Volume 31, Number 2 Fall / Winter 2012

Journal of the

CALIFORNIA HISTORICAL RADIO SOCIETY

LIVE AT KRE
RADIO DAY BY THE BAY 2012

FOR THE RESTORATION AND PRESERVATION OF EARLY RADIO

FROM THE BIRTHPLACE OF BROADCASTING

California Historical Radio Society

HOME OF THE BAY AREA RADIO MUSEUM & HALL OF FAME

The California Historical Radio Society (CHRS), is a non-profit educational corporation chartered in the State of California. CHRS was formed in 1974 to promote the restoration and preservation of early radio and broadcasting. Our goal is to enable the exchange of ideas and information on the history of radio, particularly in the West, with emphasis on collecting, preserving, and displaying early equipment, literature, and programs. Yearly membership is $30.

CHRS Museum at Historic KRE

CHRS is fortunate to occupy and restore the historic KRE radio station building located at 601 Ashby Avenue in Berkeley, CA. The KRE station an important landmark in S.F. Bay Area radio history. Originally constructed in 1937, the KRE station was one of the first facilities built in California specifically for broadcasting. The KRE site has been transmitting AM radio signals for over 75 years and still operates today as KVTO. In 1972, it was the location for scenes featuring "Wolfman Jack" and Richard Dreyfuss in the George Lucas film, "American Graffiti."

The restoration of the station plus creation of a museum and educational center gives us an environment to share our knowledge and love of radio. It enables us to create an appreciation and understanding for a new generation of antique radio collectors and historians.

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Photos by: Mike Adams

Rear cover individuals (left to right):

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Row 2: (1) Broadcast Legends Old Time Players; (2) Gimmy Park-Li, Rene Richardson, Harry Osibin
Row 3: (1) Richard Watts, Jaime Arbona; (2) authors Mike Adams and John Schneider with their latest books
Row 4: (1) Bidders checking out the nearly 200 auction items; (2) Ken Ackerman, Stan Bunger

From the Editor

I really enjoyed editing this edition of the journal and working with such generous and capable authors who provided us with great articles. I want to thank the contributors including Mike Adams, Bart Lee, Bob Rydzewski, Tom Albrecht, John Staples, Tom Bonomo, Dale Tucker, and Steve Kushman.

There were many very positive comments regarding the format and content of the Spring/Summer 2012 journal. Printing in full color was so well received that this will be continued. I truly hope you enjoy this edition of the journal. The next issue is planned for Spring 2013. If you have comments, suggestions, or are interested in contributing to a future issue, please let me know.

Richard Watts, jrchrs@comcast.net

From The President

by Steve Kushman

CHRS proudly presents this second edition of the 'new' CHRS Journal. Thanks go out to Editor Richard Watts and all the contributors for another first rate edition. We hope you enjoy it. BTY, renewal notices are included in this mailing. Please send them in or renew with PayPal on line.

As 2012 draws to a close, we should look back and reflect on a very important year for CHRS. Sadly, in February we lost Jerry Cantou. His passing was sudden and untimely. Jerry, a long time Life Member of CHRS was a tireless volunteer donating countless hours to CHRS and to the KRE project. Jerry was our first KRE Operations Manager. He also was one of the first to make a very generous Special $1000 Donation to our Building and Museum Fund in 2004. Underneath a gruff exterior, Jerry had a heart of gold. He was passionate about radio collecting and preservation and really enjoyed being with radio enthusiasts. Jerry shared his radio time between CHRS and the Southern California Antique Radio Society, (SCARS). The Members of both groups really miss Jerry and will always remember his good deeds and support for the vintage radio community.

Earlier this year, CHRS debuted the 'new' CHRS web site, http://www.CaliforniaHistoricalRadio.com. Created by Max Elman of Razorfrog, it is modern and easy to navigate. The site is full of pages on radio history and restoration including a page for recordings of 16" discs transcribed via our Electrical Transcription Project. Our new site really is a nice upgrade from the old one and has had terrific reviews from those who visit. It is also the gateway to our Bay Area Radio Museum site, http://www.bayarearadio.org that features the audio clips and histories of the people and stations that make Bay Area radio great.

The Society of Wireless Pioneers, (SOWP), is the organization that represented CW operators from the 1890s through the 1980s. These wireless telegraphy specialists using Morse code were the backbone of modern communications, and at one time numbered 5000 strong. But times change, membership dwindled, and these pioneers have faded into history. SOWP was being kept alive by a few dedicated individuals, including its' last President, Ben Russell and most notably by its' Executive Secretary Waldo T. Boyd. Walt as he liked to be called was the caretaker of the SOWP Archives, dating back to the late 1800s. Since Walt was in his 90s, he was ready to shut down the SOWP web site and pack up these historical Archives for an uncertain future. As we did with the Bay Area Radio Museum and its' Radio Hall of Fame, CHRS 'adopted' the SOWP and made it a program of CHRS. The SOWP Archives are now being incorporated into our James Maxwell Communications Research Library at KRE.

CHRS was pleased to honor Waldo Boyd with the 2012 Charles D. 'Doc' Herrold Award in July at Radio Day by the Bay, for his fine work preserving SOWP and its' archives . See the picture on the back cover. Then unfortunately in September, Walt became a Silent Key at age 94. Walt's family told us that in his later years, one of Walt's main concerns was the preservation of the Archives after his passing. Well we are happy to report Walt left us knowing that the Archives and his life's work will be preserved and protected by CHRS / BARM / SOWP. CHRS now, more than ever, encompasses all things radio.

"Radio Day by the Bay 2012" was a huge success. Volunteers once again made it happen and run smoothly. Here are the numbers: We had almost 350 people in attendance, 91 auction paddles sold, 170 of 190 items sold, $15,945 in total auction sales, and $3,195 in flea market sales. Grand total for the day - $27,032. That's $9,000 more than last year! After expenses and payouts CHRS nets $14,935.62! And a day of fun and great events … What a great day for CHRS / BARM / SOWP! Thank you everyone! Stay tuned for "Radio Day by the Bay 2013", July 20th, 2013...At KRE!

Improvements in and around KRE were abundant this year as our volunteers continue to work tirelessly. We had classes, radio clinics, swap meets, special presentations and a restoration contest. These are just some of the many activities hosted by your favorite vintage radio society.

CHRS has occupied the historic KRE radio station building in Berkeley CA for the last nine years. The KRE building, built in 1937 is one of the first structures built specifically for broadcasting in the SF Bay Area. CHRS believes we may be the only vintage radio society to have a historic AM radio station as its home. In 1972, George Lucas used KRE to film the Wolfman Jack and Richard Dreyfuss scenes for "American Graffiti".

Do to the bankruptcy of our former landlord we have been engaging in a capital campaign to purchase the building and land to create a West Coast Center devoted to radio and radio broadcasting in perpetuity. And what a campaign it's been! Members, friends and supporters of CHRS / BARM / SOWP have come through Big Time! Since June we have donations and pledges totaling over *$655,000!* Our goal is *$750,000*. We are almost there, but we need your help. Be part of this campaign! We have received pledges from all over the Country. EVERY pledge and donation means a great deal to CHRS. It is worth noting several exceedingly generous pledges / donations that are really helping us to reach our goal: ***Jack Bethards - $5,000, Bert Buss - $5,000,Elmo & Kim Giovanetti - $5,000, Chip Lim - $5,000,Robert & Reina Swart - $5,000, Judy Mears & Bart Lee - $10,000, Larry & Joan Drees – $16,600, Norm Howard Lehfeldt - $15,000, Tom & Julie Bonomo - $25,000,Tom Nelson - $25,000, George Patterson - $25,000, Gilles Vrignaud - $25,000, Norman Leal – $75,000, Philip Monego – $100,000, Scott Robinson – $100,000, and John Staples - $100,000.***

In addition to our Super Donors, some noteworthy pledges have come in from: ***The CHRS Central Valley Chapter - $3750, The Alabama Historical Radio Society - $1000, The SF Bay Area SBE Chapter 40 - $1000, The Sacramento SBE Chapter 43 - $1000, The Mt. Diablo Amateur Radio Club – $1000, The Art Deco Society of California – $500, The Delaware Valley Historic Radio Club - $1000, The Iowa Antique Radio Club and Historical Society – $500, and The Tube Collectors Association, Inc. - $1000.***

We are grateful to each and every person and organization supporting our efforts. Everyone who donates will have his or her name on a plaque in the KRE building. Please visit our web site to pledge or donate. Your support is very important and most appreciated.

I am proud to serve as CHRS President and am continually humbled by the passion and efforts of our dedicated volunteers. I look forward to CHRS having a bright future including owning the KRE building and site devoted to radio and radio history.

Happy Holidays and all our Best for a great 2013, *Steve (415) 203-2727 kushseal@flash.net*

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CHRS Sacramento Chapter News

by Dale Tucker

The Sacramento Chapter of CHRS is the successor to the Sacramento Antique Radio Club which was founded approximately 25 years ago. The Chapter currently has about 25 members who reside throughout the Sacramento region. Our members live primarily in a five county area: Sacramento, Placer, El Dorado, Nevada and Yolo. The Chapter currently has about 35 members. We meet on the 3rd Tuesday of every month at 7:30 PM at 3755 Durock Road, Shingle Springs, CA, 95682. Thanks to Bob Moore for hosting the meetings. Come join us for lively radio conversation. If you have a challenge trying to restore/repair a radio, take it along. Bob's a first-class challenge solver! One needn't be a member to attend meetings.

Each year we host swap meets. The first and largest is in early March at the local Sylvan Oaks Community Library in Citrus Heights. We often have a second swap meet during July or August. Come join us at our events – fans of classic radios are always welcome!

For more information email Bob Moore at GTA351C@sbcglobal.net or contact me, the Chapter Chairman at 916.721.3410 or drop me an email at daletucker@surewest.net

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CHRS Central Valley Chapter News

by Richard Watts, photos by Harry Bohl

Annual Swap Meet and Vintage Electronics Sale – October 2012

The CHRS Central Valley Chapter 14th annual swap meet held at the Stanislaus County Fairgrounds on October 6th was well attended. There were many sellers with a variety of interesting bargains. Several items donated by the club members were raffled; the grand prize being a fully-restored 1936 Silvertone console.

Radio Repair Classes

The CVC currently offers three weekly classes that continue to be very popular: Basic Electronics and Radio Theory led by Larry Gonsalves; Radio Electronics Repair workshop led by Wallin and Larry Gonsalves ; and the Cabinet Restoration workshop led by Jim Silva.

The weekly Radio Electronics Repair workshop is always well attended.

Turlock Historical Society Museum Display

The CHRS Central Valley Chapter has once again been invited to display vintage radios, wireless devices, pictures, and ephemera at the Turlock Historical Society Museum. The items are borrowed from member collections.

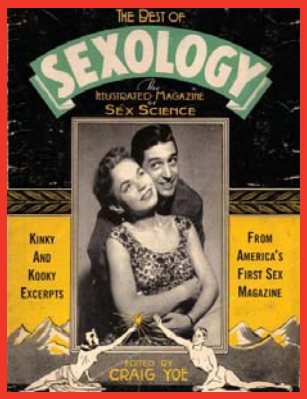
For more information about all CVC activities, please visit www.cvantiqueradio.com. ◊

Hugo Gernsback: Predicting Radio Broadcasting, 1919-1924

by Mike Adams

Hugo Gernsback is not a name immediately associated with the development of radio broadcasting. But this prolific publisher predicted, promoted, and profited from what radio was to become in the years immediately following WWI. Beginning as the earliest publisher of amateur radio magazines, he both supported and wrote about the transition from all-wireless communication by Morse code to radio as the most important entertainment media of the Twentieth Century. His major pre-war magazines were *Modern Electrics*, *Electrician and Mechanic*, and *Electrical Experimenter*. In the early years of the 20th Century Gernsback was the champion of the young boy radio hobbyist and set builder. He led the way by putting into print the triumphs of Edison, Marconi, de Forest and others engaged in the science of electricity.

Born in Luxembourg in 1884, Gernsback emigrated to the United States at age 21. He was a curious person, fascinated by the science fiction and fantasy of H.G. Wells and Jules Verne. A parallel interest was wireless, and he quickly saw a need for experimenters to be able to obtain parts and information to support their hobby. Both of these interests resulted in publications, starting with his 1908 *Modern Electrics*. In April, 1926 he published the first science fiction magazine, *Amazing Stories*, with articles contributed by Wells, Verne, and Edgar Allen Poe. We can also assume that he was interested in sex for in 1933 he introduced *Sexology*, promoted as the "Magazine of Sex Science," and contained such articles as "Sex and Youth," and "Petting is Dynamite." In his lifetime he was credited with the publication of over 50 titles. One of his lasting legacies was the science fiction writer's award named for him, the "Hugo Awards."



Non-Radio publications from Hugo Gernsback

But it was his 1919 premiere of *Radio Amateur News*, later re-titled *Radio News*, that through editorial opinion and selection of writers and content he set out to influence the evolution of radio broadcasting. During its important development years, 1919 to 1924, he chronicled radio's move from earphones to loudspeakers, from hams to citizen audiences, from crude home made devices to store-bought working radios, and from two-way communication to music and news programming. Part of this rapid change was due to the great improvement in the science of the radio, much of it driven by the World War I patent pool, a government-forced "cooperation" of inventors and their patents for the war effort. In my research, resulting in *Lee de Forest, King of Radio, Television, and Film* (Springer Science 2012), I looked closely at the vacuum tube of de Forest and its important role as a detector, amplifier and transmitter. In my opinion, the tube was the most important single piece of technology, and Gernsback took advantage of that and promoted de Forest in his publications.

As the largest of the radio-themed consumer publications, *Radio Amateur News* began at a time when an eager audience of young men were returning from the war in Europe, many seeking their future careers. Gernsback would be their voice with a combination of articles, editorials and advertising. In an article in the July, 1919 issue, "The Audion and the Radio Amateur," Lee de Forest promotes himself, his history as an inventor, and attempts to position himself as a friend of the ham. He touts the amateur hobby as "The most wonderful thing ever thought of by man." What is left unsaid is that under a series of court cases, de Forest is only allowed to sell his tubes and radios to the amateur, not the commercial user. In this "amateur" publication, de Forest was writing for his market.

In the September, 1919 issue, the Gernsback editorial is an argument against government control of radio. A year after the war's end, it was the Navy and its Secretary Daniels who believed that their branch of the armed services used radio best in the allied victory and thus should retain control of radio in peace time. It was fought over in Congress and quickly solved. Radio would become government licensed and regulated under the RCA agreements which specified which manufacturers would make radio transmitters and receivers. What was not clear was what radio would become beyond "a commercial service," whatever that meant. De Forest returned to the pages of this issue in a article, "Reviewing American Radio History." In it he reviews the great moments in invention and mentions the contributions of Fessenden, Marconi, Poulsen and himself. Missing from the list is EH Armstrong, de Forest's lifetime nemesis.

RADIO AMATEUR NEWS

H. GERNSBACK, EDITOR

Vol. 1. SEPTEMBER, 1919 No. 3

Government Radio Control—Once More

ON July 24th, Secretary of the Navy Daniels addressed a remarkable letter to the Speaker of the House of Representatives, which communication is reprinted in full on another page.

We had thought that Government radio control was at a rest for a while when certain radio bills were defeated last year. It seems, however, to be a favorite pastime in Washington to sponsor Government Control of radio every month or so, at least so it looks to us. The writer has pointed out in his previous articles that the Radio Act of 1912 has been found ample for all requirements, be they Government, commercial or amateur. Mr. Daniels speaks in his letter of *"assigning certain belts of wave lengths for the exclusive use of these services."* He immediately corrects himself by saying that *"as a matter of fact, such allotment of wave length is coming about thru International Agreement."*

Aside from this, there has been practically no interference before the war because the commercial stations, by agreement, operated on certain wave lengths and got along very well. Further down, Mr. Daniels says *"standardized practises are being worked out so that a ship off any shore in the world will work without difficulty with the closest shore station."*

If all this is so, why does Mr. Daniels desire radio control at all? Again the Secretary reminds us that *"during periods of strained relations, as well as during the war, direct Government control and operation would be the only safe and effective control and operation, as the personnel would be subject at all times to Government supervision and discipline."*

We heartily agree with Mr. Daniels, and the past war has shown that the Navy Department certainly knew its business when it took in hand the entire radio situation in the United States, BUT THIS WAS DONE WITHOUT GOVERNMENT CONTROL, and this phase was fully covered by the Radio Act of 1912. If there were another war, the present radio law would again work as well as in the past war.

After carefully perusing the Secretary's communication we fail to find any new argument in favor of Government ownership, or control of radio communication in the United States. The same ground was gone over very carefully last December, and the committee who then investigated the radio situation found that the Radio Act of 1912 was ample in all its provisions and that new legislation was not required nor wanted.

As the Radio art progresses, laws to regulate the art become of less and less import, and if radio cannot work out its own salvation, it certainly will never amount to much. When the telephone first appeared, there was more interference than there is today in Radio. It was found that wires running parallel to each other, due to induction, caused untold interference; it was then almost impossible to talk to anyone ten miles away without hearing six or seven people all talking at the same time. Placing fifty wires in a small cable was an impossibility. Suppose the Government had then stepped in and said, "The telephone situation is intolerable. There is too much interference, and, to do away with it, the Government proposes to take over all wires!" The Government could readily have done so, but wisely refrained. The telephone art worked out its own salvation and today there is no interference.

In radio, exactly the same situation prevails. As far as the bug-a-boo interference is concerned, radio will work out its own remedies. Great strides have been made in the past few years, particularly during the war, and the next ten years will certainly show a complete revolution. The word "interference" will be laughed at.

The whole radio situation is so obviously simple at the present time that we cannot comprehend why the powers that be in Washington do not realize this and forget all about Government radio control for a while. The amateurs are using the lowest step in the wave-length ladder. Next come the commercial stations covering small distances. After them come the long distance trans-oceanic stations with their long wave lengths necessary due to the great distances. There is now very little interference between all of these, and what interference there is is mainly due to inefficient personnel, or inadequate apparatus, or both.

As to Government control of radio, we are certain that the country wants none of it at present after its unsatisfactory experiment in Government ownership of the telegraph, telephone and cable lines just returned. And after its more or less disastrous experiment in Government control of the railroads of the country, we believe our legislators will think twice before attempting radio Government control at present.

If the country is sensitive about anything, it certainly is so to a high degree of radio, which has such unlimited possibilities, and which has caught the popular fancy more than anything else in recent years. We are certain that when the radio fraternity reads Secretary Daniels' letter an instant howl of distress will go up and Washington will be deluged with letters of protest, the same as happened last year when amateur radio was threatened with extermination. And exterminated the amateur surely will be if Mr. Daniels has his way.

As for ourselves, we feel not disturbed as to the future outlook. We addressed a communication to the Senator from New York, Hon. J. W. Wadsworth, Jr., and his answer to our inquiry as to the next step of the Government re Mr. Daniels' recommendation was as follows:

"The Committee on Merchant Marine of the House of Representatives, to which Secretary Daniels' letter was referred, does not expect to take any action on radio control in the immediate future."

We sincerely trust that this may be the case, and we hope to report before long the abandonment of Government control of radio.

H. GERNSBACK.

There now begins to appear in the magazine brief previews and prophecies of possible programming genres. In this same September, 1919 issue Gernsback wrote an article, "Grand Opera by Wireless." Notice that the older word "wireless" is still used interchangeably with the newer designation "radio." In this predictive article he suggests that music could be sent into homes using radio (not a new idea), and that the reason this is not being done now is that "no means has been found to reimburse the opera companies for allowing everyone to listen in." He writes: "During the next few years it will be a common enough experience for an amateur to pick up his receivers between eight and eleven o'clock in the evening and listen not only to the voice of such stars as Caruso, Tetrazzini, McCormack and others, but also the orchestra music as well, which is picked up by the sensitive transmitters along with the voice of the stars."

Whether or not he realizes it, it is by his choice of words that he completely describes the proverbial fence on which we are sitting at the end of 1919. On one side is the known world of wireless messaging and developing technology and on he other a radio future unknown. To deconstruct this passage: First, he refers to the audience as "an amateur" because that is the 1919 frame of reference, and he also uses the pronoun "his" as wireless is still a hobby dominated by the young male. Next, he describes the listening device as "receivers," as the state of the amateur technology in 1919 was the earphone rather than the newly invented loudspeaker. It would be several years before the common crystal set would benefit from the amplification of the vacuum tube, allowing the horn-amplified headphone loudspeaker to come into common use. Sure, many inventors had already sent various forms of live and phonograph music over the air prior to 1919, but without technology that appeals to a consumer audience, and without the possibility of licensing new forms of commercial fare, it was not taken seriously. But you can see in the Gernsback article how the past is influencing the future. He seems to be saying, "what if," but his prediction is firmly rooted in the current model, radio as amateur hobby.

RADIO AMATEUR NEWS

15 Cents SEPTEMBER 1919 OVER 100 ILLUSTRATIONS Edited by HGernsback

"The 100% Wireless Magazine"

GRAND OPERA BY WIRELESS

See Page 106

In This Issue:

106 RADIO AMATEUR NEWS September, 1919

Grand Opera By Wireless

By H. GERNSBACK

A RECENT newspaper report from Chicago brought the not at all surprising news that grand opera music had been transmitted by wireless telephone for over one hundred miles. Sensitive microphones placed on the stage of the opera house caught the sound waves; the impulses then being stepped up in the usual manner by means of a transformer were then led into an amplifying vacuum tube. Here the current was impressed upon the radio telephone transmitter in successive stages and then sent out over the aerial on top of the opera house. Wireless amateurs all about the surrounding country were thus able for the first time to hear grand opera. While this was only an experiment, grand opera by wireless will soon be an accomplished fact.

During the next few years it will be a common enough experience for an amateur to pick up his receivers between eight and eleven o'clock in the evening and listen not only to the voice of such stars as Caruso, Tetrazzini, McCormack and others, but also to the orchestra music as well, which is picked up by the sensitive transmitters along with the voice of the stars. The surprising thing is that it is not being done now.

The reason probably is due to the fact that as yet no means has been found to reimburse the opera companies for allowing everyone to listen in. While of course listening to the music is not as satisfying as witnessing the performance in person, still many music enthusiasts would rather stay home listening to the music alone than to witness the performance itself. To your true, dyed-in-the-wool opera fiend the performance is of secondary importance, the music always one of first.

But we must give a thought to the management, which cannot subsist on an empty opera house if everyone could listen in to the actual rendering of the opera without paying for the privilege. Needless to say that the producers would soon find themselves bankrupt. For this reason we cannot expect that grand opera by wireless will be an accomplished fact until some means has been found to reimburse the producers, and, as every wireless man knows, this is very difficult to do. Anyone with suitable radio apparatus can "listen in" to the music without much trouble. No matter on what wavelength the music would be rendered, every wireless man would find a way to listen to it without serious inconvenience.

Probably the only logical way out would be for the management of a grand opera company to advertise in the newspapers, stating that no grand opera via radio would be given unless a certain amount of revenue were guaranteed by radio subscribers before "radio performances" would be given. This would mean that probably ten out of the hundred radio stations, amateurs and otherwise would pay monthly or yearly dues to sustain the management, which then would not have to care how many were listening in.

This is the only practical solution. As for technical difficulties, there are of course none. All that is necessary for the producing company is to install a high-class wireless telephone outfit which can be bought on the market right now and which is immediately available. The rest is up to the wireless fraternity, which has nothing else to do but listen in.

At the receiving end, the future up-to-date radio opera enthusiast will, of course, have a first-class receiving outfit, using vacuum tube amplifiers, and a loud talker such as depicted on our front illustration. Then it will be a simple matter to listen to Caruso himself, tho he be a thousand miles distant. His voice will come out loud and distinct and the amateur's family will be enabled to "listen in" to their hearts' content.

There is still another novel scheme recently originated by the writer.

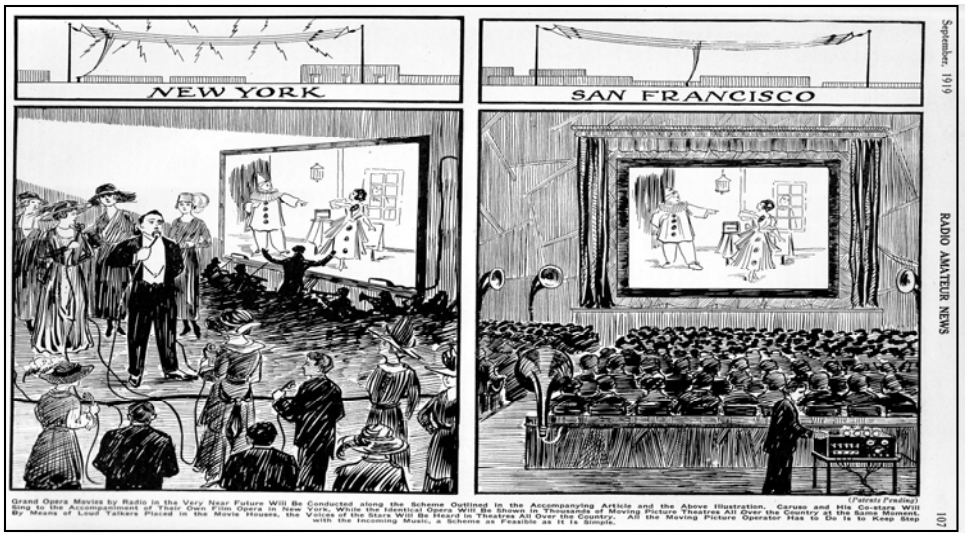
The underlying idea is not only to give grand opera by wireless, listen to the music and to the singers only, but to actually see the operatic stars on the screen as well. This is how it can be readily accomplished by means which are available today, and without the slightest technical difficulty.

Let us say, by way of example, that the opera "Aida" is filmed in its entirety. This may mean a four or five film feature. The opera will be filmed just like any other photo-play.

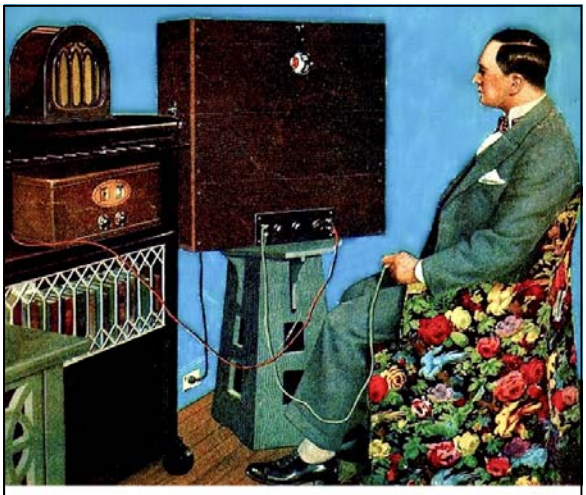
Our large illustration shows what happens next. The stars, singers, players, the chorus, orchestra, conductor, etc., are then assembled in a moving picture studio and in front of them is the usual screen. The opera "Aida," which had been filmed before, is now repeated on the screen while the entire cast follows the screen picture closely. Each performer, every star, every member of the chorus has his or her own microphone in which he or she sings the regular score, watching closely the film-play as the action is unreeled on the screen. The moving picture opera thru the film operator keeps time with the singers, and the singers themselves must keep exact time with the performance as it is unrolled on the screen before their eyes. Inasmuch as the identical cast has been filmed, it will not be difficult for them to keep time with their own performance, as may readily be imagined. *In other words, when Caruso*

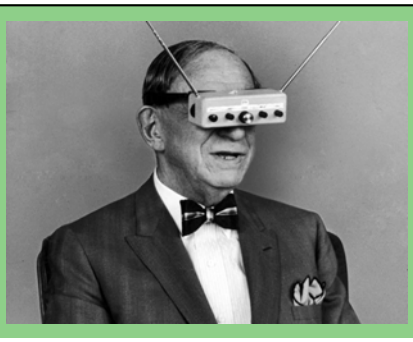
(Continued on page 145)

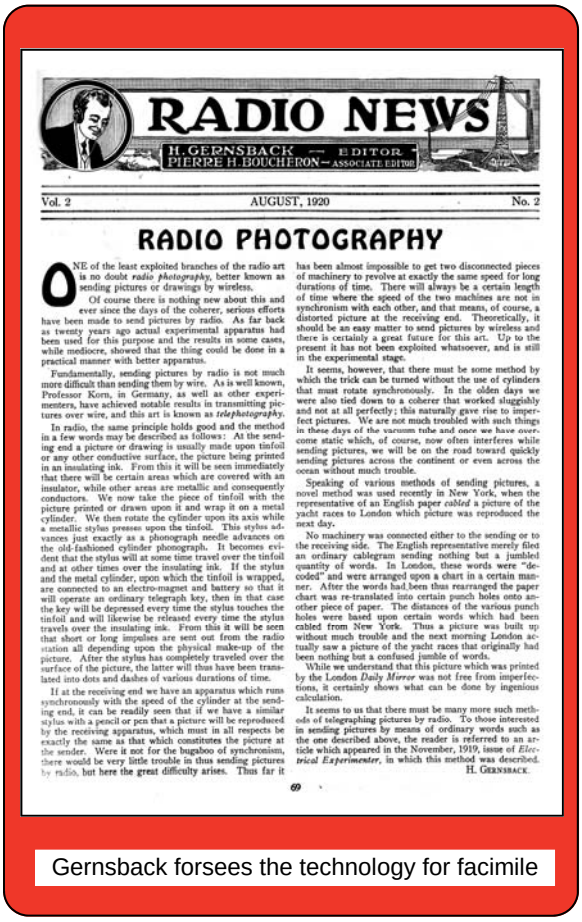
Gernsback continues his opera-as-programming predictions with these illustrations of how it might work, again using the existing media. What he ends up with is a hybrid of radio and the silent film, suspiciously a television-like system. It is his idea that the opera company performing on a New York stage would have their performance filmed by the silent movie camera. The film would be processed and duplicated. A copy of it would then be screened on the opera stage while the opera singers and musicians would perform it in synchronization with the silent film. Stay with me here. The live performance would be picked up by radio and broadcast to San Francisco where a radio receiver and loudspeaker would be set up next to a movie screen. On it would be projected a copy of the opera silent film. This film would somehow have to be synchronized with the received live performance. Yes, it could work, and said Gernsback, "The underlying idea is not only to give grand opera by wireless, listen to the music and to the singers only, but to actually see the operatic stars on the screen as well." Television? The Talkies?



Grand Opera Movies by Radio in the Very Near Future Will Be Conducted along the Scheme Outlined in the Accompanying Article and the Above Illustration. Caruso and His Co-stars Will Sing to the Accompaniment of Their Own Film Opera in New York, While the Identical Opera Will Be Shown in Thousands of Moving Picture Theatres All Over the Country at the Same Moment. By Means of Loud Talkers Placed in the Movie Houses, the Voices of the Stars Will Be Heard in Theatres All Over the Country. All the Moving Picture Operator Has to Do Is to Keep Step with the Incoming Music, a Scheme as Feasible as It Is Simple.


H. Gernsback, Editor of Radio News, *receiving the television broadcasts from WRNY at his home in New York City, with the simple apparatus described in this article. For purposes of the test, the neon tube and loud speaker were connected in series temporarily, with successful operation simultaneously.*


Hugo Gernsback wearing TV Glasses (1963)


RADIO NEWS
H. GERNSBACK — EDITOR
PIERRE H. BOUCHERON — ASSOCIATE EDITOR
Vol. 2 AUGUST, 1920 No. 2

RADIO PHOTOGRAPHY

ONE of the least exploited branches of the radio art is no doubt *radio photography*, better known as sending pictures or drawings by wireless.

Of course there is nothing new about this and ever since the days of the coherer, serious efforts have been made to send pictures by radio. As far back as twenty years ago actual experimental apparatus had been used for this purpose and the results in some cases, while mediocre, showed that the thing could be done in a practical manner with better apparatus.

Fundamentally, sending pictures by radio is not much more difficult than sending them by wire. As is well known, Professor Korn, in Germany, as well as other experimenters, have achieved notable results in transmitting pictures over wire, and this art is known as *telephotography*.

In radio, the same principle holds good and the method in a few words may be described as follows: At the sending end a picture or drawing is usually made upon tinfoil or any other conductive surface, the picture being printed in an insulating ink. From this it will be seen immediately that there will be certain areas which are covered with an insulator, while other areas are metallic and consequently conductors. We now take the piece of tinfoil with the picture printed or drawn upon it and wrap it on a metal cylinder. We then rotate the cylinder upon its axis while a metallic stylus presses upon the tinfoil. This stylus advances just exactly as a phonograph needle advances on the old-fashioned cylinder phonograph. It becomes evident that the stylus will at some time travel over the tinfoil and at other times over the insulating ink. If the stylus and the metal cylinder, upon which the tinfoil is wrapped, are connected to an electro-magnet and battery so that it will operate an ordinary telegraph key, then in that case the key will be depressed every time the stylus touches the tinfoil and will likewise be released every time the stylus travels over the insulating ink. From this it will be seen that short or long impulses are sent out from the radio station all depending upon the physical make-up of the picture. After the stylus has completely traveled over the surface of the picture, the latter will thus have been translated into dots and dashes of various durations of time.

If at the receiving end we have an apparatus which runs synchronously with the speed of the cylinder at the sending end, it can be readily seen that if we have a similar stylus with a pencil or pen that a picture will be reproduced by the receiving apparatus, which must in all respects be exactly the same as that which constitutes the picture at the sender. Were it not for the bugaboo of synchronism, there would be very little trouble in thus sending pictures by radio, but here the great difficulty arises. Thus far it has been almost impossible to get two disconnected pieces of machinery to revolve at exactly the same speed for long durations of time. There will always be a certain length of time where the speed of the two machines are not in synchronism with each other, and that means, of course, a distorted picture at the receiving end. Theoretically, it should be an easy matter to send pictures by wireless and there is certainly a great future for this art. Up to the present it has not been exploited whatsoever, and is still in the experimental stage.

It seems, however, that there must be some method by which the trick can be turned without the use of cylinders that must rotate synchronously. In the olden days we were also tied down to a coherer that worked sluggishly and not at all perfectly; this naturally gave rise to imperfect pictures. We are not much troubled with such things in these days of the vacuum tube and once we have overcome static which, of course, now often interferes while sending pictures, we will be on the road toward quickly sending pictures across the continent or even across the ocean without much trouble.

Speaking of various methods of sending pictures, a novel method was used recently in New York, when the representative of an English paper *cabled* a picture of the yacht races to London which picture was reproduced the next day.

No machinery was connected either to the sending or to the receiving side. The English representative merely filed an ordinary cablegram sending nothing but a jumbled quantity of words. In London, these words were "decoded" and were arranged upon a chart in a certain manner. After the words had been thus rearranged the paper chart was re-translated into certain punch holes onto another piece of paper. The distances of the various punch holes were based upon certain words which had been cabled from New York. Thus a picture was built up without much trouble and the next morning London actually saw a picture of the yacht races that originally had been nothing but a confused jumble of words.

While we understand that this picture which was printed by the London *Daily Mirror* was not free from imperfections, it certainly shows what can be done by ingenious calculation.

It seems to us that there must be many more such methods of telegraphing pictures by radio. To those interested in sending pictures by means of ordinary words such as the one described above, the reader is referred to an article which appeared in the November, 1919, issue of *Electrical Experimenter*, in which this method was described.

H. Gernsback.

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Gernsback forsees the technology for facimile

In early 1920 the magazine still contains the word "amateur" in the title, but there is yet another dichotomy on page 612 of the May issue. At the top of the page is an article, "Dancing by Radiotelephone," describing how couples can now dance to concerts of radio music, something that might describe radio as it is known today, but with one difference: "As will be noted, each young man and his dancing partner are equipt (sic) with a pair of radio receiving headphones and connecting cords suspended from various parts of the room, thus enabling them to cover a considerable part of the floor." Dancing with headphones, while probably not practical due to the obvious cord entanglement, does demonstrate two things: First, it is a novel use of the technology and potential programming then available, but second, for the first time a radio activity lets in a heretofore ignored part of radio marketing, the "dancing partner," a woman. This will be necessary part of the new radio audience. The second article on the same page, "The Latest in Crystal Detectors," shows that we remain, at least partly, in radio's past.


612 RADIO AMATEUR NEWS May, 1920

Dancing By Radiophone

THE accompanying photograph shows in a striking manner some of Atlanta's elite young folks preparing to gracefully trot to the tune of "Dardanella." The unusual part of this event was the fact that music was radiophoned by a concert band nearly two miles away, the music being furnished by the Georgia Tech. Band and the event taking place on the roof of the Capital City Club.

As will be noted, each young man and his dancing partner are equipt with a pair of radio receiving head phones and connecting cords suspended from various parts of the room, thus enabling them to cover a considerable part of the floor. It will also be noted that the set was furnished with a loud-speaking telephone, whereby nearby persons not equipt with receivers could hear the music as well. Altho it had originally been planned to furnish music of sufficient volume for the entire membership of the *Club de Vingt*, which consists of 500 enthusiastic youngsters, it was not possible to accommodate them owing to the fact, as our radio men will easily appreciate, that the building was a steel one, having the tendency to absorb a great deal of the radiated energy and in addition to this the open air and the noise of the crowd did its share towards diminishing the received intensity of the music.

A few well-informed radio men who witnessed and assisted in the demonstration were, however, highly elated and declared that the "first radiophone dance was a huge success," and believe that the difficulties encountered can easily be overcome in future affairs of this kind.

Sergeant Thomas Brass, of the Georgia Tech. Signal unit of the Reserve Officers' Training Corps, is the radio man who prepared and installed the apparatus making the demonstration possible. According to a reported statement the following is the manner in which he conceived the idea of the radio concert.

An amateur station in Alabama which is on "speaking terms" with the Tech. station was having considerable trouble in hearing a radiophone conversation some time ago. After having the message repeated several times the Alabama operator was instructed to "sing it." Sergeant Brass, who has spent twenty-five years in the army and whose singing days are but images of the past, declined to vocalize in the manner suggested, but promised to get a phonograph for him.

"You know," he said, "the idea struck me that it might actually be done. I tried it out with the ordinary transmitter but it wouldn't work, as not enough of the sound could be concentrated on the diaphragm of the transmitter. Then I got to work and experimented."

What Sergeant Brass actually "hit" was a very sensitive diaphgram and a two-step amplifier receiving set. This was done only after several weeks of experimenting and hard work on the part of the entire signal units. The work was kept strictly secret until the initial tryout was given. An ordinary phonograph was started, the transmitter set up, and—radio music!

On hearing the music one of the local stations promised to entertain another party of dancers, the music to be furnished by radiophone. This will necessitate some additional features since at the present the sound does not carry far enough from the receiver for practical dancing purposes, and it would be necessary for each dancer to wear a receiving head set.

The possibilities of a dance were discust and Sergeant Brass is of the opinion that it would be possible with the proper arrangement of microphones. He intends to begin work on this in the near future. Until these improvements are made the pleasure of radiophone music will have to be confined to those who are fortunate enough to secure a head set.

Some Promising Young Atlanta Folks About to "Trot" Along to the Tune of "Dardanella," Each One Equipt With the Familiar Headphones Whereby the Music Is Furnisht by Radiophone.

The Latest in Crystal Detectors

Judging from the number of different types of crystal detectors on the market at the present time, it would seem that there is no room for further improvement, as there are some exceptional designs. Of the recent types, the general trend seems to be towards the enclosed type of detector which, as we know, has many advantages over the old type of dust collector. The photograph shows an advanced type of detector invented by Fred S. Hovey, of New York, which seems to fill in the long wanted missing link. It incorporates the many advantages of other types of detector. One of the chief features is the provision made for reaching every part of the crystal employed in the apparatus with an extremely fine adjustment, which is at the same time rapid and rugged. The cat-whisker contact where used is of silver.

Another feature provided is a glass tube enclosure, thus rendering the operating parts free from dust and atmospheric conditions. The base is constructed of some insulating materials such as bakelite or hard rubber, and mounted thereon are two brackets, shown at the extreme end. These brackets support the tubular section of glass which encloses the crystal. As shown in the photograph, the crystal is mounted at the left of the tube so that a slight pressure is maintained upon it by a spring in the rear which gives it a cushion effect. At the right of the photo the adjusting mechanism is shown. A plug having two holes as shown, is inserted in this end of the glass tube.

The upper knob and rod controls the minute movement of the contact points. That is, a twist of this knob will reach every part of the crystal within the radius of the point. The lower knob and rod controls the pressure of the contact upon the crystal. And last but not least, a wide adjustment is possible by the turning of the entire plug. It is seen from the foregoing that three adjustments may be had with a detector of this type. With its many other valuable features, it should prove to be a very popular instrument for the amateur. The inventor claims that this detector was used for a considerable length of time, during which it maintained the adjustments thru all sorts of jarring and disturbing conditions.

According to the Inventor, This Crystal Detector When Once Set Will Maintain Sensitive Adjustment for Long Periods.

Finally, by July, 1920, the title of the magazine is changed to reflect the coming consumer and entertainment and information uses of radio. It is no longer paying homage to the amateur, and the magazine will remain as just *Radio News*. It is also a perfect time, thinks Gernsback to predict the far radio future under the editorial title, "Radio in 1945." His predictions are not very daring. About 1945 he writes, "We will no longer need an aerial and ground wire," and "We will have loudspeakers." Is that it? But he does continue to give the reader solid predictions, like the August, 1920 editorial, "Radio Concerts." He is suggesting correctly that music might become the basis for the new service: "There is nothing that popularizes radio more than a concert by a famous singer," and he summarizes with a call to action: "Of course, there are countless schemes and ideas of a similar nature, all of which make it possible to popularize radio, and that is what we are after. Now, why don't we get together and do it?" This is Gernsback the cheerleader, sensing an opening for a programming format that will appeal to the public – and therefore sell radios and radio magazines and magazine advertising.


RADIO NEWS
H. GERNSBACK — EDITOR
PIERRE H. BOUCHERON — ASSOCIATE EDITOR
Vol. 2 JULY, 1920 No. 1

Radio in 1945

WE are slowly ascending the steep hill of progress. However, we have still an enormous mountain to climb as far as the radio art is concerned. Compared to the ultimate goal, our present achievements are like the smallest pebble in comparison with Himalaya. Standing on this little pebble, we do not get much of a vantage point, but we can, at least, look back upon the road we travel, and we can also, figuratively speaking, soar toward the peak of the towering mountain above our heads.

Everything in life is comparative. So is progress of the arts and sciences. What appears fantastic and wholly visionary today has a knack of coming true on the morrow. Consequently on looking back only over the microscopically small stretch of time of twenty-five years, we find the art of radio just born. We then had our spark coil connected to a ponderous aerial, and as a receiver we had a tremendously complicated conglomeration of apparatus, comprising coherers, relays, tappers, choke coils, batteries and various other paraphernalia.

Of course, we smile on this today in our very superior manner; particularly when we look at our compact little sets with which, strictly speaking, we need no longer even use an aerial, nor a ground.

We use a little loop of wire three feet square; we have a small vacuum tube and a pair of receivers all encompassed into a box that fits into your suitcase, and lo and behold! We can set up this box, and within the radius of hundreds of miles receive radio music by which we dance. Had we suggested such a thing twenty years ago we would have been most severely condemned as visionaries and dreamers.

If radio has made such tremendous progress in only twenty-five years, what will it be in twenty-five years hence? The imagination fairly staggers at the contemplation of the progress that is coming. But certain things may be prophesied with relative safety. Many scientific prophecies are as certain as the rising of the sun. If you are correct on your premises, you can make certain deductions that we know in advance must come true.

It is therefore safe to say that in twenty-five years hence there will be no such thing as a big ponderous aerial must even for the powerful radio stations sending messages all around the globe. Probably no aerial will be used at all. Perhaps no ground either. Before we reach that stage someone will go and bore a shaft into the earth, possibly a thousand feet deep, and hang an insulated wire into this shaft. He will probably astound the world by finding that by means of this arrangement messages can be sent and received all over the globe just as easily as having a huge mast towering a thousand feet into the clouds. It is also a safe bet that twenty-five years from now our long-distance stations will be operating with comparatively small power. Bearing our past progress in mind, it should be possible in 1945 to telegraph 12,000 miles, which is half way around the globe, with a power which does not exceed ½ k.w.! Perhaps even this figure is high, and the day is surely coming when it will be possible to detect the waves of a small induction coil all over the globe.

And, one of these days we will wake up and find that some genius has made it possible for us to *see* actual radio waves. And why not? Arguments may be brought against this prophecy by stating that the length of radio waves is such that they can never be perceived by the eye, which is built to perceive light waves only, which have an entirely different wave length. This argument, however, does not in the least influence us for the simple reason that we have already photographed sound waves, altho we cannot see these either. Just how it will be brought about we have, of course, no means of knowing at present.

It is safe to say that twenty-five years hence we will not use telephone receivers with which to receive our messages. What the method will be at that time to receive messages we cannot even guess at. It may be by visual means; it may be by *acoustics*, or perhaps in a totally unsuspected manner. We venture to say that it might even be accomplisht physiologically. Who dares say that we will not at some future date pick up two metallic handles and "feel" the dots and dashes come in—that is, if we are still using dots and dashes at the time.

Lee de Forest has shown us that a vacuum tube can be used as an *audible* receiver. Who, therefore, dares to deny that some day we will be able to hear telephone messages simply by using a special vacuum tube, which not only will receive messages but will *also reproduce them acoustically*. This, in an experimental way, is already possible today.

One of the coming wonders without doubt is radio movies. Imagine a bank of several hundred special vacuum tubes upon which the light and dark variations of a film are thrown by means of projecting apparatus. Each individual tube will be affected in a different manner. Some tubes will be strongly exposed to the light, while others will be kept in the dark. These tubes will be light-sensitive similar to the Rubidium Cells in use today. Each tube will send out an impulse by undampt radio waves, and as the wave length of each tube differs by a small fraction of one per cent, there will be no interference between the different tubes. At the receiving end the process is reversed, and a similar bank of tubes reconstructs the picture and throws it upon the screen by some intermediary apparatus. Imagine then a central point of the country, such as Denver, which sends out nightly moving pictures by radio. These are then received in every house all over the country without any difficulty; and, of course, it will be no far cry to combine these movies with voices or music as well. All of this may sound wild and woolly and impossible now, but the reader who picks up this magazine in 1945 will smile at the utter simplicity of this editorial because at that time many more wonderful things than the ones mentioned here surely will have come to pass.

H. GERNSBACK.


RADIO NEWS
H. GERNSBACK — EDITOR
PIERRE H. BOUCHERON — ASSOCIATE EDITOR
Vol. 3 SEPTEMBER, 1920 No. 3

RADIO CONCERTS

ON June 15th of this year the *Daily Mail* of London inaugurated the first "world" concert, in conjunction with the famous opera star, Madame Nellie Melba, transmitting her voice over vast distances; the music in some instances was heard over a thousand miles away from the sending station. Madame Melba was performing at Chelmsford, near London, singing into the microphone of a standard radio telephone apparatus.

There was nothing radically new employed in sending out her voice, the apparatus used being well known and similar to what has been described time and again in this publication. The voice, on the other hand, was heard over a great expanse of space wherever there was a radio receiving station within range which had suitable apparatus for the interception of the concert, which, by the way, started at seven o'clock in the evening, London time. The results left nothing to be desired. As a matter of fact, the several voices came thru excellently.

First a deep voice slowly announced the program, then came the first strains from the piano, and finally the clear voice of the noted singer. Several selections were rendered by Madame Melba, and the concert terminated with the British national anthem, "God Save the King."

At Paris, the *Société Française Radio Electrique*, on the other hand, took elaborate precautions to receive the music in a totally unlike manner than has ever been accomplisht before. This company, with its headquarters at Levallois, near Paris, erected a special booth, where by means of elaborate tuning apparatus, as well as vacuum tubes in great profusion, Madame Melba's voice was received and demonstrated to a large audience by means of a big aluminum horn. The experiments, however, did not by any means end there. The climax came—and here is where the novelty comes in—when the Société used a special apparatus comprised of nine vacuum tubes with which to receive the music. It is interesting to note that, altho *no antenna or even a loop antenna was used*, the music not alone was received over the distance of several hundred miles, but was actually registered upon a master phonograph disc! From this master, actual phonograph discs were afterwards made, and all of them were quite clear. Here, indeed, is a worth-while novelty! While, of course, there is nothing new about "canning" radio telegraph messages, the idea of catching the voice of a great opera singer by radio on a phonographic disc seems rather novel and presents great possibilities.

The point we want to make here is that, altho America is supposed to be a country bordering close to the radio milennium, and, altho there are practically no restrictions and the law is all with the amateurs, progress, as far as radio telephony is concerned, is negligible.

In Europe, where the restrictions are very severe, and where special authorization for such an experiment as the above-described one must be had, it seems the art is thriving even more vigorously than here, where there are no such restrictions. In other words, real enterprise, as far as radio telephony and radio concerts, etc., is concerned, is rather frail and spasmodic here. Of course, there are many radiophone sets in the United States now, and these are growing all the time, but there are very few big "stunts" that come to one's notice, as, for instance, the one of Madame Melba described above.

There is nothing that popularizes radio more than a concert by a famous singer, and it is to be hoped that our amateurs, as well as professionals, shall band together and try for some original ideas. We wish to suggest here only a few:

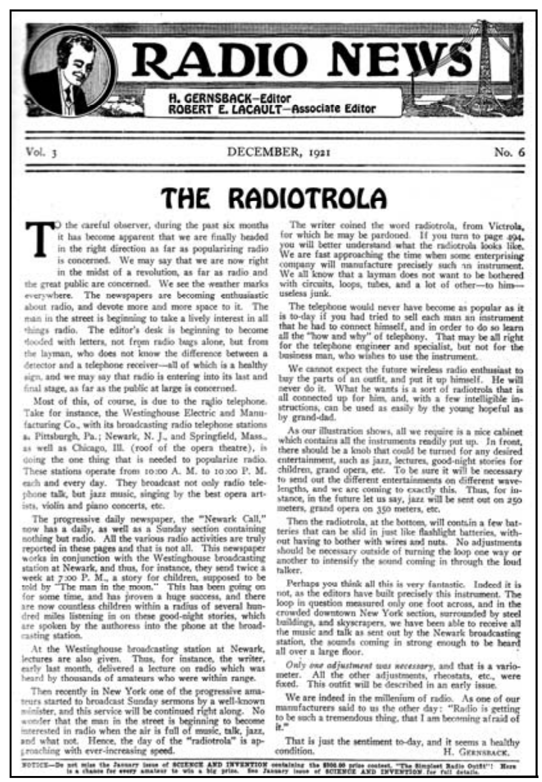
Why cannot someone go after the Presidential candidates and invite them to make a speech via radio thru a powerful telephone apparatus in the near future? With proper advertising and with the proper enterprise behind such a scheme, it certainly should not cost a great deal to do. The people of the United States, thru the amateurs, would get a chance to listen to the candidates in a very novel manner. Another idea, which, of course, is not new, would be to transmit band concerts from famous bandmasters broadcast. Such concerts could be sent from some of the big centers, such as New York, Chicago, or perhaps Atlantic City, or some other points where the bands are staying at the time.

Of course, there are countless schemes and ideas of a similar nature, all of which make it possible to popularize radio, and that is what we are after. Now, why don't we get together and do it?

H. GERNSBACK.

In the October, 1920 issue, there is an article featuring an idea that to the 21st Century reader/historian may seem like something it is not, and that is the idea of news by radio. Seeing the cover and title, "Reporting News by Radio," you immediately see the intrepid reporter on the scene, in this case a fire, and you can picture the home listener leaning into the radio as the story unfolds. Right? Wrong. The reporting of news is still 100% the domain of the print industry, and as the story reports, "We may thus conjure a newspaperman reporting a big fire, or a big flood, or a railroad wreck or any other dire calamities, by pressing a button in his pocket and talking through a small mouthpiece with his city editor downtown." This is not radio news as we know it, but it is a reporter using the radio to send content to a man with a typewriter who will write a story for a print "extra," and get it on the street hours later. We are still in the past, the known world, even as we contemplate the future of an unknown media format, broadcasting by radio. Also note another artifact of the past, the telephone microphone used by the reporter.

In January, 1921, *Radio News* begins a series of profiles of radio stations, and in this issue, the experimental but never commercially-licensed de Forest California Theatre station under 6XC. De Forest had been on the air since early 1920, at least six months before KDKA, which also started as the experimental station 8XK. Note that this issue features on its cover a photo of a young man operating a radio, "listening in" using headphones, while his mother who is knitting nearby seems not to pay attention. And at the bottom of the cover it still says "The 100% Wireless Magazine." This is Hugo Gernsback with one foot in the past while trying to predict a future for radio. By the October, 1921 issue he begins to put it all together in a cover story and editorial titled, "The Radiotrola," a possible marriage between the radio of amateur times past with the victrola now found in most homes. He writes: "To the careful observer, during the past six months is has become apparent that we are finally headed in the right direction as far as popularizing radio is concerned. We may say that we are right in the midst of a revolution, as far as radio and the great public are concerned." This is almost one year after the famous KDKA election broadcast on November, 1920. He now sees a revolution driven by music programming. Advertising in this issue features a two-tube radiola for $35 dollars, and a Radiola loudspeaker that is "clear as your headphones."



RADIO NEWS

H. GERNSBACK—Editor
ROBERT E. LACAULT—Associate Editor

Vol. 3 DECEMBER, 1921 No. 6

THE RADIOTROLA

TO the careful observer, during the past six months it has become apparent that we are finally headed in the right direction as far as popularizing radio is concerned. We may say that we are now right in the midst of a revolution, as far as radio and the great public are concerned. We see the weather marks everywhere. The newspapers are becoming enthusiastic about radio, and devote more and more space to it. The man in the street is beginning to take a lively interest in all things radio. The editor's desk is beginning to become flooded with letters, not from radio bugs alone, but from the layman, who does not know the difference between a detector and a telephone receiver—all of which is a healthy sign, and we may say that radio is entering into its last and final stage, as far as the public at large is concerned.

Most of this, of course, is due to the radio telephone. Take for instance, the Westinghouse Electric and Manufacturing Co., with its broadcasting radio telephone stations at Pittsburgh, Pa.; Newark, N. J., and Springfield, Mass., as well as Chicago, Ill. (roof of the opera theatre), is doing the one thing that is needed to popularize radio. These stations operate from 10:00 A. M. to 10:00 P. M. each and every day. They broadcast not only radio telephone talk, but jazz music, singing by the best opera artists, violin and piano concerts, etc.

The progressive daily newspaper, the "Newark Call," now has a daily, as well as a Sunday section containing nothing but radio. All the various radio activities are truly reported in these pages and that is not all. This newspaper works in conjunction with the Westinghouse broadcasting station at Newark, and thus, for instance, they send twice a week at 7:00 P. M., a story for children, supposed to be told by "The man in the moon." This has been going on for some time, and has proven a huge success, and there are now countless children within a radius of several hundred miles listening in on these good-night stories, which are spoken by the authoress into the phone at the broadcasting station.

At the Westinghouse broadcasting station at Newark, lectures are also given. Thus, for instance, the writer, early last month, delivered a lecture on radio which was heard by thousands of amateurs who were within range.

Then recently in New York one of the progressive amateurs started to broadcast Sunday sermons by a well-known minister, and this service will be continued right along. No wonder that the man in the street is beginning to become interested in radio when the air is full of music, talk, jazz, and what not. Hence, the day of the "radiotrola" is approaching with ever-increasing speed.

The writer coined the word radiotrola, from Victrola, for which he may be pardoned. If you turn to page 494, you will better understand what the radiotrola looks like. We are fast approaching the time when some enterprising company will manufacture precisely such an instrument. We all know that a layman does not want to be bothered with circuits, loops, tubes, and a lot of other—to him—useless junk.

The telephone would never have become as popular as it is to-day if you had tried to sell each man an instrument that he had to connect himself, and in order to do so learn all the "how and why" of telephony. That may be all right for the telephone engineer and specialist, but not for the business man, who wishes to use the instrument.

We cannot expect the future wireless radio enthusiast to buy the parts of an outfit, and put it up himself. He will never do it. What he wants is a sort of radiotrola that is all connected up for him, and, with a few intelligible instructions, can be used as easily by the young hopeful as by grand-dad.

As our illustration shows, all we require is a nice cabinet which contains all the instruments readily put up. In front, there should be a knob that could be turned for any desired entertainment, such as jazz, lectures, good-night stories for children, grand opera, etc. To be sure it will be necessary to send out the different entertainments on different wavelengths, and we are coming to exactly this. Thus, for instance, in the future let us say, jazz will be sent out on 250 meters, grand opera on 350 meters, etc.

Then the radiotrola, at the bottom, will contain a few batteries that can be slid in just like flashlight batteries, without having to bother with wires and nuts. No adjustments should be necessary outside of turning the loop one way or another to intensify the sound coming in through the loud talker.

Perhaps you think all this is very fantastic. Indeed it is not, as the editors have built precisely this instrument. The loop in question measured only one foot across, and in the crowded downtown New York section, surrounded by steel buildings, and skyscrapers, we have been able to receive all the music and talk as sent out by the Newark broadcasting station, the sounds coming in strong enough to be heard all over a large floor.

Only one adjustment was necessary, and that is a variometer. All the other adjustments, rheostats, etc., were fixed. This outfit will be described in an early issue.

We are indeed in the millenium of radio. As one of our manufacturers said to us the other day: "Radio is getting to be such a tremendous thing, that I am becoming afraid of it."

That is just the sentiment to-day, and it seems a healthy condition.
H. GERNSBACK.

NOTICE—Do not miss the January issue of SCIENCE AND INVENTION containing the $500.00 prize contest, "The Simplest Radio Outfit"! Here is a chance for every amateur to win a big prize. See January issue of SCIENCE AND INVENTION for full details.

Enabling a revolution in music

By 1922 the radio business and art was nearly fully formed, and these early years will become known as the "Boom Years" in radio and Gernsback is now exhorting radio manufacturers to quit making poor quality radios or risk a radio bust and loss of consumer trust and business. He is also suggesting that radios must become more consumer-friendly, a refrain heard about the personal computer: "Indeed, radio engineers, as well as the entire technical fraternity today, bend every effort towards simplifying every radio set to such an extent that it will come into the class of the phonograph or the automobile; that is, that the owner does not need to know anything of the radio whatsoever in order to operate his set." This is likely an industrial model that is followed today, culminating in the "smart phone" or tablet computer that anyone can operate without a knowledge of computers.


RADIO NEWS

H. GERNSBACK—Editor
ROBERT E. LACAULT—Associate Editor

Vol. 3 MARCH, 1922 No. 9

Boom Times in Radio

THE situation in radio for which every ardent well-wisher of the art has been longing, seems to have arrived at last.

Due to the activities of the various broadcasting stations throughout the country—there are now almost 80 such stations—the public, as we all know, has become an enthusiastic supporter of our great art.

But even the boldest prophet in radio, and the most ardent well wisher certainly never forcsaw any such condition as has existed for the past few months and exists right now. The only parallel to the radio business at the present time is the recent rush to the Texas oil fields, or the boom times of the motion picture industry some years ago.

When the entire country is in the throes of depression, and with nearly every other industry, that one can name, running part time or else is at an entire standstill, the radio business is the young giant, that will soon rival such great industries as the automobile business—and this is not an idle prophecy.

The entire radio industry was caught unprepared when the rush started last December. No one had foreseen such a thing, or thought such a condition could be possible. People stormed stores in their effort to buy radio apparatus, and anything from a ten dollar outfit to a two hundred dollar one, found, and is finding, sales, just as rapidly as the material can be delivered.

During a single week, the writer has had on his desk correspondence, circulars, special letters and telegrams which show that over five million dollars of new capital went into the radio business for the period of a single week. Every manufacturer is working at capacity day and night, trying to keep pace with the demand, and the more he turns out, the more he falls back. It makes no difference what he makes—whether it is a knob, a dial, a detector or one of the expensive outfits—all find ready sale and overtax the capacity of every maker.

The public seemingly does not care what it buys or what the price is, and, as in any boom, it may be imagined that prices on radio goods are by no means low. In other words, the manufacturers and dealers are exacting top price.

This condition is a natural one, when people are storming the stores and are lining up behind the showcases six deep, and very often breaking the showcases in the bargain.

All these are bare facts, but we are far from saying that such a condition is a healthy one. A situation of this kind is the worst that can be imagined, for many reasons. In the first place, it makes for loose manufacturing methods. Some of the manufacturers who have not been in the game very long do not care what sort of material they turn out. Inspection is apt to be lax, and many a layman who starts in the radio field to-day is disappointed, for the reason that he cannot get results. Such a man will give the entire radio business a black eye, and we would impress upon all manufacturers to rather curtail their sales and turn out workable instruments that will stand up, than make sales that will be a detriment to them later on.

The other dangerous condition that has sprung up lately is the ill-famed stock selling scheme. A manufacturer will get up a sample of a home radio outfit that looks like a Victrola, and run a full page advertisement of it in the daily papers. He has not a single outfit to sell, nor has he a plant in which to make them. Due to the boom conditions he will get many orders for future delivery, and he will show these orders to his victims as a proof that his venture is a tremendously profitable one. He will get out circulars and begin selling sock, as has been done in the past, to the detriment of the entire radio art.

When radio was young, several large concerns, as will be remembered, sold stock indiscriminately to the tune of many millions of dollars, out of which the public was defrauded. Due to this, the public for many years was wary of anything with the word "wireless" attached to it: as a result the entire radio business suffered proportionately. It is to be hoped that such business methods will be exposed as quickly as they spring up, as the radio business cannot now afford such dishonest methods.

The question which the writer is most often asked today is, how long will the boom last? When will the storm of prosperity blow over, leaving everyone prostrate with huge stocks on his hands?

It is our opinion that the present conditions will last for at least another year and that the radio business will be a very healthy one for several years to come. There will probably be the usual summer slack—although much less pronounced—and then a great rush for the fall and winter. The one thing regarding which we would caution dealers and jobbers is to be careful and not over-buy. Indications are that within the next six months there will be enough apparatus to go around. Tremendous efforts are being made by manufacturers to meet the situation, and with all the new capital being poured into the business, we estimate that within six months at the most the supply will exceed the demand. In other words, everyone, unless he buys carefully, will be overstocked, and the usual hardships will follow.

This not only holds true for the dealer who will find himself loaded with material on his shelves that he cannot move rapidly, but for the small manufacturer as well, who will have all his money tied up in merchandise for which the sale is not as brisk.

We will then witness the next cycle: price cutting, when real competition will begin in earnest. This condition, however, is at least six months distant, and perhaps a little further. It is due to come, however, at any time, for some of the supplies.

But as mentioned before, the radio business in general should be brisk for some time to come, and those who can read the future best, will no doubt reap the harvest.

H. GERNSBACK.


232 Radio News for August, 1922

Advertising by Radio, Can It and Should It Be Done?

By J. C. McQUISTON*

Advertising by Radio Cannot Be Done; It Would Ruin the Radio Business, for Nobody Would Stand for It. Mr. McQuiston in this Article, Explains Why.

THE full possibilities of the radiophone are not yet known. The popular reception given to it during the past year has been sufficient to stir the whole of our population. Radio now takes the place of both the weather and health as the chief subject of conversation. It is no wonder that just as soon as the public recognized the use of radio, advertisers gave consideration to this wonderful agency for spreading selling information. The experience that has been gained in the short time that the radiophone has been rendering service to the general public may even now give us a fair idea of some important limitations to this wonderful medium.

Whatever statements, however, that are now made are based wholly upon the possibilities of the present development of radio sending and receiving apparatus. Of course, what may follow no one can tell, but even with the present limitations the radiophone, as a means of broadcasting from a central point to great distances, will prove a wonderful benefit to mankind.

By way of preface, I wish to say that radio broadcasting will not, in my opinion, supplant, or interfere with newspapers as a medium of disseminating news, nor with concerts, churches, theatres or movies, as entertainment features.

On the contrary, it has been proved that the broadcasting of news bulletins by radio, and the publication of radio programs have increased materially the circulation of newspapers, I will risk the statement that since radio broadcasting was begun, the total circulation of all newspapers has been considerably enlarged, and I believe the publishing of radio broadcasting programs and other features pertaining to radio by the newspapers have been responsible in a very large measure for this increase.

Churches that have broadcasted their services have actually found that the attendance of services has increased rather than diminished; and although it is true that some few members of the church may prefer to hear the services while lying in bed, there are hundreds who never go to church and who, hearing the appeal of the pastors, are not satisfied to receive all their sermons by radio, but will respond to that natural desire to hear direct, and to see the speaker.

The same thing is true with reference to amusements. Certain amusement houses have had connection with our radio service for over a year and they are very glad, indeed, to continue the service because the bearing of artists by radio simply intensifies the desire to actually be present in the theater to witness the performance.

(Continued on page 332)

*Manager, Dept. of Publicity, Westinghouse Co.

So now that programming ideas have been considered, tried, rejected or accepted, and the evolution of the radio from wireless and hobby to a consumer must-have invention are nearly complete, there are other issues to be decided upon. In late 1922 Gernsback publishes this article by JC McQuiston, "Advertising by Radio, Can it and Should it be Done?" In this article, it is believed that advertising will ruin the radio business, and that ads will destroy the public service that radio can become. Reading this today, 90 years later, the conclusion is yes and yes. This is a question that is still being asked today about every new media – how will we pay for it? Radio then was like Facebook today, hugely popular but with underlying questions about viability. Like radio, Facebook for most is a "public service," and when using it on a computer the ads are not effective, while on an iPhone its ads are non-existent. Can this last? No. We all want jobs in the new economy.

By 1923, music has become the foundation of the new radio media, and just like we have witnessed throughout the years, the artists and publishers fight broadcasters for copyrights and fees. In one corner is radio, believing that if they play the recorded music the artists will sell many more records because of the exposure. In the other corner the artists who argue that if radio plays it for free, the public will not buy the records. Says Gernsback in his September, 1923 editorial, "Music vs. Radio," "The whole country has been watching with interest, and we believe with considerable annoyance as well, the fight between the music publishers and authors, conducted against radio broadcasting stations. The controversy in brief is that the music publishers and authors insist that the broadcasting stations pay them a royalty on their music compositions, and until this payment is forthcoming, they refuse to let the broadcasters use their music. They claim this right under copyright law." This issue was resolved then by a fee structure and recently re-litigated for streaming music via the Internet. This argument in 1923 indicates that radio had arrived, was popular, and like all media must pay its way to remain in the consumer's life.

RADIO NEWS

H. GERNSBACK—Editor and Publisher
ROBERT E. LACAULT—Associate Editor

EDITORIAL AND GENERAL OFFICES, 10 PARK PLACE, NEW YORK

Vol. 5 SEPTEMBER, 1923 No. 3

Music vs. Radio

THE whole country has been watching with interest, and we believe with considerable annoyance as well, the fight between the music publishers and authors, conducted against radio broadcasting stations. The controversy in brief is that the music publishers and authors insist that the broadcasting stations pay them a royalty on their musical compositions, and until this payment is forthcoming, they refuse to let the broadcasters use their music. They claim this right under the copyright law.

Technically the musical interests are, of course, right. We believe they have the power of stopping anyone from using their musical compositions if the broadcasters do not pay for the license.

But the stupidity and short-sightedness of these self same musical interests would be ludicrous if it were not so appalling.

These musical interests, when they get out a new piece, will not hesitate to resort to any means in order to bring it to the attention of the public. Thousands of copies of sheet music are sent out free, and common hand-organs are hired to drum the piece into our heads. Vaudeville and motion picture theaters are in some cases paid good money simply for playing the piece in order to popularize it. Many musical compositions as yet unknown are sandwiched in some musical comedy for the simple purpose of getting them before the public.

When it comes to the greatest advertising medium, radio broadcasting, music publishers hold up their hands in horror and say that we are ruining their trade because if everybody listens to a musical composition by radio, none will wish to buy the sheet music, piano rolls or phonograph records. How these facts rhyme together only the music trades can make out. No one else, unbiased, has as yet been able to understand the peculiar slant of mind of the people behind the movement.

The childish arguments that are used by some of the champions of the cause are often amusing; witness the following, which appeared in a recent issue of the *Music Trades*:

"I am opposed to the radio broadcasting of music, especially the popular variety, for the very good reason that the practice is inimical to the welfare of the record and roll trade and, by no means last, the talking machine and player industry. When radio fans in the larger cities can hear solid dance programs played by the foremost orchestras with a $5 outfit, it is only reasonable that they should ignore their player or talking machine, even if the rolls and records were supplied them gratis. Other forms of free public music are necessarily insignificant when compared with radio broadcasting."

This statement is made by none other than Mr. Arthur A. Friesteldt, President of the United States Music Company of Chicago.

Following along the same line of logic, if Mr. Friesteldt goes to see a musical comedy and hears a certain piece that he likes he will promptly forget all about it. Contrary to his argument, however, as he leaves the theater, he will buy a copy of the selection for himself or for his daughter. As a matter of fact that is just what happens. The piece that was broadcast from the theater has pleased him and he wishes to either play it himself or let a member of his family do so.

If proof is wanted we might cite the following:

"A typical example of the effect of radio broadcasting was furnished by the testimony volunteered at the first meeting of the National Association of Broadcasters when Mr. Wendell Hall, a song writer, made the declaration that 'Mellow Moon' which he had written, made no appreciable headway in the hands of a publisher who resorted to the usual avenues open to publishers for exploiting a new musical creation. There was practically no sale. Then Mr. Hall began singing 'Mellow Moon' at KYW and WDAP Broadcasting Stations. He stated that in the month of April the sale of 'Mellow Moon' jumped to 100,000."

We believe that the entire controversy now staged by the musical interests against the broadcasters is nothing but a hoax and is not being conducted in good faith for the following reasons: The musical interests realize that in Radio they have a tremendous advertising force that will popularize a given piece of music more rapidly than any agency ever did. They know that sooner or later the broadcasters will no longer advertise their music free, but in the near future will wish to be paid for the tremendous service they are now rendering music publishers.

Down in their hearts, the musical interests know this and wish to forestall this move by making a demand upon the broadcasters themselves. They figure that if they could secure an agreement for a number of years, a compromise might be reached whereby the broadcasters would continue to advertise their musical productions free. We hope that the broadcasters will see through this game and will not allow themselves to be ensnared into a long time contract to their detriment.

The value of indirect advertising through broadcasting is tremendous. When Grand Opera Houses and Musical Comedies are playing to empty houses, they often resort to broadcasting one or more acts of the production. The result is like magic. The writer has seen it happen time and again when for instance a Musical Comedy was broadcast from Broadway that the attendance rose to tremendous proportions during the next few days. This is not a vague general statement, but has been carefully checked up from actual observation and with talks among theatrical producers. And the time will come, as the writer has predicted before, when theatrical producers will pay broadcasting stations handsomely for broadcasting one or more acts of their productions, and that time is nearer than any of us realize. If broadcasting stations can fill otherwise empty houses they should and will be reimbursed for such services. This is legitimate and we believe fair.

H. GERNSBACK.

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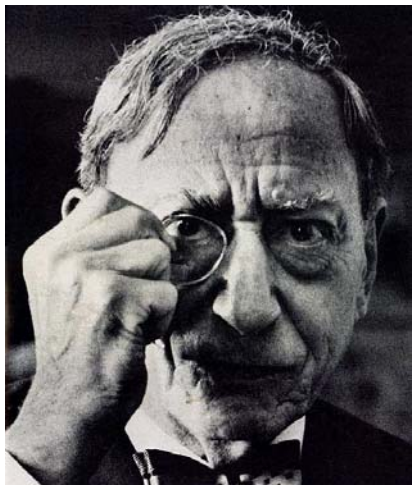
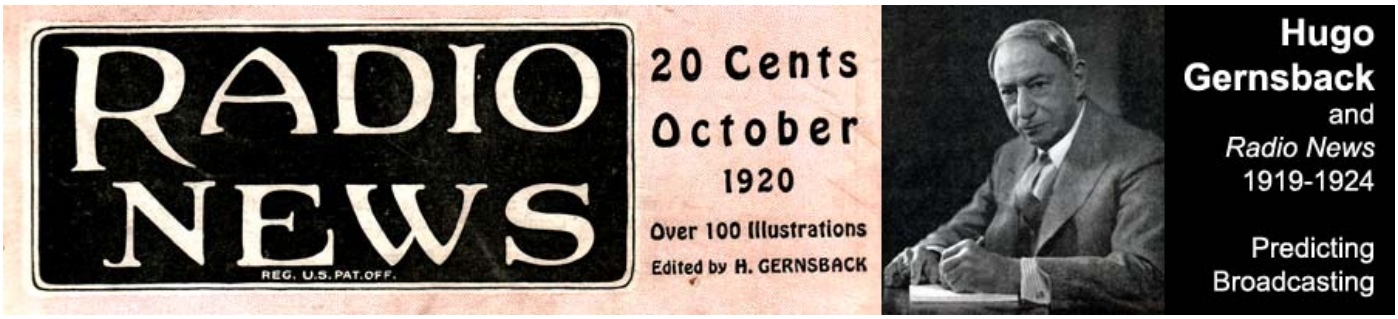


By 1924 Gernsback wrote that the radio boom was over. Radio was successful, and so was his most important publication, *Radio News*. He had brought his large audience of magazine readers the news and his opinions of what it will mean, beginning with his wireless publication in 1908, *Radio Amateur News* in 1919, and really devoting all his time to the prediction of what broadcasting by radio should and could do best. More than any writer of the era, Gernsback did predict and promote radio between 1919 and 1924, its most formative years. His influence was significant.



Mike Adams is the Board Chair of the California Historical Radio Society. As a member he has received the Herrold Award, and the title of "Fellow in History." He received the Houck Award from the Antique Wireless Association, and was recently inducted into the Bay Area Radio Hall of Fame. He is a long-time creator of television about the history of radio, the Emmy-nominated PBS series "Radio Collector," and "Broadcasting's Forgotten Father, the Charles Herrold Story." He is the author of five books including the recent biography, *Lee de Forest, King of Radio, Television, and Film.* Adams is a professor of radio, television, and film at San Jose State University where he is currently the Associate Dean of the College of Humanities and the Arts. His email is: mike.adams@sjsu.edu ◊

Fong Yee, an Early Wireless Expert from Oakland

By Bart Lee, K6VK, for the Cathay Amateur Radio Club and the California Historical Radio Society, Copyright Bart Lee, 2011, 2012, all rights reserved.

A century ago in Oakland, in the first decade of the 20th Century, lived a young man by the name of Fong Yee. He had migrated from China. In about 1910 he constructed and operated both a home wireless station (see photo) and a well - regarded portable radio station for field use. He also designed, built and flew one of the first aircraft on the West Coast (see figure 1). According to Internet sources including Wikipedia, after he brought his aircraft design to China, many Chinese, especially on the mainland, saw Fong Yee as "The Father of Chinese Aviation."

Just as the Wright Brothers and others perfected manned flight around the turn of the 19th Century, Marconi and others perfected the first wireless telegraphy apparatus in the early 1900s. Vacuum tubes, transistors and other key electronic components came much later, in some cases decades later. The first wireless transmitters sent Morse code signals. They did so by creating a high -voltage high -frequency AC spark across a gap, from an induction coil. This device is known as the spark gap transmitter. A short spark sent out a dit (dot), a long spark sent out a dah (dash), for the Morse code letters of the words in the message. The frequency at which the earliest systems would transmit could be affected by altering the length of the antenna, its height, and the amount of wire in the antenna. These big antennas often acted as "capacity hats" to permit the lead-in to radiate at a lower frequency. Soon inductance and capacitance circuits in the output determined the frequency. Then the length of the antenna was adjusted to the wavelength (frequency) of the output, for resonance and higher output. Generally lower frequencies required longer antennas. The ingenuity the pioneers of the early wireless radio communication allowed them to overcome the technological obstacles of the day and paved the way for our modern communications systems.

In the photograph of Fong Yee's wireless station (Figure 1), an induction coil with a spark gap on top of it is seen in the center top. Two leads go up to an antenna. The two cylinders below that are Leyden Jars, large capacitors used to build up the strength of the spark. By his right hand is a receiver, probably a crystal set with a galena or carborundum detector. He wears earphones to listen to the signals. To the right of the receiver is a large vertical tuning coil with two sliding taps to vary the inductance. This suggests low frequency operation. Generally these stations operated at one megahertz (1 MHz) or below, in the present AM broadcast band. The international marine distress frequency was 500 KHz. Fong Yee's station is compact and state of the art for the day.

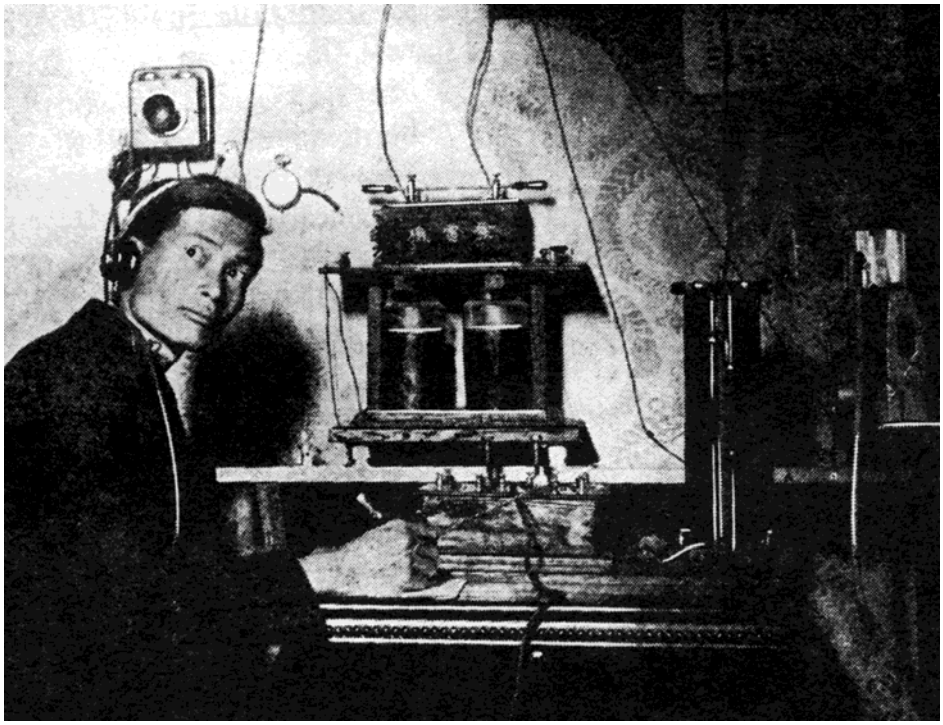


Figure 1 — Fong Yee at his wireless station (1911)

Fong Yee also built and improved a Curtis model biplane and taught himself how to fly it. He flew it in the East Bay. (Figure 2). On September 22, 1909, Fong Yee was the first Chinese man to fly in America and he made the news headlines of the day. He had constructed and improved upon the Wright's biplane and taught himself how to fly .

'Dragonwings' Takes Flight in Berkeley

Rep family play based on Chinese immigrant's attempt to fly homemade craft

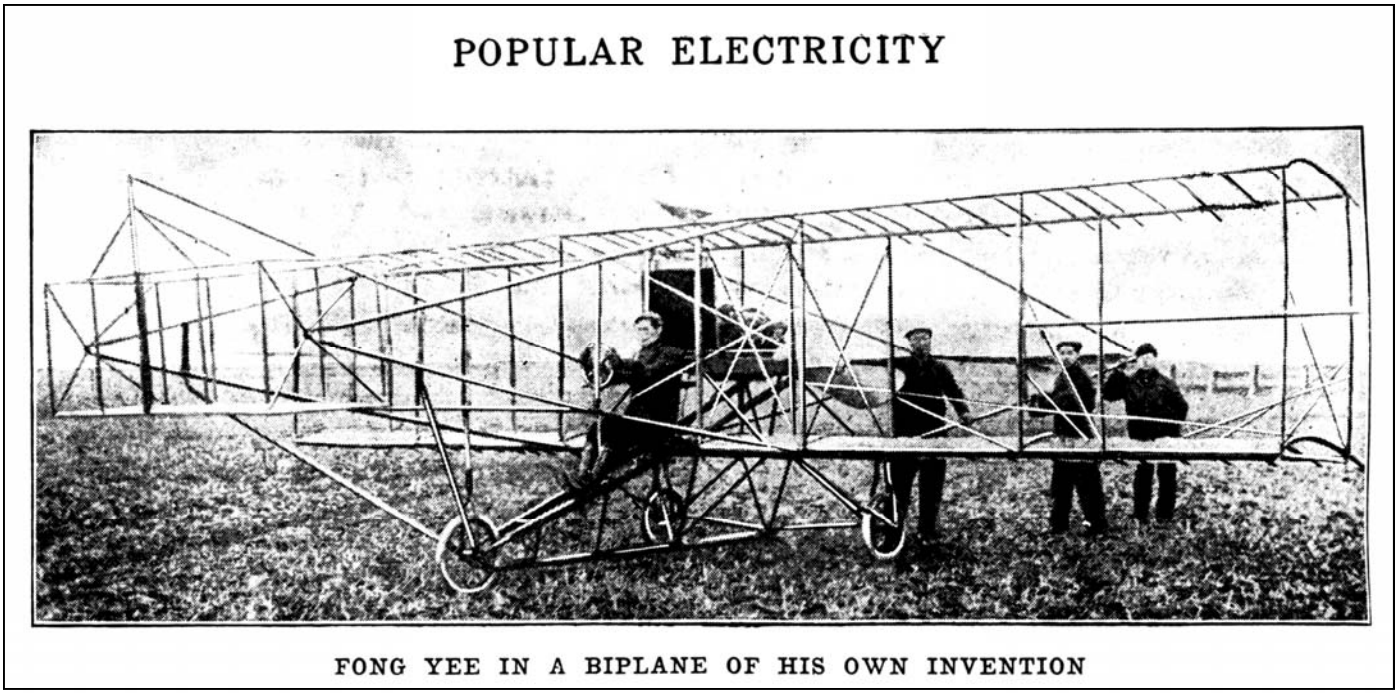


Figure 2 — Photo of Fong Yee in his "Dragonwings" biplane

Principals in China called him back to China in 1911 for technical guidance, at the time of the Sun Yat Sen revolution. See *Fong Yee, the Wireless Expert,* Popular Electricity (Vol. IV, No. 2), June 1911, reprinted as *High Power Wireless Equipment* (Lindsay Publications, Bradley, IL, 1988) at 94, from which the information about Fong Yee above derives.

Fong Yee's exploits gave rise to the legend of "Dragonwings" in the Bay Area Chinese community. To this day there are recollections in the Oakland Chinese community of an aviator and radioman of long ago, according to George Chong of the Cathay Amateur Radio Club. A local author wrote a book about him: Laurence Yep, *Dragonwings* (Harper Collins, New York, 1975) (Figure 3).

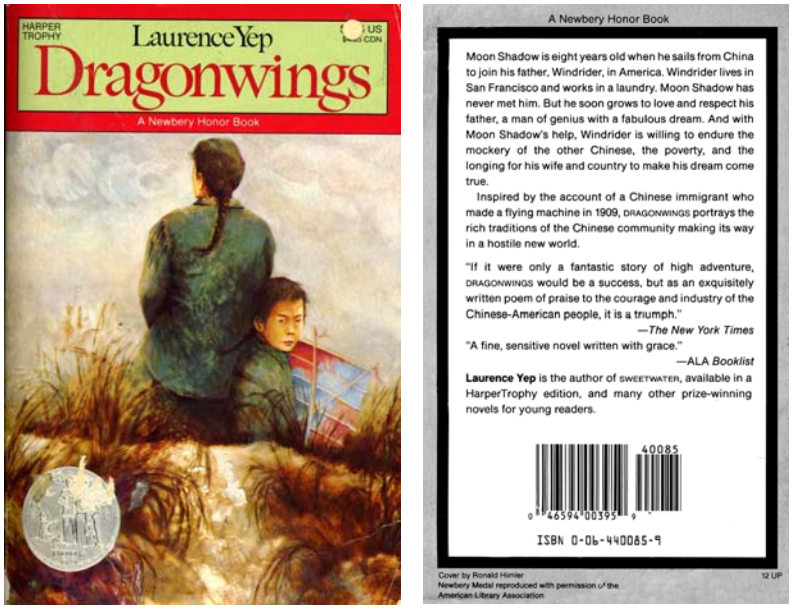


Figure 3 — Front and rear covers of the book "Dragonwings"

Mr. Yep also wrote a play of the same title. The Berkeley Repertory Theater performed it to good reviews in 1992. See figure 4 for a photo of the performance.

Figure 4 — Photo of the play (SF Chronicle, 1992)

Fong Yee's name in English is also reported on the Internet as Fong Joe Guey, Feng Ru, Fong Yue and variants. He died in a crash of his airplane in China in 1912 at the young age 29. In mainland China, Fong Yee is widely considered "The Father of Chinese Aviation." With regard to wireless, below is the text of the 1911 article in *Popular Electricity* cited above.

Fong Yee, Wireless Expert

An interesting sign of the times, connected with the awakening of China, especially in military matters, is the departure of Fong Yee, aviator and wireless expert, from San Francisco to Pekin.

Fong Yee has been summoned by the Imperial government to demonstrate his improved biplanes before the officers of the Chinese army, and his flying machine, which is said to be an improvement on the Curtis model, will probably be utilized in that country.

Fong Yee is also the discoverer of a wireless telegraph apparatus for field use, which is said to excel in compactness and efficiency. This instrument he perfected in his laboratory at Oakland, near San Francisco, where for the past three years he has labored incessantly and has aroused the wonders of many American experts who have seen his wireless apparatus in actions.

During the recent aviation tournaments in Los Angeles and San Francisco, Fong Yee was a contestant for honors and made some remarkable fights. Previously he had demonstrated his improved biplane in a number of successful cross-country trips from Oakland, where the machine was built.

Not long ago Fong Yee quite unexpectedly received an offer from the Chinese government to instruct army officers in the mysteries of aviation and wireless telegraphy. It is also believed that Prince Tsai Suin, head of the Celestial army, has made the young San Francisco inventor a flattering offer to remain in China, superintend the manufacture of the apparatus he has invented and restrict the secret of their construction to China. If the Fong Yee biplane and wireless apparatus are successfully demonstrated at a series of army maneuvers soon to be held near Pekin, Fong Yee's fortune is made and China may take a certain precedence in two important branches of military science.

Resources:

http://en.wikipedia.org/wiki/Fung_Joe_Guey

Bart Lee, Wireless Comes of Age on the West Coast, 24 Antique Wireless Association Review 241, 245ff (2011)

http://californiahistoricalradio.com/CHRSPix/BartWestCoastWirelessAsPublished.pdf

http://en.wikipedia.org/wiki/Spark-gap_transmitter

http://www.airspacemag.com/history-of-flight/The_Father_of_Chinese_Aviation.html

Thanks to Rodney Yee and George Chong of the Cathay Amateur Radio Club for editorial assistance. Correspondence is invited: KV6LEE@Gmail.com. 73 de Bart, K6VK .

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The Genius of the Lamp: Aladdin Radio's John Wentzel

By Bob Rydzewski

I can think of a lot of things radio collectors might request if magically granted three wishes. Some of them even involve radios. As for me, how about one or two of every De Forest, Adams Morgan, Scott, Zenith, McMurdo Silver, and Sparton radio model ever made, new-in-box, with the necessary museum and warehouse to store them in? While I don't seriously expect the three-wish scenario to ever happen in the real world, recently one thing I've wished for did come true, after a fashion. Reading through old issues of *Radio News* magazine, I'd wondered what it would be like to just hang around a radio repair shop sometime during the '30s, '40s, or '50s and watch the action: customers bringing in their ailing sets, servicemen going out to make calls, radios being diagnosed and fixed. The sweet smell of rosin core solder, the ca-ching of the cash register, and the chance to peer into a part of America that no longer exists. But there aren't any more radio repair shops. Or so I thought (and said online) until recently. "Shame on you!" a fellow Californian wrote to me on *Antique Radio Forum*, "There's one in your own back yard." And so there is. Tucked away in a relatively quiet corner of San Francisco's Sunset district, unmarked by neon signs or gaudy advertising, sits the storefront shop that is Aladdin Radio, still continuing today the mission it began in 1946, and with the same remarkable owner/proprietor.

John Wentzel doesn't look like someone who could have been in radio since the days when Marconi was alive. He couldn't exactly pass for a young man anymore, especially since back problems have recently made him rely on a cane or a walker sometimes, but you get the impression that the sparkle in his eye and the sharpness of his wit could match those of any 30-year old. Soft-spoken and modest, Mr. Wentzel speaks kindly of everyone and has neither an axe to grind nor a horn to toot; a gentleman through-and-through, and a resource for those who, like me, just love old radios and want to know what the business was like in yesteryear.

John Wentzel at his San Francisco shop — Aladdin Radio & TV

One foggy San Francisco morning he led me into his shop, which like many city storefronts, is narrow and long. Stepping in I was surrounded on both sides by radios, parts, and display cases. To the left was a beautiful 1939 Philco console, complete with Mystery Control tuning. (As he demonstrated later, it worked perfectly… click, click, click and the station changes, click, click again and the volume goes down. I'd never seen one in action before.) To the right was a down-on-its-heels set half the size of a refrigerator that said "Kaiser" on it. I'm not sure if it belonged to Kay, Henry, or Wilhelm, but it sure had seen better days. On one side an AMI jukebox protruded, still filled with 1940s pop 78s. Half veiled under some covers was what had to be a McMurdo Silver Masterpiece (and it was). "Midget" sets and clock radios decorated the shelves as far as the eye could see. Moving inward was like going back in time, past a hallway lined with Rider's and Sam's, file cabinets and thousands of tubes, with the ultimate destination being the brightly lit, part-overflowing repair bench at the back of the shop where incense-like plumes of solder smoke wafted toward the ceiling. These came from the iron of Steve Webster, who, like John is a long-time CHRS member and experienced radio repairman. Steve comes in to join in the fun and help out with repairs.

"What are you working on, Steve?" I asked. "Recapping an unidentified RCA," was his answer. The upside-down, grubby-looking chassis on the workbench wasn't too unlike what I see on my garage workbench at home. Maybe I can claim a little link with the past after all…

John, Steve, and I spoke over bear claws. We were joined by John's cat Lucy, the assistant in charge of set de-mousing. Although his shop now seems like a fixture in San Francisco, John didn't start out a San Franciscan. Instead he hails from Newton, Kansas. Like many youths in the late 1930's, he was attracted to the radio hobby and built his own 1- and 2-tube receivers, and like many of us, is grateful to that one special teacher, a junior college instructor who first taught him radio theory. Then the war came along, and that knowledge proved handy. "I got into the Army in '42, and went right into radio work without basic training or anything. I enlisted in Leavenworth, Kansas, and they sent us out here across the Bay."

From there he was shipped out to Muroc Field (now Edwards AFB) where he kept communications equipment, mostly Hammarlund SuperPros, running 24/7. And in his spare time he made a few extra bucks working on radios.

"We used to go into Los Angeles from the base during the war," he remembers. "We'd go into a radio shop and they'd pay us two bucks a radio to fix 'em. We'd fix about five, get ten bucks, and take off. They were so desperate for repairmen!" Radio repair shops were doing well in those days, and John took notice. Wartime shortages of parts were a big problem for the civilian market in those years, though. In spite of the gazillion JAN tubes you can still get today, those tubes were not then available outside the military. "They were all going to the Army and Navy, even stuff they didn't need. They [the repairmen] were stuck pretty bad. People were bootlegging tubes, asking $10 for a dollar tube." The demand, of course, was ultimately driven by the need to stay in touch with the latest news from Europe and the Pacific, where so many sons and daughters were serving their country.

In 1944 John was assigned to Germany, where the price of tubes was the least of anyone's concern. After his service there ended two years later, having not only survived the war but also having met his wife in the Army, he came back to San Francisco where he had relatives, intending to open a radio and TV repair shop. Aladdin Radio, at that time at a different address, was one of the shops that had started up during the war. Along with his wife and his sister Stella, John bought it in 1946. It was a good name — aside from the image of the magic lamp, it appeared first in the phone book. Commercial real estate prices in San Francisco weren't cheap even back then, but by 1950 the Wentzel clan had managed to buy the building at their current location on Irving Street.

Aladdin Radio & TV at 1609 Irving St.

The post-war boom in television made it a good time to be in the radio and TV repair business. "A small business could make it pretty good in those days. Early TVs required constant maintenance," John recalls. "People didn't know how to twist the knobs and all. And you had to put up antennas all over town. It was 10 or 15 years of fixing the old hand-wired TV sets. Then too, people kept their sets. If the picture tube would go bad, well, it was a $100 or $150 job. But they'd want to keep it and put in a new picture tube because they liked their sets." Of course, the possibility of TV service profits eventually made for a lot of competition. After a while, "the town was flooded with TV shops. I think there were about eight of them right here on Irving Street at one time." A photo in the shop window around this time shows a younger John at the wheel of the company van, a '54 Chevy, gassing up between service calls.

John in his 1954 Chevy service van

All this time, perched on a shelf right behind John was what I'd taken to be a radio with some kind of fancy display on it. But now he wheeled around and pointed it out as an example of the kind of TV set you could get back then, a 1948 Hallicrafters. John and Steve had it

hooked it up to a digital TV converter, plugged it in, turned it on, and fiddled with it. It took some time and effort to get going, but eventually produced both picture (a full 7 inches wide) and sound, and we were treated to a 2012 infomercial on a 64-year old piece of history.

The window display

The move to color sets beginning in the mid '50's was a boon to service work, and probably a pain to servicemen. "The suckers were temperamental. You had to converge them and all. If somebody put a magnet near the screen it'd screw it up and you'd have to go out and demagnetize it," he recalls. Sometimes color sets required a serviceman to install the picture tube, which was shipped separately to avoid a lot of broken necks. Reading about how color picture tubes were installed in an old magazine, this looks anything but easy. "Now, usually the wholesaler would assemble them, but once in a while someone would buy one unassembled for, you know, $50 or so off." This could seem like a good deal until the customer realized that there was no way he could install it himself, and it would cost him more than $50 to get a serviceman to do it.

But John's interest, and most of his early (and current) business was in radios. Asked which brands or models he tended to get in for repairs, his reply was, "Everything! I haven't seen 2 sets alike yet," he joked. "But around San Francisco you'd get a lot of Remlers in because they were made here." He still has an interest in these, with a couple around the shop and a sign saying he'd pay cash for a "Scottie." "You'd also get all that LA stuff coming up here – Jackson Bells, Packard Bells, you name it… A lot of them were made without a license, you know. They sold a lot of that kind of stuff, especially around the war time. You could sell anything that would play. But as far as what brands came through here, I'd say everything from A to Z."

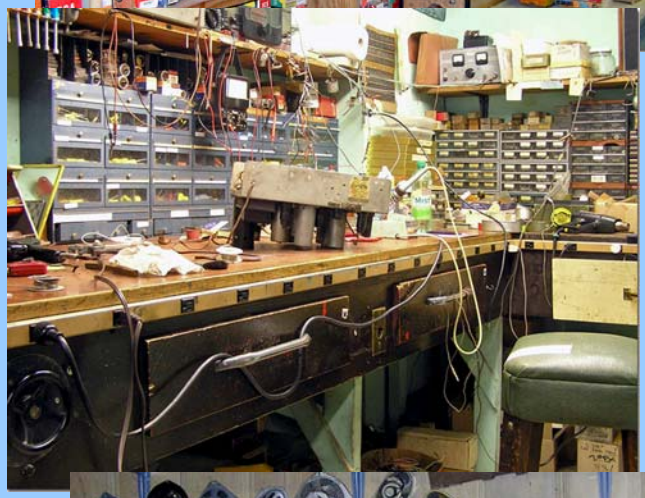
He has a special interest in Remlers

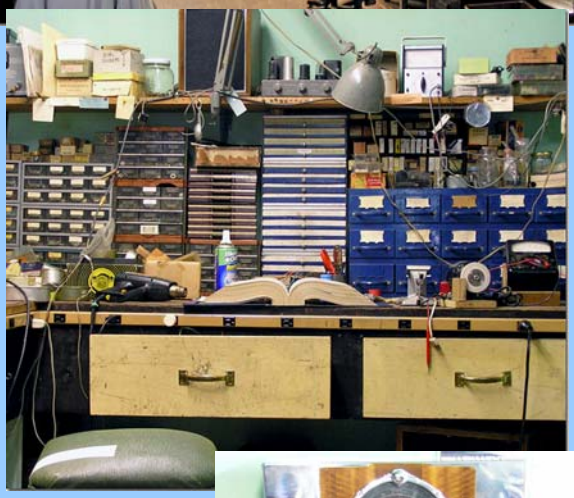
I asked him if he also sold radios back in the '40s. "After the war ended," he said, "you couldn't get a franchise with RCA or Philco or Zenith because guys already had gotten them. You'd be stuck with Arvin or Clarion or something. So I didn't really concentrate on sales. We made more money fixing 'em. The shop was 90% service and 10% sales." Advertising was mostly word-of-mouth. "My jobs came mostly from recommendations from other customers." This being the case, he had no need to resort to the methods used by some repair shops. "There was a place in Oakland that advertised with cards saying they'd give you $100 if they couldn't repair your radio. Of course, they'd just replace everything–I don't think anyone ever stuck 'em for the hundred, but it was a good come-on."


Antique radio display

There was one type of radio repair John did back then and still does occasionally today that speaks to a part of US history. "During the war–of course, Pearl Harbor was bombed by Japan and there was an off-shore incident around here. They rounded up most of the Japanese in America and interned them in camps. A lot of them had bought good radios. Now, they could take those radios with them to the camps, but they were not allowed to listen to shortwave." The US government, of course, feared that there might be Japanese agents taking orders from Tokyo via HF, and was probably not enamored of the idea of Japanese Americans listening to Japanese war propaganda. "So you'd disable the shortwave reception on their sets."

Images around his shop





The way this was done varied, but it was generally quick and dirty. Rather than actually remove coils, they were shorted out, wires were disconnected, or the set was made inoperative in some other way. "I've had some where they soldered the band switch in the broadcast position. That was pretty common." But weren't these things all easily reversible? "Oh sure. It was a real government job," he said with a smile. Even today a set modified in this way finds its way into John's shop. "After all these years you still catch one now and then. Not as often though. After the war there were more of them around. But once in a while one pops up." Collectors take note! You may have to decide between a working shortwave band and a set that tells a story through its silence.

As the post-war years drifted into the '50s, TVs and not radios became the way to stay in business, and as black-and-white gave way to color and vacuum tubes gave way to transistors in the '60s, sets became more difficult to fix, and the amount that customers were willing to pay for service began to drop. "Most of the solid state stuff was throw-away," John explained. "That's why I went back to doing antique radios in the mid '70s. There was much more work to do. And people appreciated it too. They'd bring in a set and say 'This was my grandfather's radio' or 'This was my dad's radio'. They didn't mind spending money to get them restored–they wanted to keep it." And in contrast to the early years when sets brought to Aladdin Radio generally needed one or two parts replaced, these days the sets he restored are full of leaky capacitors. "If people want their sets fixed now I replace all the caps. You can't trust those old capacitors."

John's experience with antique radios brought him into contact with CHRS early on. Steve Webster recalled being at the very first CHRS meeting, back in the '70s at a county park in San Jose. Both John and Steve recalled something that's surprising to me, an antique radio aficionado only for about the last 8 years. "Back then," recalls Steve, "unless it was a *really* antique radio, sets sold for a dollar a tube. You'd look at a 9-tube set and the seller would say, 'Well, let's make it 10 bucks'. That's the way it was. If they were really old radios–from the '20s–then they were more, but the stuff from the '30s and '40s…"

"They were considered junk," John says. "Most of the action was for old stuff–battery sets. If you took stuff from the '30s and '40s you couldn't even get rid of it. And now everyone wants 'em. The action is in, what, shutter-dial Zeniths? Back then everyone was collecting Federals and Freshman Masterpieces." The demand was driven by older collectors still around in the '70s who remembered the earlier sets from their youth. Today most of that generation is gone, and older collectors hearken back only to the '30s and '40s. Collectors who went into the hobby with the thought of eventually making money from it would be wise to think about this.

To those of us who just like old radios, of course, it's just something to keep in mind the next time we're tempted to buy an expensive set. Like most of today's Aladdin Radio customers, many of us are in the hobby because those old magic speaking boxes carry something more important than price tags. They stand as witnesses to times past as well as technology, design, and life long ago. John and his shop are a rare and welcome link to those in a world that's moved far beyond vacuum tube technology but has never figured out how to move beyond war, global or personal troubles.

There are few places like Aladdin Radio left, a fact that troubles John too. "I get all these calls and I don't know where to send people anymore. They (other repair shops) have all quit. Me? I'm just doing it because I don't want to sit around and watch TV and listen to the radio all day." Which might be a bit ironic considering just how many of them he has around him to watch and listen to. Having recently celebrated his 90th birthday, we can only hope that he'll keep going (and keep the solder flowing) for many more.

Before I reluctantly left his shop I asked whether, taking the long view at this point, John found radio repair to be the right career for him. "There wasn't a day in my life I didn't want to go to work." And how many of us can say that? ◊

The World of Early Television Receivers

By T. R. Albrecht

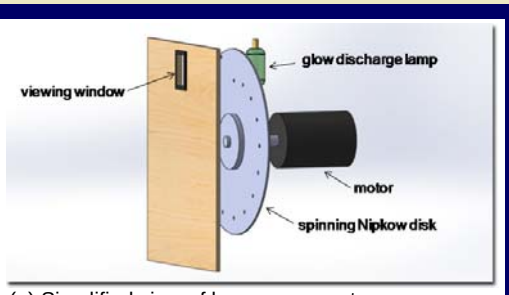
If you are like many readers of this journal, you are already familiar with the great diversity of early radio receivers and what makes them both technically and aesthetically interesting. Rapid technical progress resulted in radical changes in performance and appearance. First came crystal sets with "cat's whiskers" and headphones. Next came multi-dial tuned-radio-frequency (TRF) sets with their variety of designs – from Atwater Kent breadboards to various "coffins" and other types of boxes, some with built-in speakers, but most with external speakers which were often fascinating horn-type speakers. The 1930s brought the triumph of a circuit design that would remain with us until today – the superheterodyne receiver. Cabinet designs became creative with wonderful cathedrals, tombstones, and stately consoles – virtually all with built in speakers. After WWII a particularly simple form of the superheterodyne receiver took a huge share of the total market – the five tube "All American Five." Wealthier customers began to turn their attention to "hi fi" sets. Frequency modulation (FM) and stereophonic broadcasts came along in the postwar years as well.

A Mechanical Wonder

The world of early television receivers shows exactly the same kind of rapid technical and aesthetic design changes. Just as many radio collectors can't afford a genuine early crystal set, the TV analog is even more rare — the spinning Nipkow disk TV named after its German inventor Paul Nipkow. As we sit back and watch our flat screen HDTVs today, it's hard to imagine that the first TVs in the 1920s were as much mechanical devices as electronic. Figure 1 shows how these early contraptions functioned. A glow discharge lamp was driven by a video signal, really nothing more than a very special audio signal, from a modified radio receiver. The intensity of the light output from the lamp modulated up and down with the video signal. Between the lamp and the viewer was a rapidly spinning disk with a series of holes in a spiral pattern (Figure 1b) . The holes were arranged such that only one hole was in the viewing frame at a time and, as the hole traveled from left to right in an arc across the viewing window, light from the lamp appeared as a moving spot of light. As one hole moved out of the viewing frame on the right, the next hole would enter on the left slightly lower down the image because of the spiral pattern of holes on the disk. In one complete revolution many such holes resulted in moving spots of light that trace out a slightly arc-shaped "raster" – not so different than the moving spot of light that would appear on cathode ray tubes a few years later.

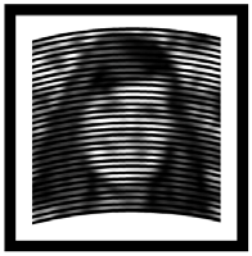
Nipkow disk TVs didn't have very many scan lines (more scan lines require an ever larger disk with more holes). A simulated image is shown in Figure 1c. By modulating the brightness of the lamp (and therefore the moving spot of light in the viewing window) in a properly synchronized fashion, the individual scan lines form a complete picture. If everything is done quickly enough, a flicker-free continuously moving image is visible. Not much to look at today, but quite an enchanting novelty in its day!

Figure 1 — Nipkow spinning-disk television from the 1920s



(a) Simplified view of key components

(b) Spiral pattern of holes in the Nipkow disk.



(c) Simulated image. The raster image is composed of a relatively small number of arc-shaped scan lines.

All-Electronic TV

By the late 1930s, the spinning disk was obsolete, replaced by all-electronic TVs with cathode ray tubes (CRTs). The spinning disk was not completely dead, however; it would make a brief comeback as a spinning color wheel on some prototype color TVs in the early 1950s.

If you collect radios from the late 1930s and early 1940s, you have no doubt come across various buttons, sockets, switch positions, and labels declaring that a radio was "Ready for Television." The idea was that a TV would be an attachment to a radio, using the radio for audio and a separate TV apparatus for displaying the picture. Although some prewar sets were indeed offered to function that way, the idea never really caught on and all-in-one TV receivers with audio became the norm.

For the most part prewar TVs like the earlier Nipkow disk TVs are too rare and expensive for most collectors today. By the early 1940s manufactures were ready to produce large volumes of sets for the public but war intervened and delayed the real launch of TV for most people until the late 1940s. This article will focus on TVs from the early postwar years to around 1960.

Early CRT Limitations Spawn a Variety of Designs

The most noticeable thing about 1940s TVs is that they are all unique designs – no design had become dominant. From the tiny $99 Pilot "Candid TV" (model TV-37, Figure 2) with its 3-inch CRT, to the $2495 — a lot of money in 1947! behemoth DuMont Westminster (model RA-101, Figure 3), with its huge 20-inch CRT, to the Philco 48-2500 projection set (Figure 4) with its tilt-up screen in the lid – these are sets that occupy very different regimes of technical and aesthetic design. They all have one thing in common, however – they all relied on primitive CRT technology that prevented making what we would consider a "normal" CRT set in the early years. Some sets, like the Pilot TV-37, used what was basically an oscilloscope CRT (type 3KP4). Scope tubes use electrostatic deflection of the electron beam to scan the raster to form an image. A pair of horizontal plates and a pair of vertical plates inside the neck of the CRT (Figure 5) are used for deflection. High scanning voltages applied to these plates deflect the beam, but not very much. Because the deflection is inefficient, the neck of the tube has to be long to generate even a 3-inch picture.

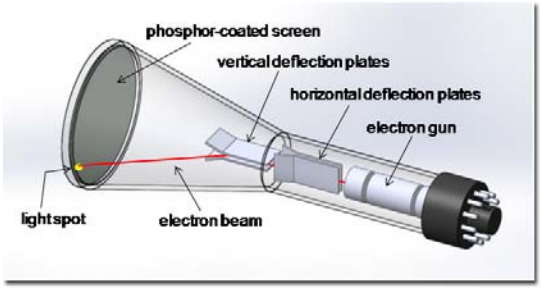
Figure 2 — Pilot TV-37 "Candid TV." Its 3-inch screen made this the smallest TV of its time, with a price to match – only $99 in 1947. The Pilot's chassis is no larger than a typical radio. Note the long slender 3KP4 electrostatically deflected CRT.

Figure 3 — DuMont RA-101 "Westminster" TV/radio/phonograph – an early form of an "entertainment center" in an enormous, yet stately cabinet. With the cabinet closed, the CRT faces upward inside the cabinet. Triggered by mercury switches in the doors, a motorized mechanism tilts the CRT into a horizontal position for viewing. To the left of the CRT (not visible) is a phonograph.

Figure 4 — Philco 48-2500 front projection set. Cabinet with lid open reveals projection screen on inside of lid. The far-right shows an actual picture produced by this set.

7-inch sets using the 7JP4 electrostatically deflected CRT were probably the most common sets in the early years. Examples include the Hallicrafters 505 (Figure 6), the Motorola VT-71 (Figure 7) and the Sentinel 400TV (Figure 8). These were all affordable sets that fit within the budgets of many first-time buyers in 1947 and 48. Note the different approaches to cabinet designs – Motorola's "radio like" design contrasts with Hallicrafters' "industrial instrument" design (the related model T-54 had a metal cabinet with an even more "industrial" look) and Sentinel's upright "suitcase" or "oscilloscope-like" design.

Figure 5 — Diagram of an electrostatically deflected CRT as used in oscilloscopes and some early TVs (see Figure 2 for a picture of a similar tube mounted in the Pilot chassis). The electron beam passes between two pairs of plates with scanning voltages applied to them. The electric field between the plates deflects the electron beam vertically and horizontally, to permit a raster scan.



The other extreme is represented by the DuMont in Figure 3. It uses a 20-inch CRT with more modern magnetic deflection. However, early magnetically deflected CRTs also had a fairly small deflection angle, and therefore required a very long distance between the electron gun and the screen to generate a big image. With the industry's largest and longest CRT (see Figure 9), cabinet design required extreme creativity. DuMont decided that mounting the CRT in a fixed, direct-view horizontal orientation would make the cabinet too big (i.e., deep) and ugly to go into the homes of the very wealthy customers who bought this set. Their solution was a tilt-out CRT, stored vertically inside the cabinet when not in use, and tilted to a horizontal viewing position by a motorized mechanism for viewing (Figure 3).

Late 1940s televisions using 7JP4 electrostatically deflected CRT picture tubes.

Figure 6 — Hallicrafters 505 TV. This set uses a 7JP4 CRT. The channel selector consists of a row of 13 buttons plus a 14th which is for fine tuning.

Figure 7 — Motorola VT-71. This was a very popular low-priced set using a 7JP4 CRT. It also came in a more common mahogany cabinet.

Figure 8 — Sentinel 400TV. Another inexpensive set from 1948 using a 7JP4 CRT. The upright "suitcase" design of this set is somewhat reminiscent of an oscilloscope design.

Figure 9 — (a) The largest CRT in 1948 was a 20BP4 as used in the DuMont RA-101 Westminster. Its Pyrex envelope is huge compared to the slightly newer 19DP4 (b), which is still a very long tube with a low deflection angle. The large envelope of the 20BP4 motivated DuMont to implement the unusual cabinet and tilting mechanism shown in Figure 3.

Other manufacturers solved this problem with a mirror-in-lid design. Opening a lid on the top of the set revealed a tilted mirror that relayed the image from an upward-facing CRT to viewers on a strategically placed couch.

Large CRTs were very expensive in the early years, so another popular solution was the projection TV – a concept that would appear only briefly in the late 1940s, but then come back again many years later in the 1980s, 90s, and early 2000s. Both front and rear projection designs were used. One example is the Philco 48-2500 in Figure 4. Its 4-inch TP-400 CRT faces downward at an angle toward the rear of the set. A spherical mirror and lens project a much larger image onto a screen on the inside of the lid via another flat mirror on the inside front of the cabinet. This "modified Schmidt optics" design is shown schematically in Figure 10.

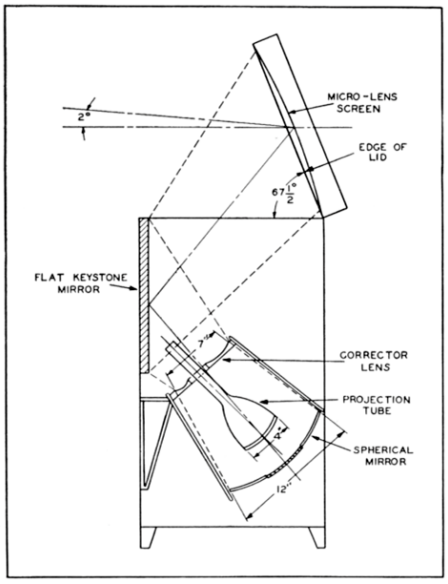


Figure 10 — Modified Schmidt optical system used in the Philco 48-2500 front projection set. (Source: Philco service manual).

Different Types of Tuners

One of the first sets on the market after WWII was the RCA 621TS (Figure 11). Unlike all of the sets discussed above, with their "quirky" designs (at least when viewed in hindsight), the 621TS had most elements of what would become the dominant design in the 1950s. Although the screen was small (at 7 inches) and the cabinet had a prewar design flavor, it was the technology *inside* this receiver that made it a bit more modern. A look at several technical aspects of the set reveals what these "modern" design directions were.

Figure 11 — The RCA 621TS is often cited as the first set on the market after WWII. Although it came to market sooner than the other sets pictured in this article, its design was more modern than most with many of its technical elements become standard in the industry in the coming years. However, the cabinet design is decidedly old-fashioned with what is thought to be a pre-war design by John Vassos, an accomplished American industrial designer.

The first modern design element is the tuner. The 621TS has a "click-click" rotary tuner with a separate position for each channel available at the time (which included Channel 1, seen only on the earliest sets after WWII). A rotary switch mechanism selects a unique set of coils for tuning each channel. A concentric knob provides fine tuning on each channel. Other early sets chose designs that didn't survive the test of time. The Pilot and DuMont have continuous tuners

which tuned a single continuous scale like a radio. The DuMont has a fabulous continuous tuning system that makes this set very special – a motorized tuner with a scale that wraps around on itself (see Figure 12). The pointer starts in the lower right with Channel 1 (around 50 MHz, part of the VHF low band), and travels left through Channels 2, 3, and 4. At the left end, the pointer turns upward and now travels to the right to reach Channels 5 and 6 (the highest channel in the VHF low band), the FM broadcast band (88-108 MHz), various commercial government, and amateur radio bands, and finally onward to the VHF high band (Channels 7 through 13) in the upper right part of the dial. The internal design of this tuner is also unique – it's a Mallory "Inductuner" using three variable roller inductors for tuning.

Figure 12 — The very unusual tuning dial of the DuMont RA-101 Westminster has a "wraparound" slide rule dial. The low frequency end of the dial begins with the VHF Low band in the lower right (marked with a red target for Channel 1). The pointer is currently set on Channel 2. From there is travels to the left to Channels 3 and 4, and then turns upward and moves to the right along the upper scale, which includes Channels 5 and 6, the FM radio band, an aviation band, and Channels 7-13 in the VHF High band. The right knob moves slowly along the dial for manual fine tuning, and the left knob activates a motor which rapidly moves along the dial.

Other early sets had switch type tuners, but with a limited number of positions. For example, the Motorola VT-71 (Figure 7) and Philco 48-2500 (Figure 4) have 8 selectable channels out of the 13 available at the time. The Hallicrafters 505 (Figure 6) has a row of 14 buttons (13 for Channels 1-13 with the last being a fine tuning knob). The Sentinel 400TV (Figure 8) has a 12-position (Channel 1 was gone by the time it came out) rotary switch tuner, but lacks a front panel fine tuning control, a big design mistake since early TVs drift and need fine tuning!

High Voltage Supplies

Another "modern" feature of the RCA 621TS isn't visible except inside. The RCA uses a flyback transformer to generate both the high voltage for the CRT anode and the horizontal scanning signal for its magnetic deflection yoke. RCA engineers recognized quite early that this concept would be a winner from a cost point of view – a single component does the work of two relatively expensive systems. An alternative is the RF step-up transformers. Like flyback transformers, RF high voltage transformers are designed to generate only the very small current needed for a CRT (around 1 mA), and not enough to be lethal in case of accidental contact. Figure 13 shows what the two types of transformers look like inside the set. A third alternative found in other early sets included high voltage windings on a 60 Hz power transformer like that used in the early version of the DuMont RA-101 Westminster, but was quickly abandoned since it was a very dangerous design from a potential electrocution standpoint.

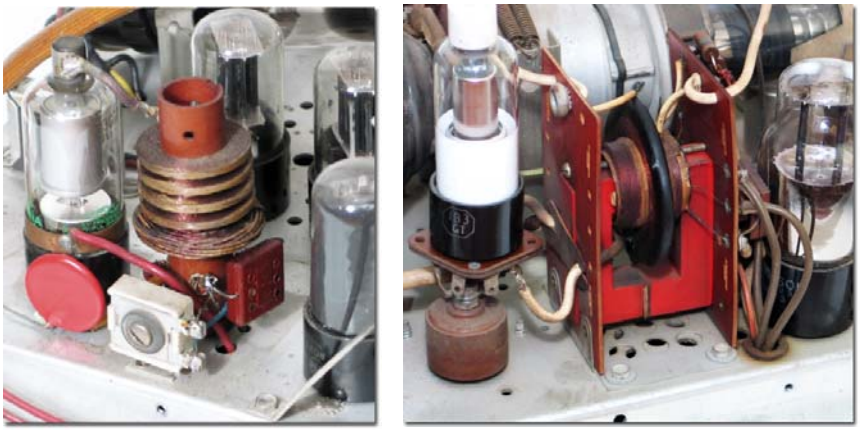


Figure 13 — Two approaches for generating high voltage for the CRT anode: (a) an RF transformer (left photo) and (b) a flyback transformer (right photo).

Cabinets and CRT Masks

By around 1949, electronic designs were beginning to converge. Direct-view 10-inch CRTs (type 10BP4) far outsold everything else. Flyback transformers and 12-position rotary tuners with fine tuning became fairly standard. Cabinet designs, however, still showed some wonderful creativity. Two notable Bakelite cabinet designs are the GE 805 "Locomotive" (Figure 14) and the Admiral 24A12 Bakelite console (Figure 15). Both are very popular with collectors today because of their unusual and attractive designs. Admiral's Bakelite TV console cabinets which included sets with CRTs up to 20 inches in the early 1950s were notable as being the largest Bakelite objects ever produced.

Figure 14 — General Electric 805 "Locomotive" with its distinctively shaped.

Figure 15 — Admiral 24A12 Bakelite console. This compact console with a 10-inch screen is quite popular with collectors.

The Admiral and GE reveal another set of important design distinctions in early TVs – the different styles of CRT mask. Early CRTs had round screens because they were easier to manufacture. Most of the earliest sets masked off the top, bottom, and sides of the face, leaving a rectangular opening through which to view the rectangular broadcast TV image. A larger viewing image, however, was quickly found to be a popular selling point with customers. Use of a "Double-D" mask design, which clipped off only the very top and bottom of the round CRT face, leaving the full width with rounded sides, allowed a larger image on the same size CRT. Manufacturers quickly discovered that many customers didn't care if the rounded edges resulted in part of the broadcast image not being viewable. Broadcasters in turn made sure that nothing vital was shown in the image corners, so they could be sacrificed. Some manufacturers such as Zenith and Raytheon took this concept to the extreme producing "porthole" sets with round images using the full face of the round CRT. Somewhat surprisingly, such sets sold reasonably well even though a round screen is a poor format on which to display a rectangular picture. Many porthole sets had switches the customer could set to magnify the image to fill the whole screen but leave the sides unviewable, or reduce the magnification leaving a black strip at the top and bottom of the round screen. Some sets even stretched the picture vertically, so the picture would fill the full height, but not extend beyond the width. These sets were advertised to the public as offering "magnified" viewing at the flick of a switch – a concept which perhaps seemed attractive to the first-time buyer, but quickly became evident as less than useful.

Better CRTs

Several CRT improvements occurred in the late 1940s. Early CRTs used magnetic "ion trap" structures attached to the neck of the tube to block the path of screen-damaging ions while allowing the electron beam to pass through. The adoption of "aluminized" screens which has a very thin coating of aluminum metal on the screen along with the light-emitting phosphors, eliminated ion damage and the need for ion traps. Aluminized screens are also strikingly brighter since the aluminum coating reflects nearly all the light generated by the phosphors forward toward the viewer instead of allowing some of the light to shine uselessly toward the inside of the CRT. Aluminized screens made viewing a TV in a normally lighted room practical. Earlier CRTs without aluminization were best viewed with curtains drawn and lights low.

Another innovation that further improved viewability in a lighted room is the very simple concept of a tinted glass face on the CRT. The tinting improves viewing contrast markedly by darkening the black level of the image. Reflected interfering light from the room had to travel through the tinted glass twice, once going to the phosphor, then again reflected and scattered back toward the viewer; while light produced from the TV only made one trip from the phosphor through the glass to the viewer. Thus the impact on the viewable picture by the ambient room light was diminished. Although the whole picture was less bright the contrast was improved particularly in the presence of ambient light. Sets with tinted glass CRTs are easily recognizable simply by noting the color of the screen when the set is off. Early sets have a very light green – almost white – screen, while later sets with tinted glass have dark green, gray, or blue screens (an example is the 1958 RCA portable in Figure 16).

Figure 16 — RCA 14PD9030 portable from 1958. In addition to its distinctive styling somewhat reminiscent of 1950s automotive design, this set has a CRT with a tinted glass screen for higher contrast in a high level of ambient lighting.

The Economic Shakeout and its Design Consequences

Figure 17 — Phlico Predicta "Holiday" with its iconic swivel-mounted CRT.

By the late 1950s, the black and white TV market was very competitive and many of the early manufacturers had left the business including DuMont, Sentinel, Pilot, and Hallicrafters. Philco was having trouble staying competitive with RCA and tried some daring designs to attract customers. One example is the "Predicta" line of sets from 1958-60 with their unusual cabinets with swiveling CRTs (Figure 17). Other models in the Predicta line had fully detachable CRTs on long cables possibly inspired by Philco's success with "chairside" radios with remote speakers a few decades earlier. The Predicta line for all its aesthetic design originality had a glaring technical problem. To fit the intended cabinet design Philco needed a CRT with a very high deflection angle and a very short neck. The engineers delivered on size and shape but failed to deliver on reliability and longevity. Predicta's wide-deflection CRTs had a very short life and the damage to the company's reputation probably played a significant role in Philco's demise as a standalone company. Philco was acquired by Ford in the early 1960s.

Another wonderfully original Philco TV design is the portable "Safari" set (Figure 18). It was the first truly portable TV which operated from a battery and used a nearly 100% solid state design. The only tubes are two subminiature high voltage rectifier tubes and its 2-inch CRT. The CRT is upward firing with a tilted mirror and magnifying lens under the flip-up hood, a bit like the very early mirror-in-lid sets from the 1940s. Clearly Philco thought a vertically-oriented cabinet would be more attractive than a deep horizontally-oriented cabinet. As other portable sets came on the market in the following years very few copied Philco's design except for a few Japanese "Micro" TVs in the 1980s. As a unique bit of design history and as the first TV with nearly all-transistor circuitry the Safari marked an important milestone in TV history. However, sales and profits were disappointing making the Safari another factor in Philco's demise.

There were many other circuitry innovations in the early years of TVs. Exploring how circuitry developed over the years, along with appreciation of the wide variety of early cabinet designs makes the world of early TVs a very interesting one. The next evolution was the introduction of color TV in 1954 and its slow adoption over the next two decades, another fascinating story that we will save for another time.

Figure 18 — Philco “Safari” portable transistorized TV.

(a) Hood closed (left photo).

(b) Hood open for viewing (center).

(c) Actual picture produced by this set (right photo).

Restoration Tips

So you’re intrigued enough to look for an early TV to restore. You’re comfortable with electronic restoration of radios but not sure about whether you can take on a TV. Indeed, the circuitry and functionality of TVs are more complex than radios. But just as tens of thousands of “radio guys” (not all of whom were geniuses) in the late 1940s learned to become TV repairmen, you can too.

First and foremost in choosing a TV and planning its restoration is to understand the condition of the CRT. Almost all rebuilders of CRTs have closed down. Two remaining shops, Clinton Displays in Illinois and RACS in France, are expensive and may not be willing to take on one-of-a-kind jobs for antique TVs. There is an intention to set up a CRT rebuilding lab at the Early Television Foundation in Ohio but the fruition of that plan is perhaps still years away. What this means is that you either must choose a TV with a known good CRT or have a plan for where to get a replacement. Cannibalizing another less desirable antique TV is certainly a reasonable option if you can find one with a good CRT. There are more antique TVs out there than there are collectors to take them, so cannibalizing a set’s CRT may mean at least one TV survives. Many antique TVs on eBay or at swap meets have no takers and may end up in the landfill.

You’ll want to get your own CRT tester and learn how to use it. They are plentiful and inexpensive on eBay. If your set has an electrostatic picture tube be aware that only a few CRT testers have the capability to test them. In addition to a CRT tester, it’s a good idea to have a high voltage probe and an oscilloscope for TV restoration. The world is awash in excess equipment from old TV shops; you can buy suitable test equipment for a few tens of dollars.

Just as for radios, paper and electrolytic capacitors generally need to be replaced. Other components which may not always need to be replaced but have a high failure rate are selenium rectifiers and Candohm power resistors. Weak and bad tubes naturally need to be replaced. Tuner contacts and potentiometers often need cleaning.

The high voltage transformer (usually a flyback transformer) and deflection yoke are additional items that can fail. Fortunately replacements can often be obtained from Moyer Electronics in Pennsylvania.

Although everyone has his own strategy, one approach is to concentrate on the horizontal sweep and high voltage sections of the circuitry first. After replacing the main power supply capacitors and any capacitors in the horizontal sweep and output stages, it can be worthwhile to power up the set on a variac and see if the horizontal sweep and high voltage are working. If not, use an oscilloscope to check the waveform on the grid of the horizontal output tube, or look for a few volts negative DC voltage on the grid if you don’t have an oscilloscope. If you see a 15 kHz sawtooth signal, the problem is in the output stage, flyback, or yoke. If you don’t see the sawtooth signal, the problem is in the horizontal oscillator stage. Don’t run the set long with the horizontal sweep not working; doing so can cook the flyback transformer and potentially ruin it. A red plate on the horizontal output tube is also a sign that the set needs to be shut down immediately.

If your set has an electrostatically deflected CRT (7JP4, 8BP4, or 3KP4 are common), there will be very high voltage tubular capacitors coupling the signals from the sweep output stages to the CRT deflection plates. These are almost always bad and must be replaced before the high voltage power supply will function properly. Replacements are not so easy to find; places selling suitable 6000 VDC tubular capacitors include Just Radios and Allied Electronics.

Once you have high voltage and horizontal sweep, see if you get something on the CRT screen. Either a full raster or a horizontal line (which indicates the vertical sweep is dead) are good indicators at this point. If you have high voltage, but nothing on the screen, check the position of the ion trap on the neck of the CRT if the set has an early type CRT that needs an ion trap. Try all possible orientations of the ion trap — rotate, flip, and slide back and forth on the neck near the rear half of the electron gun. If you know you have a good CRT but still nothing on the screen, try shorting the control grid and cathode wires together at the CRT socket (this generally will not hurt the video output circuitry). If there is still no light, check the CRT screen grid voltage which should be a few hundred volts positive with respect to the cathode. If you have high voltage, proper screen voltage, and the cathode shorted to the grid, there will be something on the screen as long as the ion trap is in the right position. If it goes dark when you unshort the cathode and grid, focus your efforts on restoration of the video output stage next.

It's quite common to find the vertical sweep not working leaving just a horizontal line on the screen. This is the next circuit to diagnose and work on. The vertical output transformer will occasionally be bad; Moyer Electronics may also be able to supply a replacement. Once you've replaced all bad components, you will have a full raster.

The relatively high voltages used in the vertical and horizontal sweep circuits make these somewhat dangerous to work on. Use common sense and be sure to use only one hand at a time when working (measuring voltages, etc.) near live circuitry. The "one hand in the pocket" rule can extend your life! The high voltage which supplies the CRT anode is a much higher voltage (5-30 kV), but is actually less lethal since it usually cannot supply enough current to electrocute you. Still, you'll want to be *very* cautious around live high voltage circuitry; touching it will hurt, and your reflexes may cause you to jump in a manner that may cause injury to yourself or damage to the set.

Another consequence of the high voltage used in TVs is that it can promote the growth of metal whiskers as various metals corrode. Potentiometers in particular are prone to shorting by these metal whiskers. Use a toothbrush to clean off the outside surfaces of a potentiometer, particularly between its terminals and the chassis. If necessary, clean the inside as well, especially if your ohmmeter shows evidence of a short.

The tuner, video IF, sound IF, video amplifier, and audio amplifier circuits are similar in some ways to what you would find in a high end radio. What you've learned over the years in restoring radios will help you in these sections.

While the tips above can be helpful in getting started with TV restoration it also pays to buy a few good TV servicing books from the 1940s and 50s. These books will explain much more of the theory of TV circuitry and provide all the information you need. Finally, don't overlook the usefulness of internet forums in finding experts to answer your questions. Forums such as the Antique Television forum at www.antiqueradios.com or the Early B&W and Projection TV forum at www.videokarma.org have plenty of experts who enjoy sharing their knowledge of antique TVs with anyone who shows interest.

Analog Signal Source

In this age of digital TV coming up with a suitable analog signal source for vintage TVs takes some special effort. One good option is to use a digital converter set top box connected to cable, satellite, or an antenna for over-the-air signals. Another way to go is to use a DVD player with a video modulator. Low cost analog modulators are still available at electronics stores; the preferred choice among many TV collectors is to use one or more Blonder-Tongue "agile modulators" to create one or more analog TV channels to feed to vintage TVs. Blonder-Tongue units are usually available very cheaply on eBay.

In this article we've explored the world of early TVs , their technical variations, different design strategies, and restoration tips. If you'd like to learn more, a good resource is the Early Television Foundation at www.earlytelevision.org.

Tom Albrecht is a research physicist working for a hard disk drive company in San Jose. He has been collecting and restoring radios for most of his life. His TV collection started in the late 1990s with a Motorola VT-71 purchased at a CHRS swap meet. Since then he has restored many TVs, both for his own collection and for a other collectors. ◊

High Gain Rectifiers ???

by John Staples, W6BM

Yes, you read that right. Under certain conditions, some rectifiers can be made into amplifiers. Here, I describe results obtained with some rectifiers obtained from CHRS's tube stock.

First, a little history…

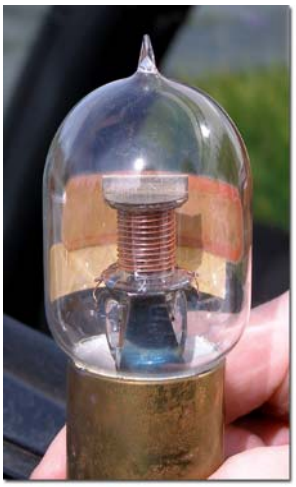


Figure 1 — Moorhead tube

A number of vacuum tube manufacturers devised ways to get around the DeForest patent of the gridded triode, resulting in a number of unusual designs, such as the Weagant external-grid triode, and the Moorhead "solenoid tube", shown in Figure 1. In 1926 Berkeley ham radio operator Ralph Heintz with colleague Jack Kauffman formed a company that provided radio equipment exclusively to the Dollar Steamship Lines. Wary of fights with RCA, who now held the key patents, they developed the gridless "Gammatron", a high-power transmitting tube that substituted an electrostatic electrode for the control grid. The tubes had low gain, but they worked and proved to be very rugged. A pair of HK255's could provide 2500 watts of audio in a pushpul circuit with 5 kV on the plates. Later sold to amateur radio operators, they survived operation with the plate running white hot.

The Gammatron configuration never caught on, but there has been a buzz of activity lately about using common types of full-wave rectifier tubes in the Gammatron mode. The 6AX5 and certain 6X5 rectifiers are built with the two plates closely facing each other, as shown in Figure 2. This geometry, similar to that of the original H&K Gammatron, can provide a significant amount of gain. A complete AM transmitter is described, including a schematic, by K2GLO in the *Tube Collector*, Volume 8, Number 1, comprising an oscillator, modulated final amplifier, and audio ampifier chain, using 6AX5 full-wave rectifiers.

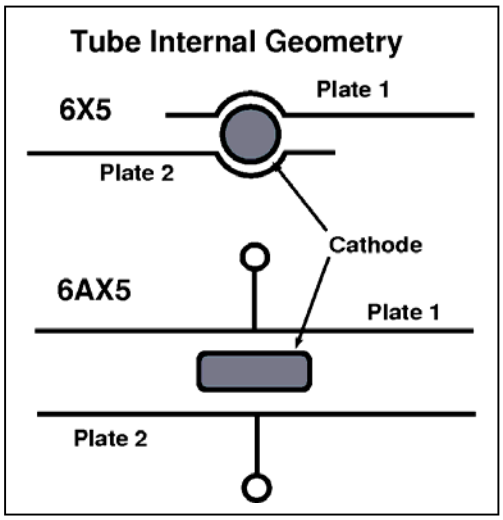


Figure 2

At a CHRS tube sorting operation, I selected some 6AX5 and RCA 6X5 tubes and tested them for Gammatron performance. Figure 3 shows the construction of the 6AX5 from the side: two anodes facing the cathode.

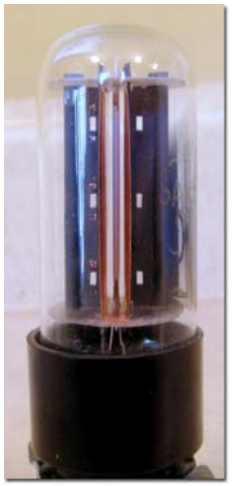


Figure 3 — 6AX5

For these tubes to operate in the Gammatron mode, they are operated in the emission limited regime. This means that the cathode temperature be low, limiting the electron emission. At full temperature in a conventional gridded tube, the quantity of electrons emitted from the cathode forms a space-charge cloud which shields it from the electrostatic potential of the grid. In the Gammatron mode, the amount of electrons coming off the cathode is small enough to prevent this shielding action, so a nearby (Gamma) electrode can modulate the current to the plate. Running the heater at a lower than normal voltage puts the tube into the emission-limited regime.

Figure 4 shows a simple test circuit. A Wavetek function generator provides a sine-wave input signal, as well as a variable d-c offset (bias). The heater is excited by a 6.3 volt transformer from a Variac. The signal output is developed across the plate load resistor R and is observed on an oscilloscope through the decoupling capacitor. Both 6AX5's and 6X5's were tested: they have the same pin-out arrangement.

The 6X5 had the highest gain. Figure 5 shows the input and the output signals on a scale of 0.5 volts per division. The highest gain of 10.9 (21 dB!) was obtained with a plate supply of 200 volts, a load resistor of 750K ohms, 1.72 volts a.c. on the heater and a plate current of 0.21 mA. The adjustment of the heater voltage is critical to achieve Gammatron operation.

A gain of 21 dB is almost what one could expect from a conventional amplifier circuit using a 6J5! Danial Stocks, in the *Tube Collector*, Vol 10, No. 6, tested several Raytheon and Tung-Sol 6X4 7-pin miniature full-wave rectifiers with the Gammatron plate geometry, finding maximum gain from 2.9 to 11.4 over a selection of 19 tubes. This exercise recreates a bit of history, showing that the concept was workable, if not practical, due to the critical adjustments and wide variability of tube characteristics. The Gammatron configuration had insufficient gain for many applications, and the patent disputes with RCA were finally settled. H&K entered into a famous court suit against RCA, where they proved to the court that their tubes could indeed amplify, and RCA abruptly dropped the lawsuit. This story is related in lurid detail in the *Al Jones Tube Museum* video, available through CHRS.

One can find additional information on H&K, the Gammatron and other recent demonstrations of Gammatron operation on the web by Googling "gammatron".

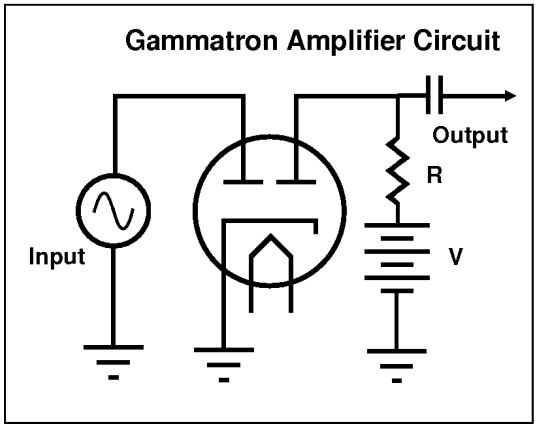


Figure 4— Test circuit

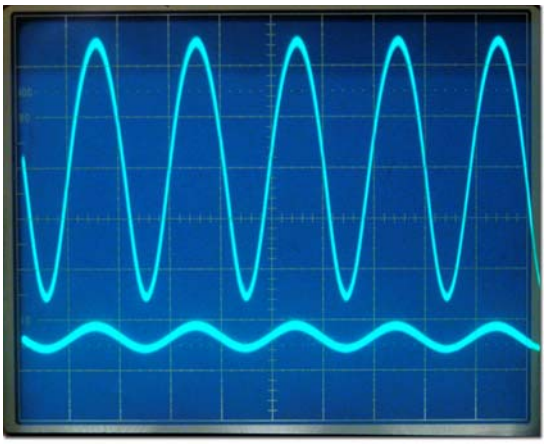


Figure 5 — Input and output signals

John Staples, W6BM, is a CHRS board member, and trustee and licensee of the W6CF ham station. He holds Amateur Extra and First Phone / Radar licenses, both issued in 1958, and a Ph.D. in nuclear physics, developing particle accelerators and laser systems at the Lawrence Berkeley Lab. ◊

Lee de Forest: King of Radio, Television and Film

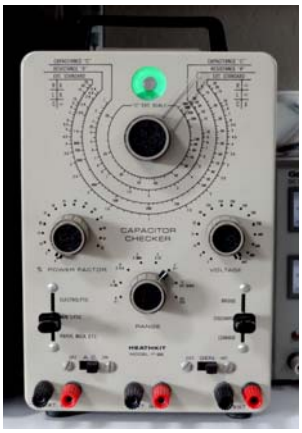
A new book written by Mike Adams

The life-long inventor, Lee de Forest invented the three-element vacuum tube used between 1906 and 1916 as a detector, amplifier, and oscillator of radio waves. Beginning in 1918 he began to develop a light valve, a device for writing and reading sound using light patterns. While he received many patents for his process, he was initially ignored by the film industry. In order to promote and demonstrate his process he made several hundred sound short films, he rented space for their showing; he sold the tickets and did the publicity to gain audiences for his invention. Lee de Forest officially brought sound to film in 1919. Lee De Forest: King of Radio, Television, and Film is about both invention and early film making; de Forest as the scientist and producer, director, and writer of the content. This book tells the story of de Forest's contribution in changing the history of film through the incorporation of sound. The text includes primary source historical material, U.S. patents and richly-illustrated photos of Lee de Forest's experiments. ◊

Available at the
CHRS Museum Store

A Tester Every Restorer Should Own

by Thomas Bonomo, K6AD



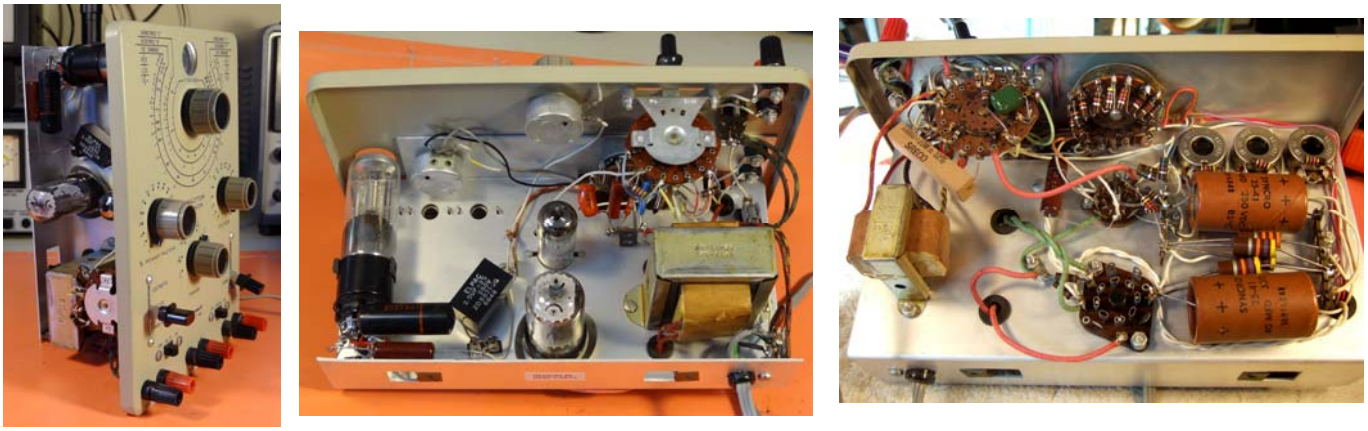
Heathkit IT-28 Capacitor Checker

Lowly Heathkit "Gets no respect" as Rodney Dangerfield might say. But I'm about to tell you about a piece of Heathkit gear every vintage radio restorer should own: the IT-28 Capacitor Checker. Sure, I know what you're probably thinking. The trouble-free nature and accuracy of modern test equipment is just too tempting to ignore. Usually, I'd be nodding my head with you. I'm generally not a fan of vintage test equipment, tube test equipment in particular. There's nothing more frustrating than getting all set up to work on a radio, only to be forced to stop my nailing to work on the hammer. But this is one piece of test equipment that is fairly reliable, and whose most useful functions are not easily duplicated at the low prices these testers usually command.

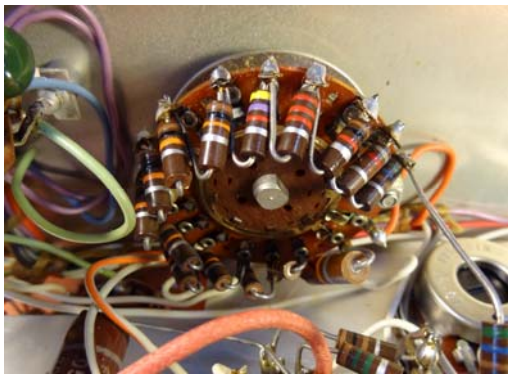
Like many modern digital meters, this device can measure capacitance, resistance and inductance. In truth, however, I rarely use these measurement functions. They're handy, to be sure, and the accuracy is usually good enough for most broadcast radio applications. Only if I am running one of the tests discussed below do I bother to let the eye tube tell me if a capacitor's value is "in the ballpark."

The secret to this tester's usefulness lies in its ability to measure capacitor leakage *under working voltages from +3 to +600 volts*. Countless times I've wondered if a capacitor I'm about to replace is responsible for the faulty performance of a certain radio stage. It's sort of a curiosity thing with me. The IT-28's green eye tube can easily show if a capacitor is leaky. The unit provides standardized leakages tests from a front panel switch marked "Electrolytics", "Miniature Electrolytics", and "Paper, Mylar, Etc." Even if I intend to replace an old paper capacitor with a modern Mylar, running a leakage test on the old cap at its working voltage satisfies my curious nature. You can't do leakage tests at working voltage with most digital testers, not unless you buy a much fancier one than is commonly available. And I've got to admit, the glowing green eye tube is just cool to use. Something utterly magical about it.

A second great use of this tester is to season electrolytic capacitors. Many NOS modern electrolytics have been sitting on the shelf for years since they were manufactured. Put one in a radio and then hit it with full working voltage, and you sometimes get the sound and smell of an instant barbeque, one you'd rather avoid. You can use the IT-28 to easily bring an electrolytic up to its full working voltage in incremental steps, all the while monitoring the eye tube for leakage. I do this with every new electrolytic I replace. Some of the new electrolytics in my parts inventory have sat, unused, for a decade or more. Who knows how long they sat on a distributor's shelf before that. The IT-28 will save you from all those unnecessary radio fireworks.


Interior views of the Heathkit IT-28

A word about Heathkit equipment. Based on my experience, I'd say 90% of Heathkit equipment has at least one bad solder joint or wiring error. No surprise that you often see poor performance. The IT-28 you see in the photo had no less than 7 bad solder joints. Do you see all the resistors on the rotary switch? Not a one was properly soldered. The guy who built this unit failed to see that he was only using enough solder to properly attach the top lead. The leads underneath often had no solder on them whatsoever. The result was erratic performance, and many "dead" positions on the function switches. So if you purchase one of these, open it up and examine every solder joint. The good news is that the IT-28 uses straightforward circuitry, is easy to work on, and is simple to calibrate. All you'll need is a manual, which is easy to find online. When conducting tests, especially if you use alligator test leads, don't forget that there is up to 600 VDC applied to the part under test. Forget, and you'll find yourself suddenly much more "alert to your environment."



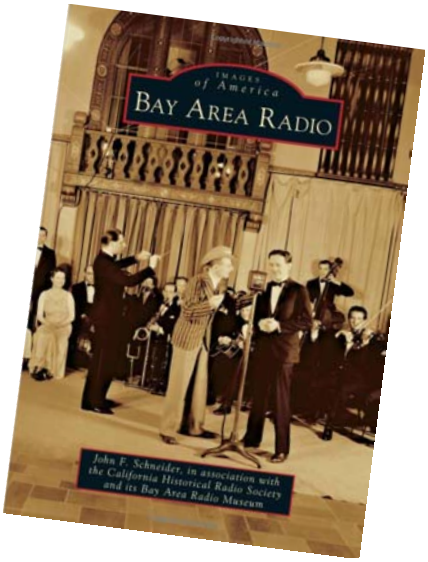
Poor solder joints on switch made during original kit assembly

Heathkit introduced an earlier version of this tester in 1961 as the IT-11. Minor changes were made in 1968, and the updated model became the IT-28. The IT-28 was available until 1977, a 16 year life for the line. The IT-28 featured Heathkit's tan color scheme, a grounded three-wire power cord, a spring-clamp on the 6AX4 rectifier tube socket, and a power transformer that could be wired for 240 volts. Unlike the earlier IT-11, which used adjustable set-screw knobs, the IT-28 used less desirable push-on knobs that can't be easily re-adjusted.

There are similar testers on the market. Knight, EICO, and Lafayette manufactured units with comparable functionality. The EICO 950B is very popular, often seen at swap meets, and it uses the less expensive 1829 eye tube. There is a good YouTube video showing the many uses of this type of tester at http://www.youtube.com/watch?v=G2yo0AVm9tY . If you spot any one of these testers at a swap meet, by all means grab it, fix it, and use it! Happy testing. ◊

Bay Area Radio

A new book from John Schneider and CHRS



Radio historian John F. Schneider and the California Historical Radio Society have assembled a collection of rare photographs that document the artistry and technology of this important aspect of San Francisco's history. The San Francisco Bay Area was a key national radio broadcasting center during the first three decades of commercial radio. In 1909, it was home to the very beginnings of the art and science of broadcasting, when Charles D. "Doc" Herrold began sending out weekly voice and music programs from his Wireless and Engineering College in San Jose. Dozens of other radio pioneers soon followed. In 1926, big broadcasting came to San Francisco when the newly formed National Broadcasting Company (NBC) established its West Coast headquarters on Sutter Street. Other national and regional networks soon set up their own broadcast production centers, and for the next 20 years, thousands of actors, musicians, announcers, and engineers were creating important programs that were heard on the West Coast as well as nationwide. During World War II, San Francisco became the key collection center for Pacific war news, and bulletins received in San Francisco were quickly relayed to an anxious nation. Conversely, powerful shortwave stations broadcast war news and propaganda back to the Pacific and entertained American troops overseas. ◊

Available at the CHRS Museum Store

CALIFORNIA HISTORICAL RADIO SOCIETY www.CaliforniaHistoricalRadio.com