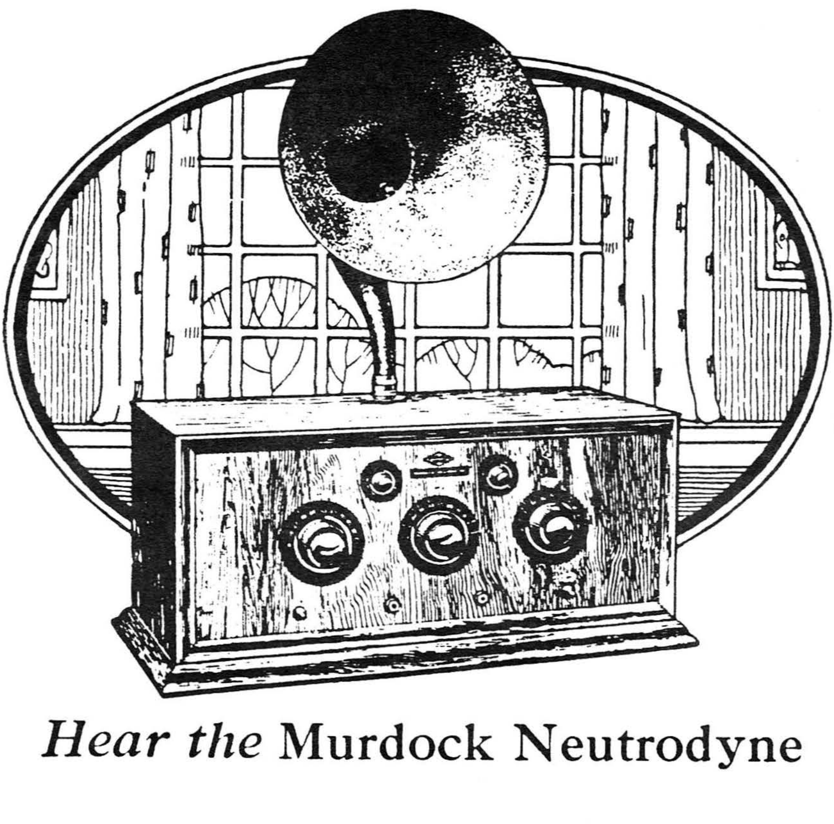
CHRS NEWSLETTER

Editor: Herb Brams
2427 Durant #4
Berkeley, CA 94704

Mar-Apr 1984
Vol. ~~4~~ 8, No. 2

The CHRS Newsletter is published six times a year by the California Historical Radio Society, P.O. Box 1147, Mountain View, CA 94042-1147. Norm Berge, President.



Hear the Murdock Neutrodyne

CALIFORNIA HISTORICAL RADIO SOCIETY

PRESIDENT: NORMAN BERGE
SECRETARY: BOB CROCKETT
TREASURER: JOHN ECKLAND
EDITOR: HERB BRAMS
PHOTOGRAPHY: GEORGE DURFEY

CONTENTS

THE SOCIETY

The California Historical Radio Society is a non-profit corporation chartered in 1974 to promote the preservation of early radio equipment and radio broadcasting. CHRS provides a medium for members to exchange information on the history of radio with emphasis on areas such as collecting, cataloging and restoration of equipment, literature, and programs. Regular swap meets are scheduled four times a year. For further information, write the California Historical Radio Society, P.O. Box 1147, Mountain View, CA 94042-1147.

THE JOURNAL

The official Journal of the California Historical Radio Society is published six times a year and is furnished free to all members. Articles for the Journal are solicited from all members. Appropriate subjects include information on early radio equipment, personalities, or broadcasts, restoration hints, photographs, ads, etc. Material for the Journal should be submitted to the Editor, Herb Brams, 2427 Durant #4, Berkeley, CA 94704.

MEMBERSHIP

Membership correspondance should be addressed to the Treasurer, John Eckland, 969 Addison Ave., Palo Alto, CA 94301.

CATHEDRAL RADIOS

by Herb Brams

Cathedral radios, those tall, rounded-top table radios that are so popular with collectors, first appeared about 1930 and were manufacturered until about 1933-34. Practically all radio manufacturers made sets in this style. Their introduction by a few manufacturers caused great consternation in the radio industry because until this time most sets were large expensive floor models. The industry felt that these small sets (scornfully referred to as "midgets") would cut their profits. However, these were the Depression years and the public could no longer afford the large floor models. The new small sets caught their fancy and they bought them in great numbers, thereby saving the radio industry.

Because of their great popularity cathedral-style radios were made in a wide range of cost and performance, from four-tube TRF budget sets in cheap cabinets selling for about $20 to large, complex, superheterodyne high-fidelity models with short-wave bands and other features, selling as high as $70-80. Some of these sets (e.g. Philco model 16) are superb performers even by today's standards. Part of their great popularity must have been due to the fact that they were small and could be put almost anywhere in the home. There had been other table radios made before this but they were usually relatively large or required an external speaker and so were more difficult to place in the home. The fact that the speaker in cathedral sets was above the chassis made them more compact and allowed the sound to be distributed in a more pleasing manner. Another reason for their popularity is indicated by the particular shape of these sets and by the fact that they were often referred to as "mantel" sets. This suggests that manufacturers gave them an air of prestige by designing them to resemble mantel clocks, a valued possession in the home. The radios could be placed on the fireplace mantelpiece, a central and prestigious location in the home. There were usually wall lamps on each side of the fireplace and so connecting the radio to an AC outlet was no problem.

By 1935 styling had changed and table radios became tall and straight-sided with a flat top (so-called "tombstone" shape). However, a few companies continued the cathedral shape until about 1936. Today, interest in cathedral radios runs high, mainly because of their interesting and often beautiful shape. Let us not forget, however, that these sets were the first self-contained plug-in type of table radio that was readily accepted by the public.

BASIC FEATURES OF RADIOS

Tuned Circuits

Radio broadcast stations are distributed at different frequencies across the broadcast band. What components in radios enable us to select each of the various broadcast signals from all the others?

The basic components involved in frequency selection are inductors and capacitors. Inductors usually consist simply of small coils of wire. Inductors allow low frequencies (i.e. stations at the low end of the broadcast band) to pass through them more easily than high frequencies (stations at the high end of the broadcast band). Capacitors are made of two sets of metal plates separated from each other either by air or by some insulating material. Their action is opposite to that of inductors. Capacitors allow high frequencies to pass through them more easily than low frequencies. The electrical symbols for inductors and capacitors is shown below.

Inductor   Capacitor

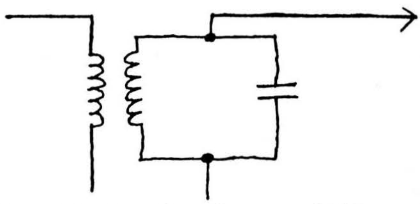
To make these components more efficient in frequency selection, variable inductors and capacitors are used. Variable inductors may have taps along the winding so that connection can be made to only part of the coil. Other methods are also used. Variable capacitors have movable plates so that one set of plates can be moved closer to or farther away from the other. Variable inductors and capacitors give us the effect of having a large number of different inductors and capacitors that we can select at will.

Although we can obtain some separation of frequencies by using either a variable inductor or a variable capacitor by itself, a more effective circuit is obtained by a combination of these two elements. They can be combined in two ways: either head-to-tail in a series circuit or head-to-head and tail-to-tail in a parallel circuit:

Series connection   Parallel connection

In both circuits the inductor allows the passage of low frequencies through itself but not the high, and the capacitor passes high frequencies but not the low. Since the two components are connected together, one might think that their individual effects would cancel each other. This does not occur, however. Instead, the series circuit allows the passage of some intermediate frequency but resists the passage of both high and low frequencies. In contrast, the parallel circuit resists the passage of intermediate frequencies through itself but passes high and low frequencies.

Both series and parallel circuits are used for frequency selection. As an example of the use of a tuned circuit, consider the following:



A current consisting of signals of many different frequencies flows through the inductor on the left. By transformer action a similar current is induced in the parallel tuned circuit on the right. The tuned circuit allows the high and low frequencies to pass through itself so that they are prevented from passing out of the circuit. However, the circuit resists the passage of some intermediate frequency and so this signal is passed out to the next stage in the radio. In practice, variable inductors or capacitors are used so that we can change the intermediate frequency that is passed. In this way we obtain a method of tuning.

By using many tuned circuits, a radio can become very selective; i.e., it can separate one station from others whose frequencies are very close to that of the desired station.

The explanation given above presents an accurate picture of how tuned circuits operate but is somewhat of an oversimplification. The impedance of a series tuned circuit at resonance (i.e., at the "intermediate" frequency) is much lower than that calculated from the impedance of the inductor or capacitor alone. Likewise, the impedance of a parallel tuned at resonance is much higher than that calculated from the impedances of its inductor and capacitor. Thus, the degree of selectivity shown by these circuits is very much greater than would be expected.

HISTORY OF FADA

by Alan Douglas

Frank Angelo D'Andrea's driving ambition was to get rich. From the time at age eleven when he stopped helping his father, a junk dealer, make his rounds collecting scrap, he had a series of jobs: newsboy, prizefighter (using skills acquired as a newsboy), helper in an electroplating shop, and finally, a tool-and-die maker. This last position, at the Frederick Pierce Co. which did experimental work for inventors, led him to radio when the company was asked by Emil Simon to adapt a German-designed radio receiver for wartime production. After making a prototype, the company awarded the contract to the De Forest Co. for production and D'Andrea went along to supervise it.

In 1920 Andrea went into business for himself, making mechanical parts for Marconi and later radio parts for sale to amateurs. Shortening his surname, he adopted his initials F.A.D.A. for his new company. His crystal detector hit the market just when the 1922 radio boom got going, and soon he had a work force of 40 girls turning out 1800 detectors a day, each of which cost him 96 cents to make and which sold for $2.25.

Again in the right place at the right time, Andrea was one of the New York manufacturers that banded together in 1922 to buck RCA, and he persuaded Prof. Alan Hazeltine to develop his neutrodyne invention and license it to them. Fada was the first to market a neutrodyne set: in March 1923, their four-tube, reflex model 160, selling for $120. It was soon joined by three kits: the 165A consisting of three tuned RF coupling transformer assemblies and two neutralizing condensers ($25), the 166A four-tube reflex ($64), and the 167A five-tube non-reflexed Neutrodyne ($65.60).

In August 1924 the 167A gave way to an improved 169A kit with a symmetrical panel layout and binding posts moved to the rear. Next month a line of factory-built models appeared: the 175A five-tuber, the 185A with built-in speaker, and the 195A three-tube reflex. The 160A was still available too.

More than a year later, in Dec. 1925, the 175A and 185A were still being advertised, but both reflexed models had long since been dropped. Reflexing, a good idea on paper, had problems, and by 1925 tubes were no longer so expensive to buy or operate as they had been in 1923.

Andrea continued to run his company until he died in 1965 at the age of 77.

References:

Men Who Made Radio, No. 3, NY Herald-Tribune, Dec. 26, 1926.
The Road to Success, No. 4, NY Post, Dec. 6, 1962.
Biography in the NY Journal-American, April 25, 1965.
Hazeltine the Professor, Harold Wheeler. Hazeltine Corp., 1978.
Ads in Radio News, Radio Broadcast, and other magazines and newspapers.

CHRS STATUS REPORT

As of Jan. 1984 CHRS had 220 members. Our membership fee is $10 per year, and so our income is about $2,200 per year. Newsletter costs are about $200 per issue or $1,200 per year. Swap meet costs are about $100 per meet or $400 per year. This leaves $600 for other expenses.

We want to expand and improve the Newsletter. However, upgrading the Newsletter will increase expenses beyond our present budget. Therefore, we are seeking ways to increase our membership. Can we count on your support to help publicize our Society and find new members?

BOOK REVIEW

The Big Broadcast, 1920-1950. By Frank Buxton and Bill Owen, Viking Press, Avon Books, 1972. 301 pp.

This book is a detailed listing of nationally known radio programs from the earliest days of radio to about 1950. Each listing gives the type of program (comedy, drama, variety, etc.), a list of actors playing the various characters, the date the program was first heard, and notes on any unusual feature of the program. An excerpt from one of the scripts is often included to bring the old memories flooding back. There are special sections on such topics as "Announcers," "Comedy and Comedians," "Commercials," "Musicians," "Networks," "Soap Operas," and "Sound Effects," and many pages of photographs. An extensive bibliography and index are included. The book is unusually informative and fascinating to read, and it will provide many an hour of pleasant reminiscences.

Frank DeMasi

ANTIQUE RADIO SOCIETIES

There are quite a few antique radio societies that regularly publish a newsletter or journal. We would like to make a list of these for people wishing to join and receive their publication. If you have any information on these, send it to H. Brams, 2427 Durant #4, Berkeley, CA 94704. A few examples are listed below, together with addresses to write to for further information.

---Antique Wireless Association, Bruce Roloson, Box 212, Penn Yan, NY 14816.
---Southern California Antique Radio Society, Ed Sheldon, 656 Gravilla Pl., La Jolla, CA 92037.
---Arizona Antique Radio Club, Lee Sharpe, 2224 W. Desert Cove #205, Phoenix, AZ 85029.
---Society of Wireless Pioneers, Inc., P.O. Box 530, Santa Rosa, CA 95402.
---Vintage Radio and Phonograph Society, P.O. Box 5345, Irving, TX 75062.
---Puget Sound Antique Radio Association, 1718 NE 98th St., Seattle, Wash. 98115.
---Antique Radio Club of America, 81 Steeplechase Rd., Devon, PA 19333.
---The Horn Speaker, Jim Cranshaw, 9820 Silver Meadow Dr., Dallas, TX 75217.

USEFUL READING MATERIAL

For those wishing to increase their knowledge of radio theory or servicing techniques, the following books are recommended.

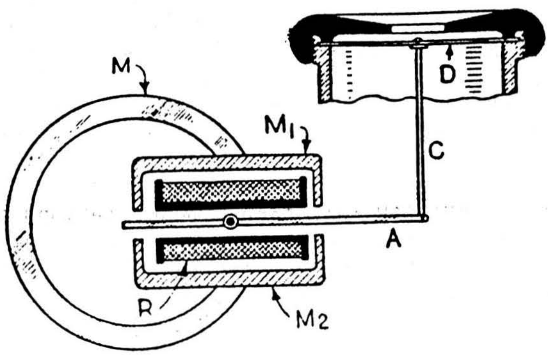
Theory:

RCA Receiving Tube Manual
The Radio Amateur's Handbook, publ. by ARRL
Elements of Radio, by A. Marcus and W. Marcus
Radiotron Designer's Handbook, ed. by F. Langford-Smith
Radio Physics Course, by A. A. Ghirardi

Servicing:

Profitable Radio Troubleshooting, by W. Marcus and A. Levy
Modern Radio Servicing, by A. A. Ghirardi

BALDWIN RECEIVER



Perhaps the most sensitive type of telephone receiver developed. The armature (A) is of soft iron and is pivoted between two U-shaped soft iron pieces (M1, M2) mounted on the ring-shaped horseshoe magnet (M). The armature is acted on by the magnets in response to incoming signals and the movements of the armature are coupled to the mica diaphragm (D) by means of a fine brass wire (C). The usual windings (R) are placed between the two pole pieces, the armature being mounted in a central slot.

When no signals flow through the windings (R), there is no magnetic stress on the armature (A) because this member is suspended centrally between the pieces (M1) and (M2), the magnetic attraction of which are equal. When a signal flows through the windings, it produces a magnetic flux which combines with the flux of the permanent magnet so that the total flux is distributed asymmetrically on both sides of the armature. The result is a rocking movement which is communicated by the wire (C) to the diaphragm, producing audible signals.

These receivers were much used both for headphones and for loudspeaker units.

AUTOMATIC SELECTIVITY CONTROL

In an Atwater Kent cathedral radio, model 627 (1933) the suppressor grid of the pentode mixer tube was connected to the AVC line. Reference to the Radiotron Designer's Handbook (ed. by F. Langford-Smith, 4th ed. 1953) revealed that negative voltages on this grid lower the plate resistance and transconductance of the tube. As a result, the selectivity of the following IF transformer is decreased, resulting in an increased bandwidth. Thus, strong stations producing a large AVC voltage pass through a broad bandwidth in the IF transformer, giving "Hi-Fi" reception. Weak stations put a smaller AVC voltage on the suppressor grid, resulting in a sharper bandwidth, thereby reducing the passage of noise and interference. Other Atwater Kent radios of this vintage also employ this feature.

UNUSUAL DISTORTION

A five tube AC-DC table radio (ca. 1936 vintage) I repaired seemed to work okay but had a slightly garbled sound. When I put my hand near the grid cap of the converter tube (6A7), the sound became extremely distorted. Investigation revealed that the lead from the grid cap had been connected to a dummy pin on the antenna coil; i.e., the signal grid had absolutely no connection to the rest of the set. Evidently, some signal was transferred by capacity from the coil to the dummy pin, enough to give nearly normal operation. The disconnected signal grid apparently had little effect on the operation of the tube or its associated voltages. Soldering the grid cap wire to the appropriate terminal cleared up the problem completely. This discovery demonstrates the importance of testing for continuity in all coils and transformers during restoration.

MUSHY TUNING

A five-tube AC-DC radio (ca. 1946 vintage) had an unusual problem. One could tune in a station and then, turning the knob slightly further, detune it. But then, to tune in the station again, one had to turn back quite a way, more than was used to detune the station originally. The point at which the station came in seemed to move, depending on which way the knob was turned. Slipping of the dial cord was ruled out as well as a double-peaked response due to faulty alignment. The problem turned out to be a loose rotor in the tuning capacitor, allowing the plates to shift position depending on which way the knob was turned. The problem was solved by tightening the screw on the end of the capacitor that holds the rotor plates centered.

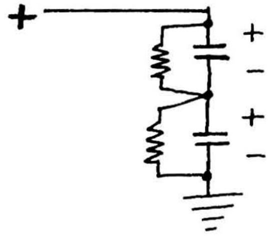
RESTORATION HINTS

Philco 90 I.F. Frequency: In some Philco 90 cathedral radios the IF frequency is 175 kc and in others 260 kc. To determine which one was used, connect a modulated signal generator to the cap of the converter tube through a small (10-50 mmfd) capacitor. Determine whether there is a peak in response around 175 or 260 kc. Once a peak is found, turn the tuning condenser back and forth. If the signal generator is tuned to the correct IF frequency the peak should not be tuned out by varying the tuning condenser. This method can also be used to determine unknown IF frequencies. Usually, these are about 175, 260, or 460 kc.

AD-DC Radio Output Tubes: Output tubes of AC-DC table radios often are gassy. The radio will sound fine for a while but after 15-30 minutes the sound will become distorted. Measure the grid voltage of the output tubes after the set has been playing for a while. If the grid is positive by more than about half a volt, the tube is gassy and should be replaced.

Cleaning Brass, Copper, and Bronze: Mix the juice of one lemon with a teaspoon of salt. Apply this mixture to the metal with a piece of extra-fine steel wool. Wet the entire surface and rub well with steel wool. Let stand for one hour and repeat. Rinse well with water and dry. If salt is not removed completely, dark spots will appear under the finish. Buff to a shine with dry extra-fine steel wool. Clean the metal with a cloth or tissue moistened with denatured alcohol or lacquer thinner. Allow to air-dry. Place in sunlight or under a hot spotlight and apply tung oil to entire surface with a cotton ball. Let dry in the sun or near heat for at least 24 hours.

High Voltage Electrolytic Capacitors: The maximum voltage electrolytic filter capacitors can withstand is usually not more than about 450 volts. Sometimes a higher voltage rating is required. To obtain this, connect two or more capacitors in series, with an equalizing resistor (100,000 ohms, 2W) connected in parallel with each capacitor. The total capacity of the assembly is less than that of each capacitor, being half the value for two capacitors of equal value connected in series.



SERVICING RADIOS: Equipment Needed

Most often used:

Soldering irons - 25w, 100w
Rosin core solder
Solder tool--bent, pointed tip
VTVM
Wire cutter
Wire stripper
Needle-nose pliers

Also:

Rider's manuals
Tubes
Tube tester
Tube manual
Capacitor tester
Signal generator
Regulated high voltage power supply
Chassis punch
Nibbler tool
Vise, hacksaw, drills
Terminal strips
Fuses, fuseholders
Volume controls
Power transformers
Audio output transformers
Resistors

Capacitors - disk type, 500v
.001, .002, .005, .01 mfd, 110 mmfd.

Capacitors - tubular,* axial leads
.01 mfd - 100v, 400v
.02 mfd - 100v, 400v
.05 mfd - 100v, 400v
.1 mfd - 100v, 400v
.2 mfd - 100v, 400v
.5 mfd - 100v

Capacitors - electrolytic
10 mfd - 25v, 450v
20 mfd - 450v
50mfd - 150v

*tubular capacitors - buy high quality mylar types - these are usually small with brightly-colored plastic bodies.

QUESTION COLUMN

The Philco model 90 cathedral radio is a popular set. My Philco service data show three different circuit variations for this model. These differ in the type of tubes used, IF frequency, type of oscillator, and presence of AVC. I have seen about six of these radios; all except one were the second version, with a single type 47 tube as output. The one exception was the first version, with push-pull 45 output tubes. The cabinet of this model was identical to the others. Has anyone seen the third version, with type 35 tubes and push-pull 47 output tubes? Does this look the same as the others? Or was this chassis used only in floor models?

Many Philco radios of the late 30's had a set of eight dark red pushbuttons. Invariably, the tips of these buttons are shrunken, cracked, and discolored. The rest of the button is usually in perfect shape, however. Was the plastic used for these buttons attacked by moisture and bacteria left on them from fingers pressing on the tips? Was the plastic sensitive to light? A few years later the buttons were brown in color. These are always in good condition. Did Philco switch to a new type of plastic?

In many Philco radios of the mid-30's the suppressor (third) grid of the IF amplifier tube was connected to a negative bias voltage rather than being grounded or connected to the cathode. Why was this done? My radio books indicate that negative voltages on the suppressor grid have little effect on the characteristics of the tube. The main effect is to lower the plate resistance of the tube. Was Philco attempting to avoid regeneration in the IF stage by this means?

Plastic radios were made in a variety of colors in addition to the common brown or white. I've seen red, yellow, dark green, light blue, and maroon sets. I have never seen a dark blue set, however. Has anyone seen a radio of this color or of any other unusual color?

ADVERTISEMENTS

For Sale: The following radios have been restored and are in excellent condition. Philco floor model (37-670) $250, Philco cathedral (16B) $250, and the following table models: Crosley wood radio "Fiver," large round gold dial $85, Zenith curved brown plastic radio $75, Remler "Scotty" wood radio $50, Bendix wood clock radio $50, Philco wrinkled plastic radio $35, Sparton black oval plastic radio $35, Zenith dark red plastic radio $35. Michael or Suzanne, 5295 College Ave., Oakland, CA 94618 (415) 652-4333.

For Sale: The following radios have been restored and are in excellent condition. Tombstone radios: RCA model 5T $120, Crosley radio $100, Goldentone radio $90, RCA model T6-9 $75, Emerson white plastic radio $65. Wood table radios: Zenith model 5S126, big round dial $125, Western Air Patrol, round dial $60, Pacific radio, round dial $60, Silvertone, round dial $35. Plastic radios: Airline brown plastic, cute $45, Packard Bell brown plastic $20. Herb Brams, 2427 Durant #4, Berkeley, CA 94704 (415) 841-5396.

For Sale: Philco model 84 cathedral radio, works well, looks good, new capacitors and tubes, $175 plus shipping. Allied Knight radio model D212, multiband, tuning eye, with original shipping box, ca. 1942 vintage, $75 plus shipping. Jim Tuohy (702) 322-6498.

Wanted: Hallicrafters radio, model S-40, designed by Raymond Loewy in 1945, in excellent condition. Hall Acuff, 6833 Dartmoor Way, San Jose, CA 95129 (408) 252-1319 or (408) 942-6320.

Wanted: E.H. Scott non-chrome radios (before 1931) such as World's Record 8, 9, or 10, Symphony, AC-10, Shield Grid 9, etc., E.H. Scott All Wave 15, communications receiver ca. 1941, and Scott literature or memorabilia. Also wanted: radios made in Michigan such as Sparton, Emerola, Wilcox, Michigan, and Lansing, and radios using type 401 tubes. Also wanted: Orchestrion horn speaker. Jim Clark, 1006 Pendleton Dr., Lansing, MI 48917.

Wanted: De Forest radios, Silver and Atwater Kent table models post-1932, give price wanted in first letter. Art Axelman, 19652 Weeburn Lane, Tarzana, CA 91356.

Wanted: Service manual for National Receiver Model NC-183D. C.F. Elgasser, 1920 Fern St., San Diego, CA 92102.

Wanted: Federal horn speaker to match type G10-60 receiver. Harold Johnson, 734 Carter Rd., Arkadelphia, Arkansas 71923.

Wanted: Vernier dial for AC Dayton XL-25 and parts chassis for Stromberg-Carlson model 641A. Edwin Allison, 5525 20th Ave., Sacramento, CA 95820 (916) 454-1788.

Wanted· Any parts and literature pertaining to McMurdo-Silver and E.H. Scott sets made from 1930-1938. John Eckland, 969 Addison Ave., Palo Alto, CA 94301 (415) 323-0101.

For Sale: Magazines: Radio Broadcast 1924-1925 and Radio News 1922-1926, $5.00 each. Saga tube book by Jerry Tyne, hardback, $12.50 each. Two General Radio tuning condensers, 500 pfs, $7.50 each, Three ERLA tuning condensers, 500 pfs, $6.00 each, two National Equicycle tuning condensers, 500 pfs, $7.50 each, three Bremer-Tully toroidal coils (used in the B-T Counterphase circuit), 500 pfs - the set of three coils $25. Shipping costs extra. Floyd Lyons, 754 Post St. #203, San Francisco, CA 94109 (415) 885-1028.

For Sale: RCA Radiola 33, model AR-784 with Thorola speaker, fair condition. Nine professionally bound volumes of Radio News and Radio Craft, misc. Sept. 1924-July 1931, very clean, average of six magazines to each volume. Best Offer. Frank Wojdula, 325 Sylvan Ave., #75, Mtn. View, CA 94041 (415) 964-6317.

For Sale: Grandfather Clock Radio, Westinghouse WR-15, $190. Rider's Manuals I-XVI with I-V abridged, $125/offer. Russ Goodlive, 1401 Franchere Pl., Sunnyvale, CA 94087.

For Sale: Various plastic radios and clock radios of the early 1950's - send for list. Emerson 1930's plastic radio, black, airplane dial, good cond., works, $50.00. Robbins-Meyers electric fan, good cond., brass cage and blades, $75 oak plant stand, $70. Bob Crockett, 1520 Willow Rd., Palo Alto, CA 94304 (415) 324-8235.

For Sale (tentative): Replacements for red pushbuttons found on late 1930's Philco radios, usually in poor condition. These replacements do not look like the original; they are round, dark brown, with a recessed top. They will, however, fit on the pushbutton shafts and present a neat appearance. I have no samples at present; the buttons have to be made up by the manufacturer and the minimum order is $100. If there is sufficient interest, I will order a batch. Their cost will be $6.00 for a set of eight. Let me know how many sets you would be interested in. H. Brams, 2427 Durant #4, Berkeley, CA 94704.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★

All ads should be sent to the Editor, Herb Brams, 2427 Durant #4, Berkeley, CA 94704 at least three weeks before publication.

COMPARE THE

Herald

BY

SWITCH TEST

LOUD CLAIMS for Loud Speakers prove nothing. The proof of the Speaker is in the hearing.

Ask your radio dealer to let you hear the Herald Switch Test. He will shift the same broadcasting from one speaker to another.

Compare the tone, quality, clarity, purity and depth of the HERALD with all other Speakers and judge for yourself.

If your dealer is not equipped to give this test, ask him to write us and our Demonstration Department will stage the Herald Switch Test in his store.

The HERALD operates on any voltage from 45 up, without an external or "A" battery. Merely attach in place of a head-phone.

Hear the HERALD before you decide. The price is $40.

Herald

Herald Laboratories Inc. 74 Lafayette Street, New York