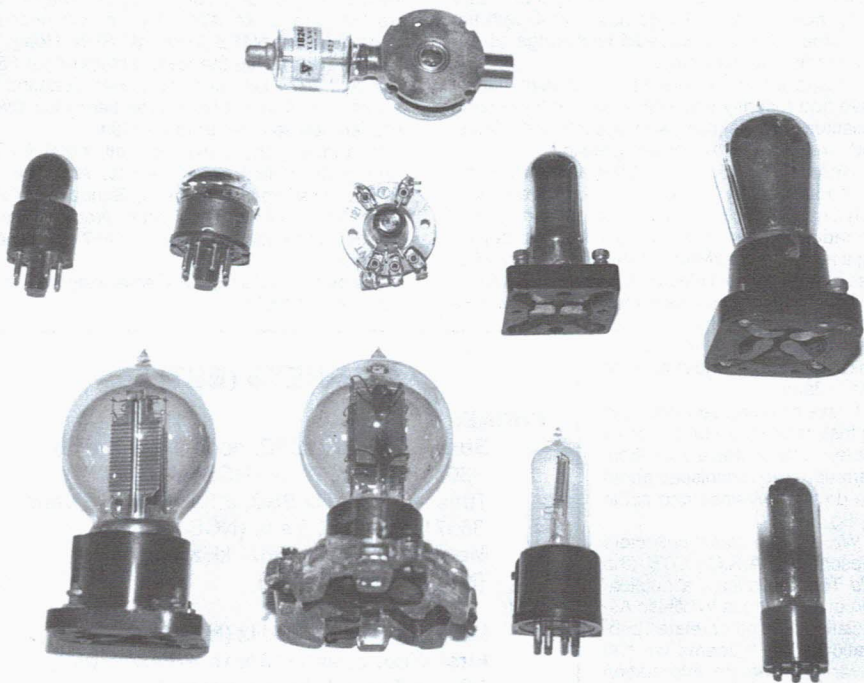
Thomas Edison discovered the electron stream which existed inside an evacuated glass bulb, but he didn't know what to do with it. De Forest, Fleming and others put it to use in what the British call the "valve," but what Americans, referring more to the container than to its function, call a "tube."

These "electric lights for radios" began as simple triodes containing a filament, a grid and a plate. Triodes gave way to "screen grid" tubes, highly advertised in the late 1920s, and finally to

multi-element wonders for transmitting and receiving radio frequencies and amplifying RF and audio.

Western Electric, General Electric, RCA, Ken-Rad, Cunningham, Arcturus and scores of others began production, at first by hand, and then by machine, of millions of evacuated glass domes to supply the rapidly-growing appetite for vacuum tubes which began in the 1920s.

During World War I, the Army and Navy used the early VT-1 and VT-2 globular triodes with the evacuation tip at the top. Old timers remember the colorful Arcturus tube in its blue glass envelope — the company's trademark. Later came the spray-shielded tubes which eliminated the wraparound metal containers.



An assortment of vintage tubes. Top row: a 1B24A TR tube used in radar units to protect receivers. Middle row: a 313C, 717A, 955 (VT121) acorn tube in steatite socket, a 199 brass base, tipped, in socket, and a UV 201-A brass base in a 4-prong socket. Bottom row: a WE VT-2 army triode, WE 216-A in Pyrex socket, WD-12 by RCA, and a UV 199.

In the late 1930s, the development of the electron indicator tube popularized the tuning eye tube in the form of Types 6U5, 6E5 and others. Development of the electron valve accelerated during World War II when military needs increased, not only in communications but in radio detection

“Although the supply of old and rare vacuum tubes is vanishing rapidly, collecting them is a means of preserving the history of an industry which served us well for more than seventy years.”

and ranging — thus, the acronym “radar.” The cathode ray tube (CRT) became an important part of radar and other “plotting indicators.”

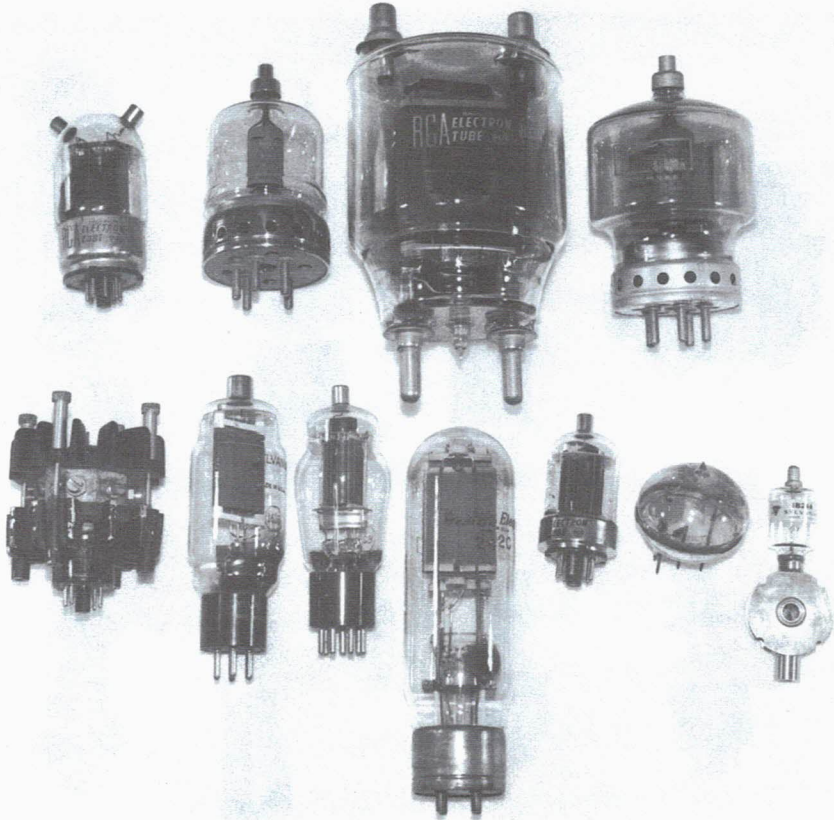
As early radar moved into the ultra-high-fre-

quency spectrum, it became necessary to cope with the problem of electron transit time within vacuum tubes. Thus, it became necessary to build tubes with closer elements. As a result, tubes got smaller. Equipment miniaturization requirements also created a need for smaller tubes. The “acorn” tubes are good examples of such tubes. After World War II, the small nuvistor tube was developed for UHF reception.

Magnetrons and klystrons were developed to solve the transit time limitation and to generate the high-powered microwave signals required for improved radar performance. “TR” tubes were developed to protect the radar receiver from the powerful blast of the radar transmitter. These tubes shorted out the receiver while the transmitter was operating and opened up when it was time to receive the echo.

Cathode ray tubes ballooned in importance with the development of the first black and white television receiver, and then with the complicated shadow mask, color picture tube, which was very

(Continued on following page)



Vintage tubes. Top row: an 815 double pentode, a 4-125A, an 833 500-watt transmitting tube, and a 4-400A transmitting tube used in early FM transmitters. Bottom row: a 2K28 klystron in tunable holder, a 1616, a 1623, a WE 242C 50-watt transmitting tube with brass base 6146B, a WE 316A (VT191), and a 1B24A TR.

(Funny Old Radio Tubes, continued)

expensive at first. Oscilloscope tubes replaced the old rotating mirrors used by early laboratories, while the rotating discs in the ancient "flying spot" television pickups were replaced by Zworykin's first TV camera tube. The TV picture tube industry still thrives, but liquid crystal pictures are now seen on small sets. It is difficult to predict what is next on the horizon.

With the introduction of the transistor, vacuum tubes began their disappearing act. Today only a few high-frequency transmitters use tubes in output circuits. In fifty years we had changed from water-cooled tubes to air-cooled, and from large tubes in UHF output uses to large magnetrons, and then, to klystrons. Today most new broadcast band transmitters are equipped with multiple heavy-duty, low voltage, solid-state devices in their output circuits.

Very few makers of vacuum tubes exist today in the U. S., but replacements are becoming available from such exporters as Yugoslavia and China, along with others.

Although the supply of old and rare vacuum

tubes is vanishing rapidly, collecting them is a means of preserving the history of an industry which served us well for more than seventy years.

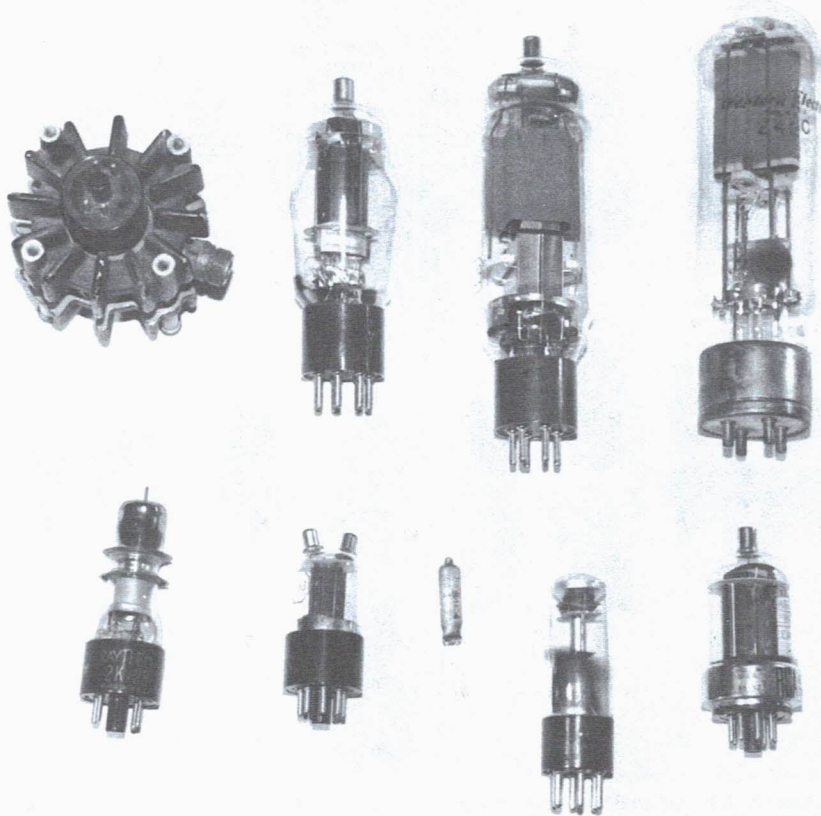
(Philip Whitney, Rt. 2, Box 231, Stephens City, VA 22655)

References:

Stokes, John W. *70 Years of Radio Tubes and Valves*. New York: The Vestal Press, Ltd., 1982.

Tyne, Gerald, F.J. *Saga of the Vacuum Tube*. Tempe, AZ: Antique Electronic Supply, 1977. (Out of print).

Philip Whitney has held a federal radio license for 56 years and is still actively employed in broadcasting. He collects antique receivers, horns, and early tubes, as well as early radio publications. He is the author of several books, including a history of broadcasting for the state of Virginia, and many national magazine articles, mostly on engineering topics.



Vintage tubes. Top row: a 2K28 in tunable holder, a 1623, an 828, and a WE 242C 50-watt transmitting tube for the broadcast band. Bottom row: a 2K28 without holder, a 7193, a 1AD4, a 6U5 "magic eye" and a 6146.



RADIO MISCELLANEA

"Antique Radio Classified" invites its readers to contribute letters and information for inclusion in "Radio Miscellaneous" and elsewhere in the magazine. The topic should be of general interest and sent to A.R.C., P.O. Box 2, Carlisle, MA 01741. All material submitted should be verified for accuracy and may be edited for publication, which is not guaranteed. See the masthead for more details.

The Kenrad Model B-12

Dear Editor:

I greatly appreciated your engrossing, informative article on the Kenrad Model B-12 "Last Word" crystal set that appeared in the March 1993 issue of A.R.C.

When I purchased my Kenrad crystal set in 1979 from Bill Wakefield, he and Paul Giganti told me part of the story about 200 unsold sets having been found in a warehouse "back East." I've also heard other bits about the discovery and dissemination of the Last Word sets, but your article is the first time I have encountered all the facts put together concisely and authoritatively.

A special bonus for me was the information about the Buff & Buff Machine Co. I'm now in the latter stages of preparing Volume 2 of *Crystal Clear*, and one of the crystal sets to be listed was made by Buff & Buff. Until I read your article, I had lacked the company address.

Thanks for sharing all these special details in such a highly readable manner.

Maury Sievers, Phoenix, AZ

Dear Editor:

Loved the article you did in the March issue, as I am one of the "200" owners of the Kenrad "Last Word" crystal sets!

Jerryl Sears, Winston-Salem, NC

Dear Editor:

Many thanks for your nice and impressive article about the Kenrad "Last Word" crystal set. As I read your article, I put my hand in the air because I also own this interesting set. Some years ago, I received the Kenrad from a collector who is living in Alabama. I traded a Telefunken receiver made in the early 1930s for it.

It is a long way from Boston to faraway Vienna, but here the Kenrad found a new home among hundreds of other crystal sets — many of them are from the U.S.A.

Erwin Macho, Vienna, Austria

Dear Editor:

Many thanks for recounting the history of the Kenrad crystal set in the March 1993 issue of A.R.C.

I got my set in March 1972 by replying to an ad in *QST* from Roland Matson and H.R. Hermann. In a letter of March 14, 1972, Mr. Hermann wrote: "Mr. Matson and I were the ones who acquired the 40 Kenrad crystal sets in the original crates. We did not realize that these sets were advertised for sale, and we have been deluged with requests to buy. We decided to sell all but 5 of them, and we have only 8 left at \$65 each."

The rest of the story is probably obvious. I bought one of the last remaining sets, and it is now one of my prize radios. You don't run across a deal like this very often!

Ted Hannah, Silver Spring, MD

Dear Editor:

The story on Kenrad's "Last Word" crystal sets was a gem. Something that all of us dream of.

Garnet Moser, Mortlach, Saskatchewan, Canada

New Collector — A 6th Grader

Dear Editor:

I am in the 6th grade. I am 12 years old, and I collect antiques, preferably radios. I have an AK 20, a Miraco Ultra 5, a Day-Fan 7, and an old home brew. I enjoy collecting and fixing old battery radios. I really enjoy your catalog. I got a 6-month trial subscription, and I think I'll get a one-year subscription when this one runs out. I really enjoy your magazine. Keep up the most excellent work, A.R.C.!!

Alex Ebenhoh, Owatonna, MN

Quietrole Update

Dear Editor:

I read Mr. Harold Wright's letter in the April edition of A.R.C. in which he lamented the demise of Quietrole. I too have used the product for many years and still have a can of it on my shelf.

My local electronics distributor informed me that Quietrole has been discontinued. It seems the company that produced it changed the formula to use a Freon-replacement propellant. The new formula had a skunk-like smell and many distributors returned their stock to the factory. I will miss it; however, Radio Shack makes a good contact/potentiometer cleaner/lubricant which seems to work well.

Dave Bertinot, Baton Rouge, LA

Radio Buffs — Trusting Souls

Dear Editor:

We really enjoy the magazine and look forward to getting it every month. First page we turn to is the *Photo Review*, and it's always a thrill to see one of our radios there. We have good responses whether buying or selling and find that most everyone in this hobby is of good, honest fiber — in other words, trusting souls. And that's hard to find these days. We like the format. Stay as sweet as you are.

Doris and Doyle Roberts, Clinton, AR

Pro-A.R.C. Format

Dear Editor:

First, I want to tell you how great I think your magazine is. I enjoy reading both the ads and the articles in each issue. I think some of the criticism you've been publishing in recent issues is funny. People want it "this way" and "that way," but the bottom line is — there is no other monthly publication which offers the variety of info and diverse ads that yours does. (The AWA Journal, although very good for articles, doesn't have the volume of ads that A.R.C. does.) I too wish to keep the ads non-sorted since this makes reading the magazine more like finding something which is hidden from obvious view.

Thanks again for your publication and its benefits in maintaining a unique hobby of ours very active.

Bill Becker, Totowa, NJ

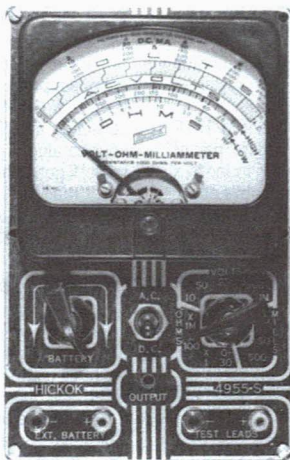
RESTORATION TOPICS

Conventional and Dual-Scale Ohmmeters

BY CHESTER A. GEHMAN

In consultation with Chester Gehman, we have expanded his article on his experience with restoring a dual-scale ohmmeter to encompass ohmmeters in general.

Conventional analog ohmmeters have a single scale for reading resistance values and they read "zero ohms" when the meter pointer is fully deflected (full right). A dual-scale ohmmeter uses the conventional scale described above and an expanded scale for reading low resistance values. Unlike a conventional ohmmeter, this "low ohms" scale has its "zero ohms" reading at the left of its scale (no meter deflection). The operation of these two types of meters is described in detail. (Editor)



The Hickok multimeter.

required for full-scale deflection of the meter (I_{fs}) and the total resistance in the circuit (R_t). The total resistance in the circuit consists of the variable resistor (R_1), the series resistor (R_2) and the internal resistance of the meter (R_m). In practice, R_m may be ignored.

As an easy example, if we use a 1.5 volt battery and an ammeter with a full-scale reading of 1 milliampere, the value of R_t that will produce a full-scale reading on the meter, can be calculated by using Ohms law ($R = E/I$) where $R = 1.5v/0.001A$ or 1,500 ohms. Thus, when the test prods are connected to each other, the meter will read full-scale or zero ohms.

Conversely, when the test prods are not connected together,

there will be no current flow in the circuit and the meter will not be deflected and will indicate infinite resistance. R_1 is used to compensate for changes in battery voltage and to set the ohmmeter to zero (full-scale deflection) when the test leads are connected together. Typical values for a R_1 and R_2 are 500 ohms and 10,000 ohms respectively.

MID-SCALE CALIBRATION

When the test prods are connected to a 1,500-ohm resistor (R_x), as in Figure 2, the total circuit resistance increases to 3,000 ohms and the current will decrease by half to 0.0005 A. This arrangement can be used to establish the mid-scale calibration point of 1,500 ohms.

A "box deal" that I purchased at a New England Antique Radio Club (NEARC) auction for two dollars included a Hickok multimeter carcass which consisted of its metal case, panel and meter. I was about to discard all but the case when my curiosity was aroused. I discovered that the meter had two calibrated scales for reading resistance. One scale had the customary "zero ohms" reading on the right end of the scale, while the second scale's zero reading was on the left.

The challenge? Develop and restore the circuitry to make the dual-scale ohmmeter work again. Lacking any information about the multimeter, I began at "square one" by reviewing the design parameters for a conventional ohmmeter.

A BASIC OHMMETER

The schematic diagram for a conventional single-scale ohmmeter is shown in Figure 1. Note that the test points are located in series with R_1 , R_2 and the meter. For this basic circuit we need to know the battery voltage (E_b), the current

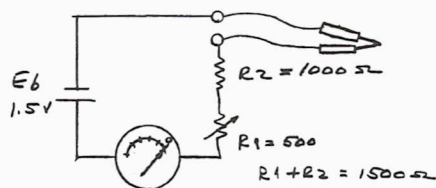


Figure 1. A diagram for a single-scale ohmmeter. The 1 mA meter at full deflection reads zero ohms.

A REVERSED-SCALE OHMMETER

This type of ohmmeter is also referred to as a "back-up," "shunt," or "reverse-reading" ohmmeter. It has the ability to measure very low resistances. The basic circuit is shown in Figure 3. This type of

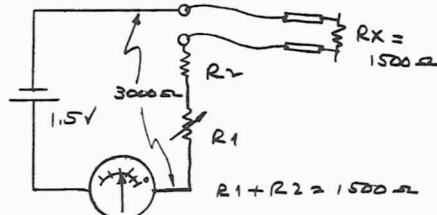


Figure 2. A 1,500-ohm resistor. The meter at mid-scale reads 1,500 ohms.

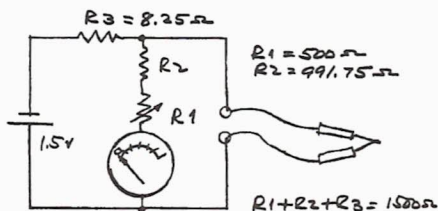


Figure 3. A reversed-scale ohmmeter. The 1 mA meter, no deflection, reads zero ohms.

ohmmeter differs from a conventional ohmmeter in several ways. First, the "zero ohms" reading appears on the left end of the meter scale, not the right. Secondly, the test prods are connected in parallel with R1, R2 and the meter. Also, an additional resistor (R3) is used in this circuit. More about R2 and R3 later.

Like the conventional ohmmeter circuit, we will again use a 1 milliamper meter, a 1.5v battery and a series resistor. But in this case, the test prods are connected across R1, R2 and the meter, as shown in Figure 3. When the test prods are connected together, no current will flow through the meter because the R1, R2 and the meter are short-circuited. Consequently, the meter's "zero ohms" reading will occur at the left end of the scale.

As Figure 4 shows, current will flow through the circuit when the tests prods are not connected. As a result, the reversed-scale meter indicates infinite resistance at full-scale deflection. To set the full-scale meter current to 1 milliamper, the total resistance of R1, R2 and R3 must equal 1,500 ohms, just as in the case of the conventional ohmmeter.

R3 performs two functions. First, it is used to limit the amount of current that flows in the circuit when the test prods are connected together. Without R3, the battery would be shorted when the test prods were touched together. Secondly, the value of R3 (8.25 ohms) determines the mid-scale reading of the ohmmeter, which in the case of the Hickok meter is 8.3 ohms.

Figure 5 shows the circuit conditions when the resistor under measurement (Rx) has a resistance of 8.3 ohms. The current flow is divided between two paths: (1) through Rx and (2) the series resistance consisting of the meter, R1 and R2. The values of R1, R2 and R3 are selected so that one-half of the total current flows through each path. As a result, the meter will be deflected

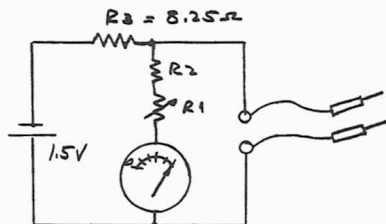


Figure 4. A reversed-scale ohmmeter at full deflection reads infinity.

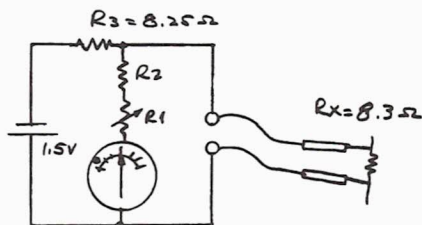


Figure 5. A reversed-scale ohmmeter. Meter reads mid-scale or 8.3 ohms.

to mid-scale and indicate a measured resistance of 8.3 ohms.

The current through each path can be calculated by applying Kirchhoff's law. Those calculations are beyond the scope of this article, but interested readers can find a full explanation of Kirchhoff's law and examples of its application in many books dealing with radio mathematics, including the *ARRL Handbook for Radio Amateurs*.

PRACTICAL APPLICATION

By applying the theory described above, I have restored the multimeter's "back-up" ohmmeter function. When compared to a digital ohmmeter, I found the restored ohmmeter's mid-scale accuracy to be within about 2% or about as close as an analog meter can read considering the width of its pointer. Based on my success with the ohmmeter function, I went on to restore the multimeter's voltmeter and milliammeter functions as well.

WHY HAVE A "BACK-UP" OHMMETER?

This type of ohmmeter can read low resistance values with greater precision than a conventional analog ohmmeter. However, there is a disadvantage. The battery circuit must be turned off when not in use; otherwise the meter will be deflected fully and cause premature discharge of the battery.

This restoration turned out to be a real fun project, but it was not the end of my adventures into multimeter restoration. Later, I acquired a Triplett Model 1200-A multimeter and found that it had a "back-up" scale also. (Both the Hickok and Triplett meters appear to be of the same vintage.) What a coincidence! Fortunately, the Triplett included an instruction manual that contained a schematic diagram which made my repair task much easier. Now I have two dual-scale ohmmeters in operation to add to my collection.

(Chester A. Gehman, R.F.D. 2, Burwell Rd., Winsted, CT 06090)

During the late 1930s and early 1940s, ohmmeters with dual scales were fairly common. The "back-up" or "reverse low-ohms scale" made it possible to measure low resistances with a greater accuracy than that which could be achieved with a conventional ohmmeter. When using present-day digital multimeters, which permit even more precise measurements of low resistances, it is easy to forget the value and utility that those old "back-up" meters offered in the early days of radio.

VIDEO REVIEW

In Quest of the Light: Visible & Invisible A Video of Early Electrical Apparatus and Vacuum Tubes Produced by Jim Kreuzer and Jim Hardesty

COMPILED FROM INFORMATION PROVIDED BY JOE KNIGHT

The early scientific electrical field — the prewireless era — is one of the most intriguing areas of interest for antique radio collectors. Among the more avid collectors of early electrical devices are Jim Kreuzer and Jim Hardesty, who have made an unusual and informative video tape on the subject.

Entitled "In Quest of the Light: Visible and Invisible," this 90-minute color video is an ambitious project covering the development of vacuum tubes — not to be confused with the thermionic vacuum tubes used in radios — in the 19th century. These tubes were used not only to demonstrate their artistic effects, but also to study in them the physics of the electrical discharges of rarefied gases. Observing these beautiful tubes inspired scientists to more experimentation and led them to some of the most important discoveries in the field of electricity.

In beautiful color with appropriate background music, "In Quest of the Light" covers both the scientific and historical significance of the featured equipment. Beginning with the aurora tube, showing a glow discharge similar to the aurora in the sky, it moves on to the 17th century experiments of Von Guericke, who discovered that when a globe of sulphur was spun and rubbed by hand a luminous glow appeared — the first "electric" light.

Also shown are Leyden jars in which static electricity is stored; early voltaic cells, predecessors of the battery; early induction coils; many early meters, each one more sophisticated than the last and capable of finer calibration; and vacuum pumps.

The artistry of the glassblowers who made these beautiful tubes is emphasized, especially in the Geissler tube, the first gaseous discharge tube and a predecessor of the neon sign. Tubes with different gases show different colors, since each gas has its own characteristic color — a point not clearly made in the narration of the video.

In fact, one of the weaknesses in the narration, which is nevertheless informative, is that these early experiments are largely explained in the light of today's knowledge. The curious viewer interested in the history of science and early electrical equipment would want to know what explanations were advanced by those early experimenters themselves and what terms were used in their explanations.

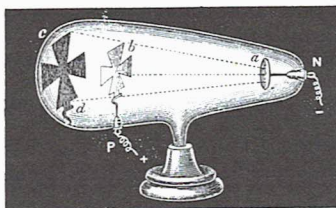
Other experiments covered in detail are those of Crookes, developer of the vacuum system, who began to place objects, such as a conch shell, in glass tubes. His purpose was to study what happened when what we now know to be electrons struck the material.

Today, we call this process "electron bombardment." One of the most beautiful segments of the video shows a Crookes tube containing a painted metal model of a butterfly being bombarded by electrons and casting shadows. A more dramatic demonstration of shadow is given with another Crookes tube, the Maltese Cross.

Another interesting topic concerns Crookes' "Radiant Matter" experiments. The amazing construction of the "millwheel," "paddlewheel," or "railway" tube is demonstrated. Shown in action as

IN QUEST OF THE LIGHT; VISIBLE & INVISIBLE

A HISTORY AND DEMONSTRATION OF GEISSLER AND CROOKES TYPE VACUUM TUBES FROM THE LATE 19TH THROUGH THE EARLY 20TH CENTURIES, AND THEIR ULTIMATE CONTRIBUTION TO THE DISCOVERY OF THE X-RAY.



electrons strike its phosphorescent vanes, the wheel is propelled along a pair of supporting rails in the tube. This tube showed that rays or streams of Crookes' "fourth estate of matter" could not only cast shadows but could also propel the wheel by striking its vanes.

During the 1870s, Hertz and Lenard, seeking to learn the nature of these mysterious "rays or streams of light or particles, whatever they are," found that they caused a glow on the glass at the end of a tube shaped like a Crookes Maltese Cross tube but not containing the cross.

Continuing the work of Hertz and Lenard, Roentgen found that the same kind of tube caused a glow *outside* the tube on an object a meter away. Accidentally, he found that when the rays struck his hand, he could see his bones. In an 1895 pamphlet called "On A New Kind of Ray," he coined the name "X-ray."

Roentgen's discovery of X-ray, called by some the birth of modern physics, is the climax of the video. Of additional interest are pictures, drawings, and pamphlets related to a whole new industry engaged in the rapid development of X-ray equipment.

Visually, "In Quest of the Light" offers some striking effects, although some sections could have been edited to achieve a faster pace. Also, more than one speaker would have created some variety in the narration.

From an educational standpoint, this video raises many questions, unless the viewer is well versed in the history of physics. A simple example lies in the use of scientific terms that are dropped into the narration but not defined; for

example, "digital enhancement," "atomic number," "linear force," "photons," and the like. Also, the narrator uses the terms "phosphorescent" and "fluorescent" indiscriminately, as if they were the same. A novice may be hard-pressed to follow the technical references and may well decide to enjoy the visuals and let it go at that.

Overall, the value of this video to radio collectors lies in its historical perspective. As antiquarians, we have an appreciation not only of our own specialties but also of others. A primary asset in establishing value is the ability to judge the relative age and importance of an item, and this is best done within a total historical context. "In Quest of the Light" helps us to do just that. Seeing the variety, ingenuity, and beauty of the equipment is much like a trip to a museum, and we are enriched by the experience.

Credits include the following: the Jim and Felicia Kreuzer Collection; the Jim and Judy Hardesty Collection; Bruce Kelly and the Antique Wireless Association Collection; the Lauren Peckham Collection; David Way, video editor; Mike Hopiak, slides and photos; and Clear Productions, music. Jim Hardesty is the narrator, while research is credited to a presumably mythical scientist — Dr. Phineas Volt.

In Quest of the Light: Visible and Invisible may be ordered from New Wireless Pioneers, Box 398, Dept. 1A, Elma, NY 14059, for \$29.95, plus \$2 postage and handling, or call: (716) 681-3186.

(Joe Knight, 132 N. Grand Ave., #F, San Pedro, CA 90731)

Telegraph Review

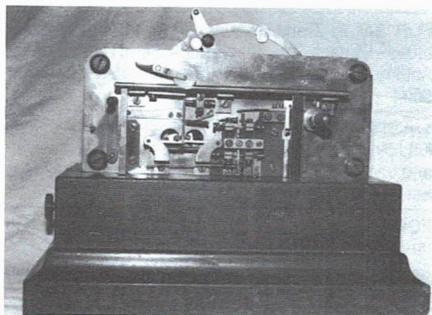
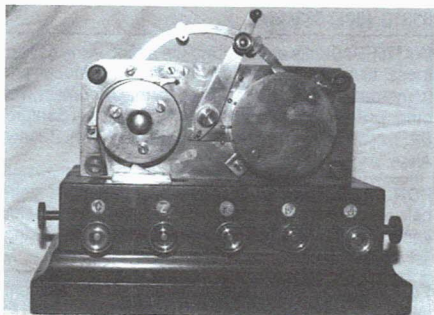
Wheatstone High-speed Transmitter

BY ROGER HART

The Wheatstone high-speed transmitter, which runs from a punched tape, was supposedly used to send Morse Code at up to 600 words per minute (WPM). In fact, from what I have read, the maximum usable limit was about 350 WPM — still pretty good! This particular transmitter was manufactured by the General Post Office (GPO)

in England, and the design dates it to somewhere around 1890. There is a picture of an identical unit in the Christmas 1989 issue of *Radio Bygones*. The only other one I have ever seen is in the Science Museum in Kensington, London.

(Roger Hart, 4533 Harvard Ave., Montreal, Quebec, Canada H4A 2X3)



Front and rear views of the Wheatstone high-speed transmitter.



CLASSIFIED ADVERTISEMENTS

FOR TRADE: Will trade Orthophonic Victrola Radiola 7-25 operating instruction book for Radiola AR-812 operating instruction book. Contact: Ken Ericksen, 1049 Felspar, #33, San Diego, CA 92109-2844. (619) 483-2183, evenings after 6:30 pm

FOR SALE: (2) Altec Lansing 1570B tube type (811s) 175W, shopped and working - \$350 ea. RCA audio board stereo SS Model BC7A - \$400. SCA 30 Radford SS amp, mint - \$225. WE Model 600 mic element - \$45. Call: Wiesner Radio, 147 Hunter Ave., Albany, NY 12206. (518) 371-9902 or (518) 438-2801

WANTED: E.H. Scott military receivers RBO, RCH, RCK, RDO, SLR-12A/B/H. Also need manuals on all Scott military. Thanks! Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436

WANTED: Speakers, 40's, 50's, 60', hi-fi, theatre, commercial, studio. Altec, Jensen, Western Electric, JBL, Electro-Voice, RCA, field coils, old microphones, hi-fi books 50's & 60's. Sonny Goldson, 1413 Magnolia Ln., Midwest City, OK 73110. (405) 737-3312

FOR SALE: More items from my collection. Old tubes from 1910 and later. Western Elect., DeForest, brass base, tips; list - \$2.50. Old books, magazines, call letter, other paper; list - \$3. Crystal sets, crystal detectors, large tuning coils, ham parts; list - \$2.50. Transistor sets, small tube radios, ports, sets - SASE w/2stamps. Send checks only. Will not ship outside U.S.A. Krantz, 100 Osage Ave., Somerdale, NJ 08083

WANTED: Pre-1925 Crosley. I haven't added anything in a long time. Please help me out of my misery! Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 27606. (919) 851-1517, fax/phone

WANTED: Information, radio chassis and speaker set for Miracle radio console. Mark Gutekunst, 2600 Martin, Willow Grove, PA 19090. (215) 830-0425

FOR SALE: Stromberg 1500h - \$75. **WANTED:** Brass blade/cage electric fans, cash or radio trades. Dave Friedlund, 36006 SW Bald Peak Rd., Hillsboro, OR 97123. (503) 628-1439

FOR SALE: Transistorized 201A, 112A, X199, etc. tubes - \$5 each. You supply duds. Send LSASE. Jacob Anthes, Box 52 Lutz Rd., Glidden, WI 54527. (715) 264-5004

WANTED: Thordarson spark transformers. Hammarlund plug-in coils. Pre-WW2 home brew ham receivers and transmitters. George Flanagan, W2KRM, 42 Cygnet Dr., Smithtown, NY 11787. (516) 360-9011

FOR SALE: Choke, 2.5 Hy, 280 MA, 43 ohm, upright open frame, 3C317-22, NOSB - \$2.50, \$10/5. DY-17A/ART-13, NOSB - \$45. Plus UPS. **WANTED:** Aluminum CS-48's, buy or trade steel ones. Rectifier RA-34, power unit PE-49, BC-191/375 tuning units, prefer -A version. Robert W. Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043. (713) 467-5614

WANTED: The juvenile fiction book, Radio Boys and the Sky Pilot by Duffield or Honeywell. Robert Stapleford, 1800 Randolph, Topeka, KS 66604

WANTED: All kinds of old transistor radios. Send photo, Xerox or sketch to: Roger Handy, PO Box 24527, Los Angeles, CA 90024. (310) 451-4040

FOR SALE: 6-transistor locomotive radio, N.I.B., with papers - \$25. 1940s Oldsmobile radio - \$25. Bob Putter, 637 Stratford Rd., Baldwin, NY 11510. (516) 223-9667

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WANTED: Or Trade: Microphones. TV cameras. hi-fi/professional audio, radio/TV broadcasting equipment. WE & RCA items. Robert Van Dyke, Squires Ave., East Quogue, NY 11942. (516) 728-9835

WANTED: Rider's manuals, Volumes 18 and up; RCA Service Notes, Volume 1, 1923-1937. Gary A. Micanec, 226 Henry Ave., Manchester, MO 63011. (314) 227-7046

FOR SALE: Emerson Models ED354, L222, 530A, 560A. List avail. Dave Sutherland, PO Box 201, Spoford, NH 03462. (603) 363-4459

FOR SALE: Tubes - SASE for list. Antique laboratory galvanometer, oak case, needle shadow on ground glass window - \$50. RBL LF receiver, National - \$75. DZ-2, pre-WWII DF receiver, no ant. or PS - \$40. Teleprinter repair parts in depth. Typetronics, Fred Schmidt, N4TT, PO Box 8873, Ft. Lauderdale, FL 33310. (305) 583-1340

WANTED: Books and information about: early days of tubes, tube manufacturing, rebuilding of old tubes and homemade tubes. I would like to make contact with other people about these items. Write to: Abel Santoro, (IAR) casilla de correo No. 5, Villa Elisa (1894), Buenos Aires, Argentina

FOR SALE: Send \$3 to receive our latest 40+ page catalog of rare 78 rpm records, cylinders and related items. Nauck's Vintage Records, 6323 Inway Dr., Spring, TX 77389-3643

FOR SALE: Power transformers, chokes, filament, interstage audios, misc. types. Over 500 listed. Send \$1 for 10-page list. Gary B. Schneider, Play Things of Past, 9511-23 Sunrise Blvd., Cleveland, OH 44133

CLASSIFIED ADVERTISING POLICY

ONE FREE 20-WORD AD for subscribers in each issue; additional words are 17¢ each. See details below. Classified ads must be received (not just postmarked!) by **Noon Eastern Time** on the ad deadline. Late ads are held for the following issue. Please enclose correct payment with all ads. Stamps or cash are OK for small amounts. (Canadian and other foreign advertisers, please see "Payment" on page 2 for methods.) "Free words" cannot be accumulated from month to month; free words must be requested when ad is submitted.

Please write each ad on a separate sheet of paper, especially when included with other A.R.C. correspondence. Include SUB# with ad. Ads may be sent in advance; but, write each ad on a separate piece of paper and indicate the month (or successive two months) you want the ad to run.

Please write legibly and use both capital and small letters. Do not use dashes between words. Some numbers and letters can look alike, for example 1, l and I (the number one, the capital i and the small L.) Write the following characters clearly (especially in model numbers): 1, l and I; 0, O, o, Q and D; r and n; 6, b and G; V, U, u, v and Y; A and R; 5, S and s; 2, Z and z. We try to correct spelling errors, so when using an uncommon word or manufacturer which looks similar to a common word or manufacturer, note it so that we do not "correct" it. Editor's comments are in [brackets].

Advertising is accepted only for early items related to radio, communication, etc. All items must be described fairly; reproductions, reprints and not-original items must be so identified. Advertisers agree to respond promptly to inquiries and orders, to resolve problems promptly if the buyer is not satisfied, and to comply with a buyer refund request on unaltered returned items.

Publisher reserves the right to edit ads without notification to the advertiser and to reject ads for any reason. Publisher is not responsible for errors due to illegibly written ads or for any other reason. Since club activities receive free advertising on the *Coming Radio Events* page, the free 20 words may not be used for club activity ads. See inside front cover for additional information.

CLASSIFIED AD DETAILS

Deadline: NOON ET—10th of the month!

Classified ads must have a standard heading such as **WANTED, FOR SALE, FOR TRADE, FOR SALE/TRADE, SERVICES, MESSAGE, HELP, AUCTION, MEET**, etc. This heading is the only bold or all-capitalized words allowed in the ad. Capitalize only manufacturer names, model names, etc. Wanted and For Sale ads are mixed together to encourage the reading of all ads, including the Wanted ads. This standard ad format makes scanning the ads easier.

Before writing your ad, please look over the ads in a recent issue of A.R.C., and try to write your ad in the same style. Full name (or company name) and address is required in all classified ads; we will add it if you forget.

To encourage varied content of the ads, the same classified ad may be run only once per issue and for only two consecutive months. (To run an ad longer, use a boxed classified or display ad.)

Classified Ad Rates per Month

Subscribers:

First 20 words: **FREE***

17¢ per word for extra words over 20 **plus**

10¢ per word for a shaded ad (count all words including free words).

* Subscribers may take 20 free words on only **one** ad each month.

Non-Subscribers:

33¢ per word **plus**

10¢ per word for shaded ad.

Please do not forget to send in the extra 17¢ per word when your classified ad runs over the free 20 words; your payment will be appreciated, and it will help to keep A.R.C. healthy.

BOXED CLASSIFIED AD DETAILS

Deadline: 1st of the month!

Boxed classified ads can run unchanged for three months or more. No words are free. Ads may be shaded and may include bold and all-capitalized words freely. The ad need not begin with For Sale, etc. Minimum run is 3 months, prepaid. Discount: 5% for 6 months; 10% for 12 months.

Boxed Classified Ad Rates per Month

Nonshaded ads:

28¢ per word for all words,* none free, **plus**

10¢ per word for each bold word **plus**

10¢ per word for each all-caps word.

Shaded Ads (All words are bold at no charge):

38¢ per word for all words* **plus**

10¢ per word for each all-caps word.

Non-Subscribers:

Add 20¢ per word to above costs.

*Three words can be bold-all-caps at no extra charge.

PHOTO & DRAWING DETAILS

Deadline: 1st of the month

for all ads with drawings or photos!

Drawings and photos are encouraged as the response to your ad is much larger and the reader knows better what you want or are selling. Send in your drawing or photograph, and A.R.C. will reduce it or enlarge it as needed.

Photo and Drawing Rates per Month

\$10.00 per month for each photo or drawing

(If ad is canceled, this amount cannot always be refunded.)

CHANGES & CANCELLATIONS

Please check your ads carefully before sending them in. Once ads are received, it is not always possible to refund the amount sent, pull the ad or make changes.

IMPORTANT — COUNTING WORDS — IMPORTANT

The **standard headings**: WANTED, FOR SALE, etc., count as **one word** each time used in an ad. **Name, address** and (one) **telephone number**, count as **6 words**, regardless of length. Ham call letters and business name can be included in the 6 words and do not count extra. Full name (or company name) and address is required in all classified ads. Each additional word, abbreviation, model number or number group, extra telephone numbers, etc. count as one word each. Hyphenated words count as two words.



SECOND CLASS

A.R.C., P.O. Box 2, CARLISLE, MA 01741
RETURN POSTAGE GUARANTEED

**CLASSIFIED AD
DEADLINE MAY 10th
Noon Eastern Time**