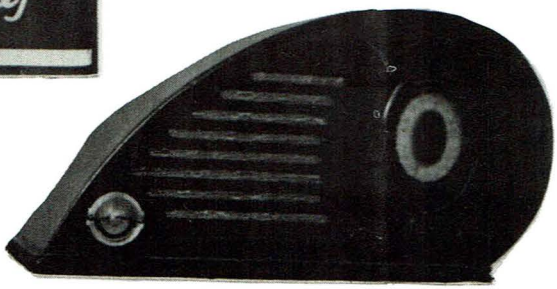
CHRS

CALIFORNIA HISTORICAL RADIO SOCIETY



"NOVELTY RADIO KING" PAGE 3

10th Anniversary Issue

CHRS

The California Historical Radio Society is a non-profit corporation chartered in the state of California, and was formed to promote the restoration and preservation of early radio and radio broadcasting.

Our goal is to provide the opportunity to exhange ideas and information on the history of radio, particularly in the West, with emphasis in areas such as collecting, literature, programs, and restoration of early equipment.

Regular swap meets are scheduled at least four times a year.

The Journal of the California Historical Radio Society is published quarterly and is furnished free to members.

EDITORIAL

by Gary Halverson

A Word About Stay Power

What do you call a guy who had a concept of organizing a group of collectors, then proceeded to organize it into reality, get it off and running, and nearly single-handedly maintained that reality purely out of personal dedication, energy, spirit, and love for his hobby over a ten year period?

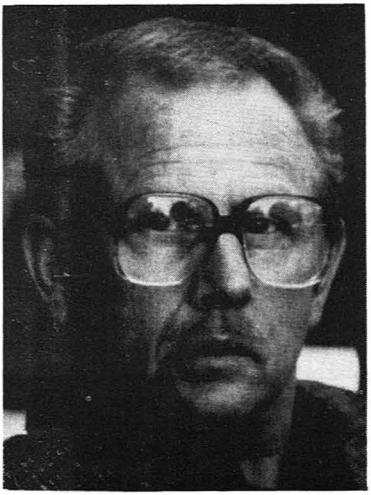
Norm Berge.

CHRS is the conceptual offspring of Norm Berge. Ten and a half years ago, the California Historical Radio Society was formed as a non-profit Califorina Corporation dedicated to the preservation of antique radio and broadcasting in the West. Six months later, the first journal was published.

Norm isn't what you might expect. A big Norweigen kind of guy, he doesn't have the ego you'd expect for someone with his horsepower. Sometimes his enthusiasm for the Society can be a little diffused, but, by God, it's always 200%.

Like any mortal, Norm went through the burnout phase. How many meets can a man organize, get there two hours before anyone else to start setting up and be told "I can't help, I've got to be out at my table to sell" before his enthusiasm starts to fade? But Norm overcame the burnout.

Throughout the past ten years, his dedication and energy has worked to nuture and promote radio and early broadcast here in the West. Some noteworthy examples of CHRS "firsts" include:



The Dr. Herrold Award; conceived to honor those in the collecting field making outstanding contributions for the benefit of everyone.

The Lifetime Membership Award; commissioned to honor those making outstanding contributions to promoting and supporting the cause of CHRS.

The quality of the Journal was another important element important to CHRS.

Quality Swap Meets have been a mainstay of CHRS sponsorship.

During an interview with him, Norm mentioned at least a half a dozen major situations he put together where nothing happened. From being the catalyst sparking an offer of a building to house a CHRS museum by the City of Oakland to a permanent display at the San Fransisco Mint, Norm has single-handedly championed CHRS with an energy most of us will never know.

Many of these things didn't happen because of membership apathy. But Norm is still here.

This issue marks 10 years of publishing the CHRS journal. Many of you only know CHRS by the journal. You long-time members saw the ups and downs through the years. I hope that in this special ten year anniversary issue, you come to appreciate, a little more, Norm and the small handfull of people who beleived in CHRS to make it happen.

And that, folks, is a real-live Twentieth Century example of Stay Power. If nobody else nominates Norm for the Dr. Herrold Award, I sure as hell will.

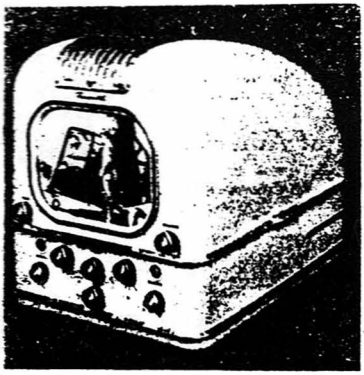


Table Model Metal Cabinet

The metal cabinet of the Farnsworth FV-200 table model television receiver is made of aluminum 1/16-inch thick. It is lighter than wood and is available in several colors.

Designed by David L. Evans, noted interior decorator and designer for the famous Capehart phonograph-radio line, the metal cabinet not only permits tonal

PRINTED BY GRAPHIC EXPRESSIONS, SUNNYVALE, CA.

spotlight collector

Ken Zander

What's Normal?

I always thought that it would be neat to have an old radio. So in 1975 after I first came to California, I bought a Philco Jr cathederal. I put it on a desk and thought that it looked nice. But it didn't work very well. I looked in the back - funny tubes. I took them to Radio Shack to be tested. The guy shook his head sadly. I thought what's the point of bothering with old radios when you can't even get tubes. Then I met this guy across the hall at work. He said that he had "hundreds of radios". Have you heard of Jim Cirner? I thought that this poor fellow must be nuts. Who would ever need more than one radio? I went to his house - sure enough - he had hundreds - and a black dial Zenith that I could have for a "special" price of $95. Remember it was 1975. I bought it. The following year, I bought four more radios - then fifteen.

In 1978, the disease hit. I went into vacuum mode of buy-buy-buy. I couldn't get enough. Up before sunrise to go to antique shows, I saw another collector ahead of me with a flashlight - Panic! Run! Get ahead! Don't let him see you! Maybe I should get two flashlights - one for each hand. Once at sunrise while crossing the Golden Gate going to the Marin Flea Market, I see Cirner's van coming through the fog going the other way. He had already been there! He was on his way to who knows where for the next flea. Next time I would have to get up earlier and drive faster!

When my parents came to visit and first saw the radios, my mother asked "How come you're not married?" in a tone of voice that said "And now what's wrong with you?"

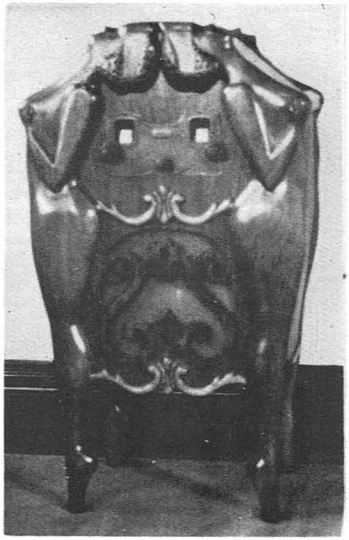
After awhile, I started to specialize in novelty radios. Why? I don't know. It's just the way the brain cells got jiggled. Being this way, I don't understand the "coffin battery and crystal" collectors. If you can't plug it in and listen, what good is it? Several collectors have told me that their wives like novelty radios. What are they trying to say?

The excitment of radio collecting seems to be getting them. Once acquired and finally at home, there they sit and sit - then collect dust. Radio collectors should have a good feather duster. The shallow value of material things becomes obvious after a few years of collecting. I used to collect artifacts from sunken ships. All these "treasures" are now stuffed in boxes in the basement. There are also a few radios in the basement that have been demoted. During the rainy season, there

might be a half inch of water down there, but that's all right, the consoles have legs - just kidding.

Tubes - I now have thousands. Most of them came from Pete Griffen. I remember returning home - stuffed in a Pinto with 8000 tubes - and I though "Zander, you have really gone off the deep end. What if someone normal sees me?". Then while crossing the Golden Gate - again - I saw these joggers running from one end of the bridge to the other, and I realized that I wasn't the only nutty person in the world. Even I, with all those tubes, knew it was easier to drive across a bridge than to jog.

A couple of months ago, I was on London's West side prowling around a bunch of old radios in an antique store. I was ready to find something rare that no one else has seen before. Traveler Cheques were



burning a hole in my pocket. I found the store owner. I'm sweating - heart pounding - excitement! We started talking. That rascal must've known half the CHRS membership. He had been "cleaned out" of radios by California collectors years earlier - maybe I should try Boston.

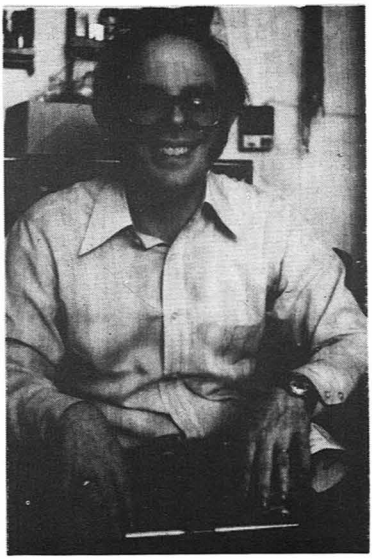
Once in Florida, the woman owner of an antique store relied to my old radio inquiry, "We sell antiques, not junk". Another time at the motel after the Illinois Radiofest, some people saw me loading strange looking radios into the car and they laughed. I'm sure normalcy to them is swilling beer while watching baseball on the boob tube. But I do drink scotch and have "Baseball" and "Football" radios.

Now with more than 100 novelty radios in my bedroom, I'll sometimes wake up in the middle of the night and hear this far away laughter. It's these radios staring down at me - making fun. They know how excited I was to get each one and now they just collect dust. They are waiting for the big "quake". They'll all come falling down and I'll become the first person to ever be crushed to death by novelty radios. I wonder who will pick up the pieces and be the highest bidder to get Zander's splintered collection. I hope he has a good feather duster. Also, that Philco Jr. still doesn't work very well.

From the beginning
wireless telegraphy

(Part 2)

By: Paul J. Bourbin

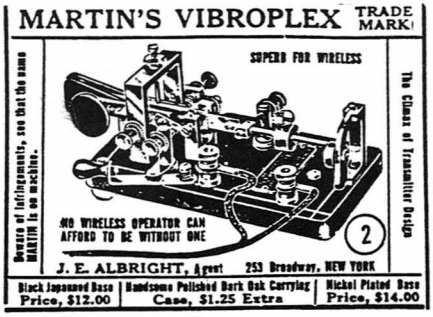


In part one of this series, we discussed the methods used in wireless telegraphy prior to Electromagnetic Radiation or Radio. These systems were limited by the relatively high amount of power needed to transmit over a very short range. The early systems were capable of ranges of only a few miles. Also the conditions for transmission and reception had to be just right and were very limited. Conduction, be it over land or water, required the medium of conduction be consistant throughout the length of transmission. The induction methods required the proper atmospheric conditions to work properly. Another problem was that no-one had yet developed a form of detection and tuning so that more than one transmission could be made form the same area at the same time.

Radio, like most other inventions, was "invented" by a person who took the ideas of other experimenters and put them together in a practical and commercially usable way. In 1896, Marconi applied Faraday's 1845 principles of oscillation and detection, which were demonstrated by Hertz and Clerk Maxwell in 1885 and radio was born. Marconi, like Edison, wanted to produce inventions which were capable of commercial and practical applications. However, Marconi unlike Edison, was a good businessman and was able to "market" his ideas. The invention of radio transmission quickly made other methods of wireless telegraphy obsolete and they faded into oblivion. The radiation system showed much promise at the beginning because the first permanent radio station was set up in 1896 at Needles, Isle of Wright, England. In 1897 Marconi went back to Italy to supervise erection of a transmitter at Stezia to communicate with battleships. As you can see, the first uses of radio were maritime. Because no wires were needed, the medium was perfect for ship-to-shore and ship-to-ship communications. By 1899 the U.S. had wireless communication between shore based stations and lightships and tenders on the East Coast. On the West Coast, amateur experimenters set up communicaitons between the lightship San Francisco and the Cliff House to alert people on the shore of the arrival of a ship load of Spanish-American War veterans. The amateurs preceeded the Navy on the West Coast by five years. Also in 1899 maritime communication was very common in Europe. The sinking of the Titanic in 1912 would have been even more tragic had not the Carpathia, being alerted by wireless, come by to resuce 507 survivors. Another ship was closer,

but just a few minutes before the Titanic was struck, the Marconi operator put down his headphones for the night. Transatlantic transmission first occured on 12 December 1901 by Marconi and George Kemp.

The Marconi system consisted of current from a low-voltage battery, rendered intermittent by an interrupter (vibrator), going to the primary winding of the transformer. The secondary winding picks up the high voltage A.C. using the frequency of the interrupter and charges the aerial and ground. This causes a spark to jump the spark gap, transmitting the signal. The oscillation produced by the spark occurred at a rate of 1-2 million per second. The radio waves then strike the aerial and oscillate at the same rate as the original transmission. The energy overcomes the resistance of the



detector which permits current from the battery to pass through the detector to the telephone receiver or relay.

Many early improvements were made to this system. The Lodge-Muirhead Syntonic System had conical sheet metal capacity areas for transmission and reception instead of a wire aerial. The purpose was to acheive electromagnetic resonance. This was important in that only receivers tuned to the resonance would respond to transmissions. In this way, more than one transmitter could operate in the same area and the receivers could discriminate between them.

The Fessenden Tuned System was the first to combine receiver and transmitter in the same circuit. This simplified things quite a bit. The Telefunken or Slaby-Arco Multiple system made use of 1/4 wave transmission from grounded aerials. The frequency could be changed by varying the inductances. This system allowed transmission and reception at different frequencies simultaniously with one arerial system using a different circuit for each frequency. The De Forest System, instead of using a coherer, first used a liquid detector, and then an Audion. Also, an alternator was used which produced a much "purer" carrier frequency than that produced by an interrupter.

The most important parts of these early systems were a powerful oscillating system and a sensative detector. The earliest oscillators were of the open circuit type. That is, they employed a spark gap. The spark gap used an air gap to resist the passage of current. This was overcome by the high voltage induced in the transformer secondary winding, and the resulting oscillations would then feed the aerial. The wave length was one quarter the vertical length of the aerial. Later on, the use of high frequency alternators improved transmission greatly. These alternators had to oscillate over 10,000 times per second and were vital to the development of voice transmission.

Early detectors were of many different types. The first were the coherers. They were difficult to adjust for proper sensitivity. They used metal filings in a tube which resisted feeble current but passed current when the resistance was overcome by the increased current of the received signal.

The Marconi Magnetic detector had the signal tuned by condensors used in conjunction with coils. The current for the coil temporairly destroyed the magetic field made by two permanent magents. The interpution is then picked up by a secondary set of coils and magnets and appears as a click in the earphones. This system was obsolete by World War One.

The Fessenden Electrolytic detector, or barretter, was the most sensitive detector next to the audion. It consisted of a small cup of carbon filled with a 20% solution of nitric acid. A platinium wire was dipped into it. High reistance was reduced by radio waves and was used to operate a telephone diaphram shunted around it. It was not strong enough to operate a relay.

Also in use were the de Forest responder or anti-coherer and the delicate carbon-steel microphonic detector. All of the above were in use at the turn of the century, used batteries, and were critical in their adjustment.

In 1902, while experimenting with a carbon-steel detector, Dr. Greenleaf W. Pickard discovered that messages were received quite well when the battery was out of the detector circuit. The discovery that the telephone diaphram could be operated by radio energy revolutionized thought about detectors.

While others continued to study the older methods of detection, Dr. Pickard began to investigate mineral detectors. "After building my own test instruments, I began experiments in the summer of 1902. I started with a typical carbon-steel detector using a local battery, and tried all possible variations to improve reception. One day, I obtained the best results when I used a oxidized steel surface, instead of carbon, in contact with a steel needle", recalled Dr. Pickard.

After exhausting the possibilities of a carbon-steel device as an efficient rectifier, Pickard was ready to explore further the field of minerals. Recalling his fair results with an oxidized steel surface (essentially an oxide of iron, or layer of magentite), Pickard obtained a small quantity of lodestone or natural magnetite. "For my experiment", stated Dr. Pickard, "I used a fragment of lodestone about 1/10th of an inch thick, placed on a piece of tinfoil to provide a large contact area. A copper wire served as the second member of the contact".*

On October 16, 1902, the system was successfully used as a detector without a battery for the first time. In September 1903, the device was used in the first intelligible transmission of speech with a carbon-steel detector.

From 1903 to 1910, Pickard conducted experiments using about every mineral substance known. In the beginning, he tested mostly metalic oxides and later crystalline materials. He discovered more than 250 materials that produced rectifying properties, and used them in over 30,000 combinations.

By late 1905, other experimenters, conviced by the works of Pickard, also began to investigate crystal detectors. In 1906, Pickard began experimenting with silicon and found it to be the most sensitive to date. The silicon detector, with its cat's whisker and special holder, was patented in November 1906. Silicon detectors had the advantage of not going out of adjustment as easily as other detectors.

About the same time, H. H.C. Dunwoody invented the Carborundum detector. It consisted of a peice of carborundum placed between two carbon cups. It had the advantage of beign rugged and stable, but it did require a battery and potentiometer for sensitivity adjustment. Dun-

woody sold his patent to the American de Forest Wireless Telegraph Company who hired Pickard to perfect it. Pickard designed a holder to handle the high pressure needed to be asserted on the Carborundum and this detector was used in early de Forest receivers.

After making more improvements to the silicon detector, Pickard went on to develop the "Perikon" detector. It was a commercial type made of a piece of zincite (zinc oxide) in contact with a piece of bornite or chalcopyrite. These were used by the U.S. government and were very sensitive.

Incidently, the Government also used the Ferron detector because of its high sensitivity and the fact that it was not affected by the transmitter. Pickard at this time showed that crystal detectors were true rectifiers, not having the thermoelectric activity all other experimenters belived. He also produced oscillations with crystal detectors, thereby making a beat receiver. Pickard than went on to produce a molybdenite detector and a "Pyron" detector using iron sulphide.

In 1933, when the government was trying to develop Radar, they found the work of Pickard most important as crystals were the only thing capable of oscillating a the high frequencies required for Radar.

While Pickard was developing his detectors, others were also experimenting. Lead peroxide detectors were used early in radio. They consisted of a piece of lead peroxide placed between an electrode of lead and one of platinum. This detector required the use of a battery. Other crystal types included detectors made from iron pyrites and pyrolusite. Galena was a very popular crystal at this time due to its high sensitivity, but it had the disadvantage of being hard to adjust.

Wireless telephony was desired from the beginning of the development of radio. The first broadcast of distorted speech by radio was in November 1900. The first public broadcast of speech was on December 24, 1906 by Professor R.A. Fessenden at Brant Rock, Mass. A.F. Collins developed an "arc" telephone with a range of a few miles. De Forest made the first complete system. The Marconi Company made a commercially practical system before World War One.

The main problem was to design a fast rotating, even speed generator that could produce at least 10,000 cycles per second. Early transmitters supplied power from a fast rotating, 250 volt dynamo through chokes to the primary coil of a transformer. The secondary coil connected to the aerial, a hot-wire ammeter, a telephone transmitter, and ground.

The receiver had the aerial and ground connected, via condensors, to the audion. The other side of the audio connected with the batteries and the telephone receiver.

Reference

The Crystal Detector, by George McQuay: Radio Craft Magazine, July 1948, pp. 20-22

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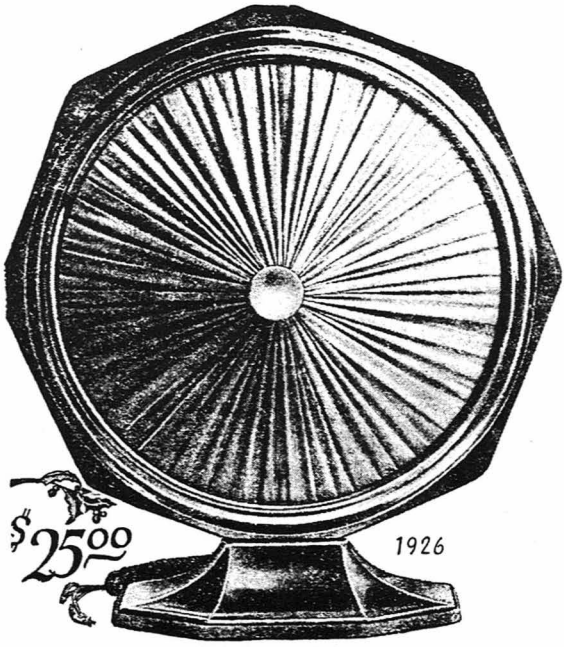

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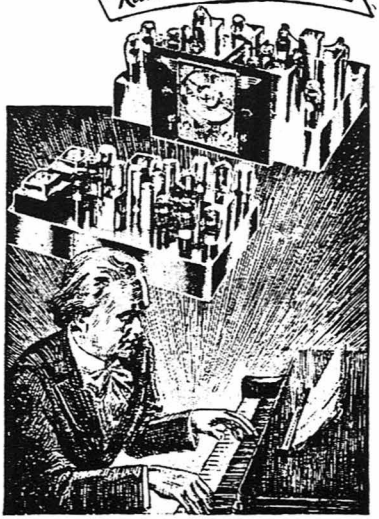

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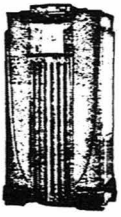

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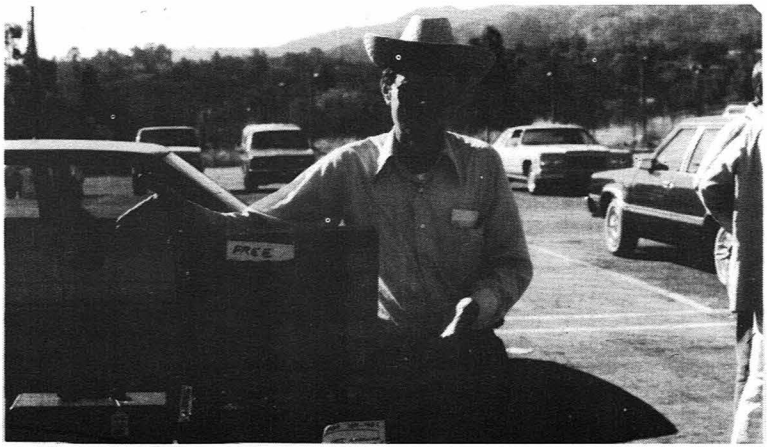
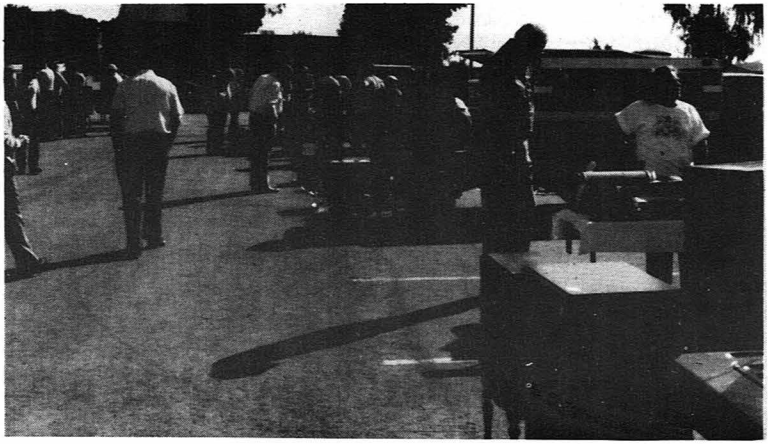
I'M RADIOACTIVE

CALIFORNIA HISTORICAL RADIO SOCIETY

The new CHRS bumper sticker is now available. All new members and subsciption renewals will receive their message to the world:" IM RADIOACTIVE ". If you would like additional bumpers stickers, they are available at a modest donation of $1.00.

AUGUST SWAP '85





Restoration Hints

by Herb Brams

Your AC Set Doesn't Light Up?

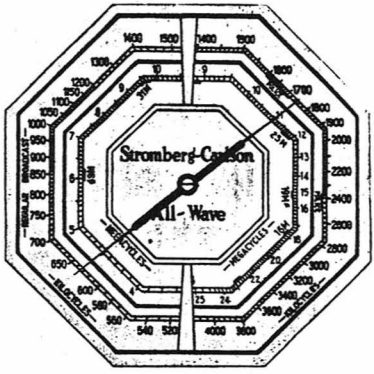
You plug in your old set and turn it on. It does not play. The tubes don't even light up. Do you think the power transformer is bad? Before you go through the trouble of replacing it, consider these alternatives: (1) the On-Off switch may be bad. (2) there may be a break in the line cord wire. (3) the plug may not be making electrical contact in your AC outlet. (4) the fuse may be open not making contact with its holder.

Slipping RCA Dial

A 1935 RCA floor model radio with a 4 in. round dial had a tuning knob that could be pulled out for fine tuning or pushed in for fast tuning. The dial drive was a planetary unit with three flat metal fingers that gripped a toothed gear for fast tuning. The fingers were pulled out of contact with the gear by the tuning knob for fine tuning. The gear teeth had become worn so that when the knob was pushed in, there was insufficient grip to provide the fast tuning and the knob slipped instead. Bending the fingers inward did not help much but the problem was solved by slipping a tight-fitting rubber O-ring around the metal fingers.

Replacing Speakers

If one has a dead speaker in a set that cannot be repaired and one wants to preserve the original appearance of the set, mount a new, smaller speaker in front of the old one. The new speaker will be hidden by the old one and the original appearance of the set will be preserved.



SELECTORLITE DIAL

The dial is divided into four sections: 540 to 1500 Kc, the standard broadcast channels; 1500 to 4000 Kc, the police, aircraft and amateur channels; 4000 to 10,000 Kc, including the 49 and 31 meter broadcast bands; 10,000 to 25,000 Kc, including the 25, 19 and 16 meter broadcast bands and down to 12 meters. Only the section in which you are tuning is illuminated.

Starting Nuts

To hold a nut in that impossible place while you get the screw started, try this trick: cut an appropriate lenght of solder (large diameter works best) and lay one end across the nut on a hard surface. Hammer this end sufficiently to flatten the solder and drive a lump into the nut threads. The solder can then be bent and the nut will stay attached while it is positioned over the screw, using the solder as a handle. The screw can then be started into the nut.

Dial Glass

For broken round radio dial covers, try glass clock faces. These are usually available at clock repair shops.

Speaker Cloth

Fabrics used for speaker grill cloth may be stiffened with spray starch or spray paint.

Volume Control

For smoother control of volume in radios that use a potentiometer as a variable resistor in the cathode of the RF tube, connect a 100K one-watt resistor from B+ to the cathode of the tube.

Philco Pushbutton Radios

Philco radios of the late 1930's that have pushbuttons have two large wax-coated ceramic 370 pfd mica capacitors on the pushbutton assembly. These are often bad, making the pushbuttons inoperative. Replace them with good micas.

Neon Tuning Indicator Tubes

Neon tubes used as tuning indicators can sometimes be restored by filling them with new gas. Sign manufacturing companies may be able to provide this service.

F M

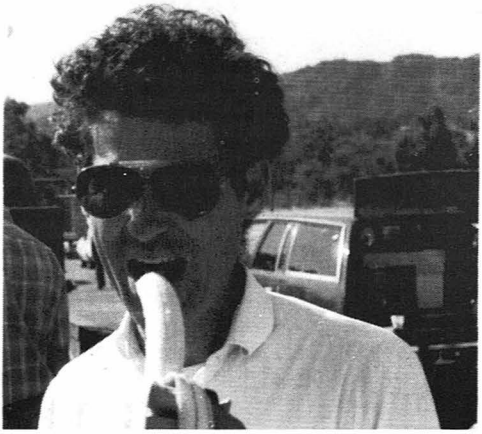
by Herb Brams

From its earliest days AM broadcasters have been plagued by interference from static and other electrical disturbances. In AM transmission the amplitude or strenght of the carrier wave is modulated by the speech or music signal. Unwanted electrical distrubances also affect the amplitude of the radio waves, and there is no easy way to remove these disturbances without affecting the modulation already present.

Edwin H. Armstrong worked on this problem from the early 1920's. He realized that interference might be eliminated if one could develop a system of modulation and detection that did not depend on the amplitude of the radio signal, but rather on some other property. He realized that one could modulate the frequency of the radio wave and recover the modulation by using detectors that were sensitive to the frequency of the signal but not its amplitude. In this way disturbances in the amplitude of the signal caused by electrical interference would not appear in the output.

By 1933 Armstrong had developed a workable system of frequency modulation (FM) that eliminated or greatly reduced many of the forms of interference that had plagued standard AM radio transmissions.

In frequency modulation the amplitude of the radio signal remains constant but its frequency is varied. With a 1000 Hz audio signal, the frequency is shifted up and down 1000 times a second from the nominal frequency of the carrier wave. With a 2000 Hz signal, the frequency of the carrier is shifted up and down 2000 times a



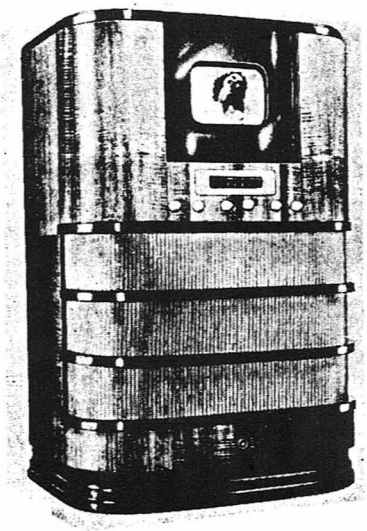
second, and so on. The amount of deviation from the nominal frequency is determined by the amplitude or strength of the audio signal, louder signals causing greater shifts in frequency. The maximum amount the frequency can shift from the center is limited to 75 kHz, or the bandwidth is 150 kHz. This compares with a bandwidth of 10 kHz for amplitude modulation (AM).

Armstrong went to RCA with his FM system by received little encouragement or support. RCA felt that FM posed a threat to its heavy investment in the AM system used at this time. Using his own funds, Armstrong continued research and applied to the FCC for a construction permit. In 1940 the FCC granted the first construction permits and soon there were more than forty FM stations serving some 400,000 receivers, operating in the 42-50 MHz region of the radio spectrum. Then, World War II intervened and all radio construction stopped.

During the war, controversy arose over assignment of frequencies to FM and TV, with both interests competing for the lower portion of the VHF bands. Hearings were held in 1944 and the powerful TV interests won out. The Commission reallocated the bands assigned to FM, moving them to a frequency range of 88-108 MHz. This dealt a crippling

blow to FM because it made all the equipment that bad been built and sold for the old FM band — transmitters, receivers, antennas, etc. — all obsolete.

In its new frequency band, FM slowly grew and attracted a loyal following of listeners, particularly music lovers, but it did not immediately become as popular as AM broadcasting. Many FM stations failed and the numbers steadily declined until the mid-1950's. Depressed by his years of struggle



29-tube General Electric model HM-226 television set with 12-inch tube and all-wave radio.

with commercial interests, Armstrong committed suicide in 1954.

Ironically, within a few years after Armstrong's death, FM enjoyed a great upsurge in popularity. In 1955 the FCC authorized FM broadcasters to transmit "store-casting" programs, i.e., commercial-free background music for stores, offices, banks, etc. In this system the programs are carried on a subcarrier which is broadcast on a regular FM channel but on a frequency too high for the human ear to detect. The subcarrier can be picked up and decoded by specially constructed receivers. Store casting provided an important new source of income for FM broadcasters.

Another boost for FM came from the increased interest in high-fidelity music, started in the mid-1950's. With its wider bandwidth and low-noise characteristics, FM could provide significantly better sound quality for the enjoyment of music by radio listeners. A third factor in the success of FM was stereophonic broadcasting. In 1961 the FCC approved the transmission of multiplexed signals -- the transmission on a single channel of the tow signals necessary to reproduce music stereophonically. Finally, the introduction of transistors and printed circuit techniques allowed FM receivers to be constructed easily and at low cost.

Today, when we think of radio in the home, it is the FM system of broadcasting that immediately comes to mind.

References: Stanley Leinwoll, From Spark to Satellite, Charles Scribner's Sons, New York, 1979.

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The little tube of big performance
$6.50

Radiotron UV-200
The long distance detector, $5.00

Radiotron WD-11
The ideal dry battery detector
$6.50

Radiotron WD-12
The standard base dry cell tube, $6.50

This symbol of quality is your protection

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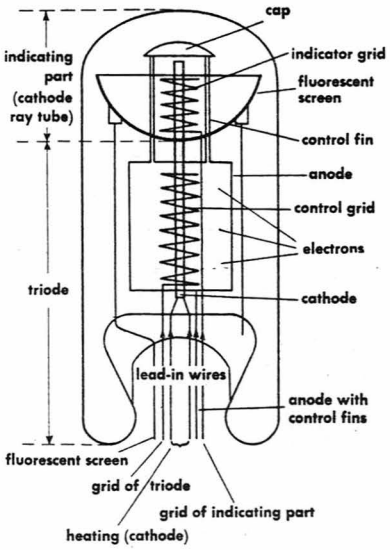


Fig. 1a MAGIC EYE (*schematic*)

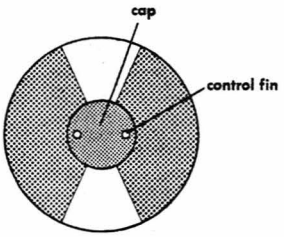


Fig. 1b ZERO POSITION

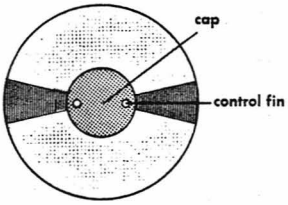
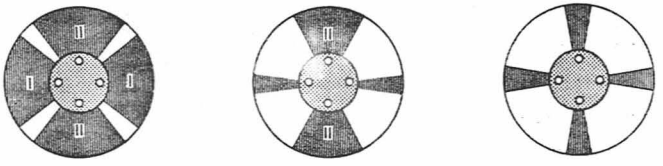


Fig. 1c CORRECTLY TUNED



a) zero position

b) range I adjustment (medium-power transmitter)

c) range II adjustment (powerful transmitter)

Fig. 2 IMAGES FORMED BY DUAL ELECTRON-RAY TUBE

MAGIC EYE

The name "magic eye" is popularly applied to the electron-ray tube, a device which gives a visual indication of correct tuning in radio receivers and correct adjustment of the microphone output to obtain a good recording in tape recorders. The electron-ray tube consists of a triode (an electron tube with cathode, control grid and anode: see page 74) and a cathode ray tube (see page 126). The latter comprises a fluorescent screen which is bombarded by electrons emitted by an incandescent cathode; they are accelerated by an anode and are controlled by another electrode (indicator grid). The two parts, i.e., the triode and the cathode ray tube, have separate grids, but share a common, indirectly-heated cathode and have a common anode voltage. The anode of the electron-ray tube comprises two control fins which are conductively connected to the anode of the triode. The fluorescent screen symmetrically surrounds the dark red glowing indirectly-heated cathode, whose light is screened by a cap. The image on the screen in the zero position is shown in Fig. 1b: wide dark sectors are separated by narrow luminous ones. When the receiver is correctly tuned, the luminous sectors open to maximum width.

A further development of this device is the dual electron-ray tube, which allows of coarse and fine adjustment (for powerful and medium-power transmitters). It contains two triode systems and two pairs of anode fins. The fluorescent pattern for various conditions is illustrated in Figs. 2a, 2b and 2c.

Wanted Two bayonet sockets for short pin, brass base 01A tubes. Also Bud, National, or Hammarlund 4 or 5 pin regen receiver plug-in coil sets. Ralph Michelson, 19150 Portos Drive, Saratoga, CA. 95070. (408) 867-2883

For Sale AM Broadcasters. Play old radio shows on record or tape through your old favorite set. Solid-state, size of pack of cigarettes and tunable 550-1600 KHz. $11.00 postpaid. Send large #10 SASE for list of radios, tubes, parts available and description of broadcaster. Monthy updated flyer. Stan Lopes, 1201-74 Monument Blvd, Concord, CA. 94520. (415) 825-6865.

Wanted "Construction of Induction Coils and Transformers" by Secor; Same title by Curtis; "Wireless Telegraphy and High Frequency Electricity" by Twining; "Electrical Condensers" by Coursey. Also early electrical and radio magazines. Want list available.

For Sale Clapp-Eastham "Unico Special" single tube battery receiver. SASE for descriptive sheet with photos. Tesla Coil Builders, RD3, Box 181, Glen Falls, NY 12801.

For Sale Riders Manuals Vol 2-9, plus 12 and 13. $60.00 you ship. Pat Stewart, 1404 Ruth, Walla Walla, WA. 99362.

For Sale New items . . Power transformers for sets with 2.5 Volt filament tubes. Upright or half shell mounting. For sets with 4 to 5 tubes, $32.50. For sets with 6 to 9 tubes, $39.00. I also have lacquer sticks for engraved panels or knobs, $3.25. Write Peter Yanczer, 835 Bricken Pl. St. Louis, MO. 63122.

For Sale or Swap RME 69 with matching speaker, (VG) $125. Rare RME 70 (missing S meter), $55. Patterson PR-10 with matching preselector, (VG) $125. National HRO with power supply and 7 coils, (VG) $150. HRO 50T1 with speaker and one coil, $50. Hallicrafters SX-99, $35. AK30 in Pooley cabinet, $130. Collins 310-B3 VFO (1949), $40. Want early ham spark gear. Gary Halverson, 1751 Michon Dr. San Jose, 95124. (408) 266-2218.

For Sale AK35, $45; Radiola III, $70; Radiola IIIA, $80; Weston tube checker, no chart, $20 untested; Garod R.A.F., $140; National NC-183, $120; Emerson Model R, $75; Freshman Masterpiece 5F4, $85; Michigan Midget M-10, $75; Bimini Marine radio telephone Mod 500 Transceiver, $40 (untested); Mission Bell radio, Los Angeles, needs restoration, $65; Aeriola SR, $135; Sonochord Speaker, $65; Airway Broadcast receiver 6 tube set, $95; AK20 bigbox, $95; Photos $1. Send for more description. David McKenzie, 516 South Exeter St, Eustis, FL. 32726. (904) 589-0149.

Wanted Philco Model 90 or 90B cathedral either restored or restorable. Kenneth Stanley, 3502 Appleton Ave. NW, Roanoke, VA. 24017.

FOR SALE- 1940 SCOTT PHANTOM DELUXE IN WARRINGTON CABINET. GOOD CHROME,RESTORED WORKING CONDITION-$350./OFFER.
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FOR SALE- OLD R.H.MACY RADIO-PHONO, UNUSAL-$75. MANY OLD TAPE RECORDERS FOR SALE-CALL FOR SPECIFIC NEEDS. JOHN ECKLAND 969 ADDISON AVE.,PALO ALTO,94301 (415-323-0101)

WILL BUY- ALL COLORS&STYLES BY: FADA, MOTOROLA, FADA, BENDIX,DEWALD, EMERSON, GEROD, SENTINEL, ADDISON, KNIGHT, ETC. MUST BE BAKELITE. WANTED- PINK, BLUE,AND GREEN MIRROR SPARTON RADIOS. ANY DECO MIRRORED GLASS, AND COCA-COLA RADIOS. MARK HONEA, 13201 N.W.81st, PARKVILLE, MO. 64152 (816-891-2441)

WANTED- IF FREQ. COILS AND PWR.SUPPLY FOR HRO. PARTS OR CHASSIS FOR STROMBERG-CARLSON MODL.-641-A. GOOD BC-348 RECIEVER. SCHEMATIC FOR OREGON ELEC. PWR. SUPPLY MODL.-A3. TRANSISTOR RCA GLOBETROTTER PORT. ED ALLISON,5525 20th AVE. SACRAMENTO, CA. 95820 (916-454-1788)

WANTED- RIDER MANUALS. SINGLE OR SET. DAVE FREELS,935 POPLAR, SUNNVALE,CA. 94086. (408-739-6412)

WANTED- AMPLION AR111-AR114,AR-19,AR-65 DRIVERS. EDDY CLEMENT, 6585 VIAU, MONTREAL, H1T-248 PQ, CANADA

WANTED- SINGLE COMPLETE TUBE SHEILD FOR SCOTT 16. DENNIS LARIVIERE,516N. 9th AVE. LAKE WORTH,FL. 33460

WANTED- INFORMATION ON RECIEVER MANUFACURED 1922-39 WITH NAME "MELL-O-TONE". RUSS GODDLIVE, 1401 FRANCHERE PL. SUNNYVALE,CA. 94087

FOR SALE- SCOTT PHANTOM DELUXE. VERY NICE CABINET,GOOD CHROME. WORKS GOOD $400./OFFER. ALSO PHANTOM DELUXE CHASSIS AND SPEAKER,$75. WANTED-DEAD OR ALIVE!- ANY AND ALL MIDWEST RADIOS,CHASSIS,PARTS,CHAIRSIDES. MIKE SIMPSON, 1345 FLOYD AVE. SUNNYVALE,CA. 94087(408-733-6069)

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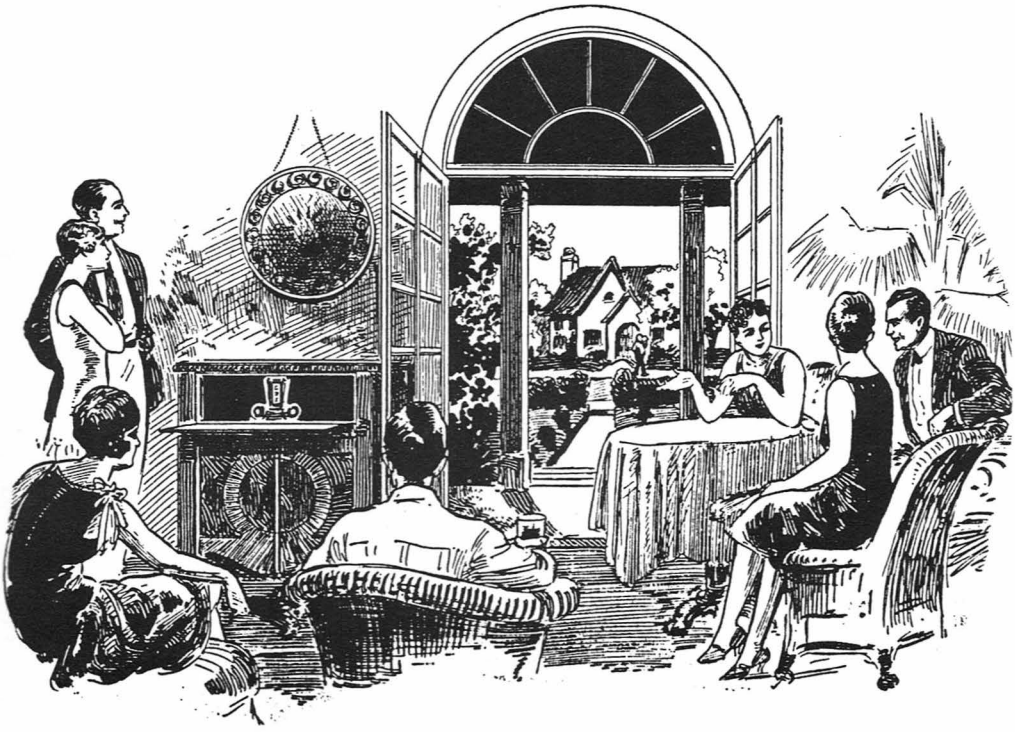

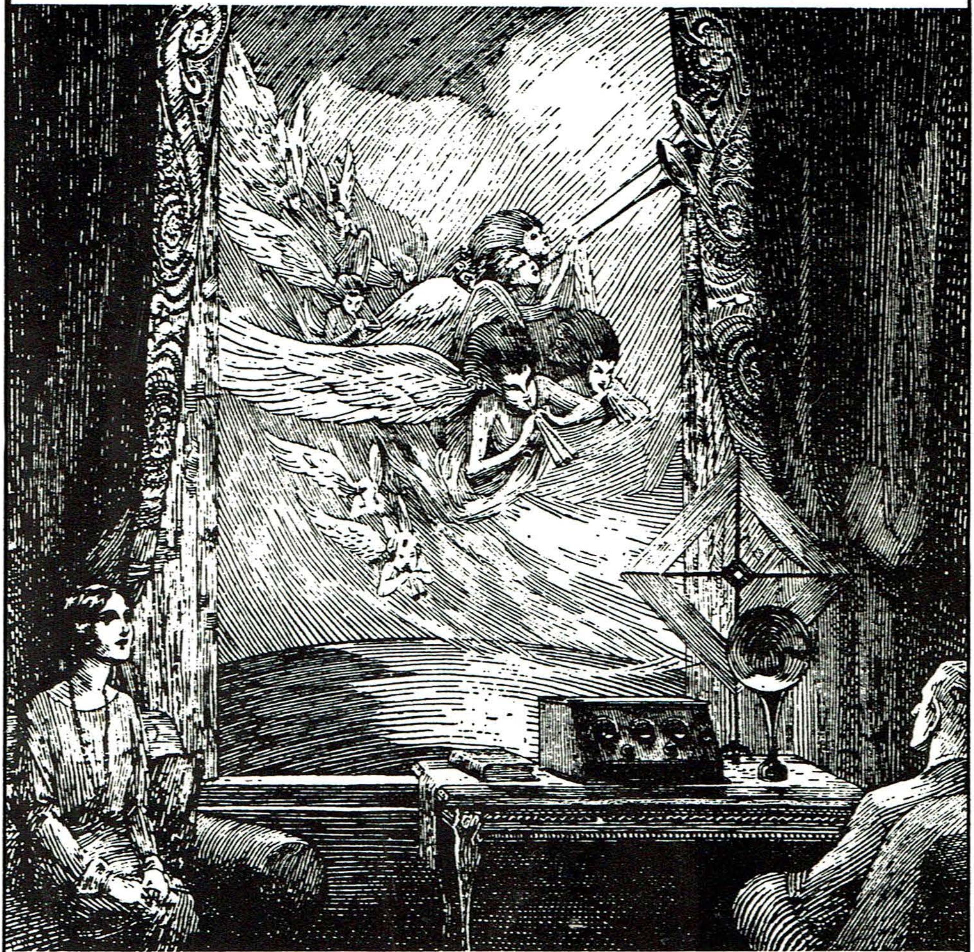

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