

Get This Magazine Every Week for Complete Broadcasting Programs

RADIO
MAGAZINE

The Daily News

EVERY
MONDAY

SAN FRANCISCO, MONDAY, APRIL 28, 1924

WILL WE SEE OVER THE RADIO?

FREE AIR OF ADVERTISING, NEW SLOGAN

NEW YORK, Apr. 28.—"Free the air of advertising," is one of the slogans of the American Radio Ass'n, which has in view the elimination of commercial exploitation through the medium of radio broadcasting.

"Some action is necessary at this time," according to Alfred M. Caddell, secretary, "to head off what threatens to become a handicap to the radio industry itself. Thousands of complaints are being received from radio fans who object to having their news, music and entertainments interspersed with advertising which belongs properly in the columns of newspapers and magazines.

Stuart Rogers has been appointed chairman of the Anti-advertising Committee, which will ask the Associated Advertising Clubs of America, the American Newspaper Publishers' Ass'n, the Associated Advertising agencies and similar organizations to co-operate with the radio association for the protection of the public.

"It is only natural that with the coming of broadcasting in the United States," Rogers said today, "that advertising and publicity would seek to take advantage of the opportunity offered for advertising their individual firms. While much can be done toward spreading information of general value to the public, the radio public is being saturated with a large amount of matter which can be classified only as pure and unadulterated advertising.

"The reaction to this sort of a program is obvious. In the end the result will be disastrous to the trade itself and the American Radio Ass'n feels that this kind of propaganda should be eliminated from radio programs."

C. of C. Wants Radio

The Chamber of Commerce at Birmingham, Ala., may be the first similar organization in the United States to operate a big radio station, if present plans go through. The organization is negotiating for the purchase of station WSY.

India Gets Pittsburgh

A Calcutta (India) radio fan, understood to have been using a five-valve set, picked up broadcasting from Pittsburgh for a half-hour, according to dispatches received at London, England.

LOOK HOW THEY FOOL US

SCHENECTADY, N. Y., Apr. 28.—A sack of peas and a paper tube.

What do you suppose they are used for?

Station WGY finds them valuable as props in their production of radio plays.

Let us peep behind the scenes of radioland.

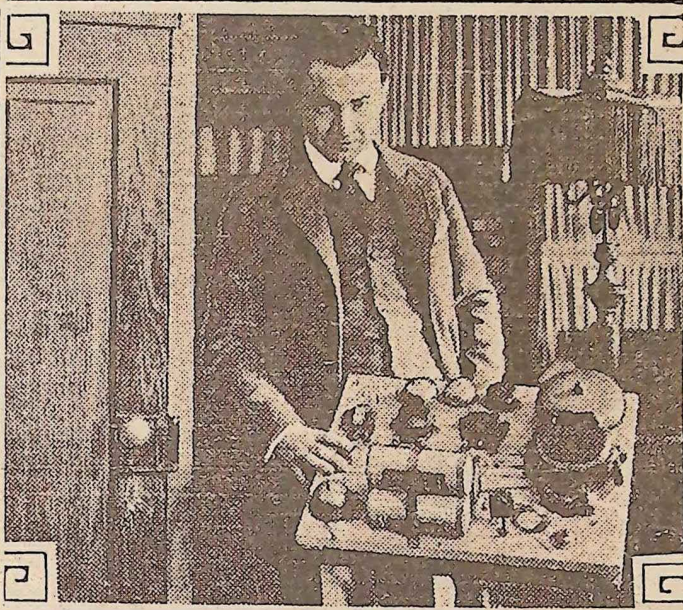
The play opens. A doorbell rings. Someone enters. A conversation ensues, and then the telephone bell rings. Someone leaves the scene, and the door is heard to close. It is in the dead of night, and the chimes strike. Suddenly the clang of a firebell is heard. The sound of crackling flames is so real one can almost smell the smoke.

How is all this done?

Here's the secret:

The bell board consists of a convenient arrangement of five bells of different tones and a buzzer. All are connected to dry cells and may be operated by the pressure of a button. There are door bell, telephone bell, an alarm bell which may be sounded for fire, ambulance or as a burglar alarm, and a clock chime and tap bell.

Fires are reproduced by means of a plumber's gasoline blow torch, the breaking of match sticks and the crushing of paper. The torch produces the effect of rushing wind and flame, and



The intentional noises you hear by radio—slamming doors, ringing bells, whistles and such—are "atmosphere" to make you enjoy plays broadcast by radio. Edward H. Smith, director of the WGY players at Schenectady, N. Y., is shown above with his collection of "atmosphere."

matches and paper, brought close to the microphone, sound like the crackling of burning wood.

The construction of the door prop is most ingenious. Contrary to all civilized ideas, the closing of a door softly is not desirable over the radio. It is

quite important in the radio drama that the sound of the door and clicking of the lock be loud enough to actuate the microphone. The WGY portable door is made of thin oak and has a peculiar resonant quality, and is easily recognized as a door by its sound.

Radio Meets With Farmers' Favor

Radio is fast gaining favor among the farmers of Ohio. A survey made by Statistician West of the State-Federal Crop Reporting Service shows that there is a radio set on six per cent of the farms in Ohio, or about one farmer in 17 has a radio in his home.

The radio companies are flooding the rural districts with salesmen.

Musicians Seek Pay

Pittsburgh's 2500 musicians are seeking increased wages for radio broadcasting engagements. The musicians demand \$8 for a three-hour engagement. The scale is now \$6.

LET'S SWAP

These "Swap" advertisements will be published free of cost until further notice in the Monday Radio Magazine of The Daily News. The article to be traded must be radio equipment. Keep the wording concise.

TO SWAP—Willard rechargeable "A" battery, type CTR125, for WD11-12 tubes, 2 volts. For something of equal value.—M. Finnegan, 120 Eugene Ave., San Francisco.

TO SWAP—Flewellling receiving set mahogany cabinet. Fine for distance. For one r. c. loop or something of equal value.—J. B. Vassallo, 15 Pennsylvania Ave., San Francisco.

TO SWAP—Loose coupler crystal set, complete except for headphones. Will exchange for other radio equipment. P. S. Jones, 1410 Milvia St., Berkeley.

Convicts in Prison Study Over Radio

Several radio fan prisoners at Rockview penitentiary (Penn.), have enrolled in the radio correspondence course of the Pennsylvania State College. They are permitted the use of the prison receiving set for experimental work in connection with their studies. Instructors in college extension work visit the prison regularly.

Lifeboats Safer

Sea disasters will be "enjoyed" hereafter, with radio receiving and sending sets fitted on lifeboats. The new North German Lloyd liner Columbus has six of its lifeboats equipped with radio sets for emergencies.

TRANSMISSION OF LIGHT IS NEW HOPE

BY ISRAEL KLEIN

Radio entertainers face the same problem and difficulty motion picture actors have been confronted with ever since introduction of that popular form of entertainment.

This is the difficulty of trying to put over a "gag" or "line" without expecting immediate applause.

When the movies first came this was considered a perplexing problem. It was difficult to get men and women to act before a camera as though they were performing before a vast audience.

Pantomime, in America, was a new art, and in the movies the actors had to go even beyond pantomime—they had to move their lips in conformance with words they were supposed to talk.

With the passage of time and experience, however, this difficulty has been practically obliterated.

Same Problem

Radio broadcasting, still in its experimental stages, has the same problem. Experienced actors are "stage-struck" when they face the microphone.

Used as they are to appear before a large gathering, they become almost speechless and lose their histrionic faculties for the moment when they have nothing but a microphone in a quiet room to speak to.

Imagine Al Jolson trying to crack a joke to his broadcast audience. To get it over, he must put himself into the spirit of it, he must act the joke just as he acts it on the stage. And Al Jolson's acting of a joke is just as important as the joke itself in getting it over to the audience. Yet it would be to no avail if he had to send it across the air to his audience miles away.

Recognition

Try as best he might to get that joke across, he doesn't know whether he succeeded. There is no applause. Not even those few attendants in the studio may applaud, because they might disturb the performance.

So the actor, so far as he personally is concerned, receives

(Concluded on Page 6, Column 5)

SONG WRITERS SEEK PART OF RADIO PROFIT

BY ROBERT TALLEY

WASHINGTON, Apr. 28.—Are you ready, Professor?

Then strike up the music!

Gee, I'd give the world to be
Like that Old Gang of Mine;
I remember yet, the cash we used to get
Before Radio was in its prime.
Good-bye forever, profits and pay,
Good-bye forever if this bill passes, I say—
Gee, I'd give the world to be
Rich as that Old Gang of Mine!

In not so many words, perhaps, but with this as the burden of their song, the bright young men who manufacture the nation's jazz have laid their plea before the senate committee on patents in opposition to Sen. Dill's bill to make the air free to all.

In other words, they say the radio has cut into their sheet music royalties immensely so they want the broadcasting stations to pay for every time one of their brain-children is cast upon the ethereal waves. The bill is still before congress.

Grouped around E. C. Mills of the American Society of Composers, Publishers and Song Writers, a dozen or more of the nation's jazz kings heard him plead their case.

"Yes," said Mr. Mills, "it used to be that a song hit meant a sale of 3,000,000 or 4,000,000 copies of sheet music, but now if we sell 700,000 we are lucky. Boys and girls are not studying music nowadays;

it's too easy to turn the radio knobs, then roll back the rug and begin to dance."

It was the elite of jazzdom's song writers that surrounded him. They looked like actors and dressed like oil stock salesmen.

There was Irving Berlin, who started out 12 years ago with "Alexander's Ragtime Band" and has been writing catchy ones ever since, including "When I Lost You" and "Oh, How I Hate to Get Up in the Morning."

Con Conrad, who wrote "Papa Love Mama," turned out "Maggie" and perpetrated "Barney Google," was there, too, and so was Irving Caesar, who has had a lot of folks asking, "What Do You Do on Sunday, Mary?"

The expression on Wilbur Donaldson's face seemed to indicate he was thinking that "Nothing Could Be Finer Than to Be in Carolina in the Morning," except a radio royalty on his songs.

The presence of Gene Buck recalled the snappy strains of "Hello, Frisco," and the litting lines of "When It's Tulip Time in Holland," while seated at his right was Silvio Hein, who wrote "I'm Forever Blowing Bubbles," and also that droll ditty with which Raymond Hitchcock used to strut around the stage in "The Beauty Shop" back in 1916—"When You're All Dressed Up and There's No Place to Go."

The old-timers were there, too.

There was Charles K. Harris, who used to make 'em weep with "Just Break the News to Mother," "After the Ball" and "Always in the Way." Of course, the picture wouldn't have been complete without Harry Von Tilzer, who wrote "When the Harvest Days Are Over, Jessie Dear," and also the liquid strains of "Down Where the Wurzbürger Flows," back in the good old days.

Memories of 10 years ago when "Every Little Movement Has a Meaning All Its Own" was waltzing its way across the country were brought back by the presence of Otto Harbach, who was also responsible for "Kid Boots" and "Going Up."

The composers of another kind were represented by Victor Herbert, whose tinkling tunes have put over more than one comic opera, and John Philip Sousa, the march king, who wrote "Stars and Stripes Forever," which did about as much to win the late war as anything else.

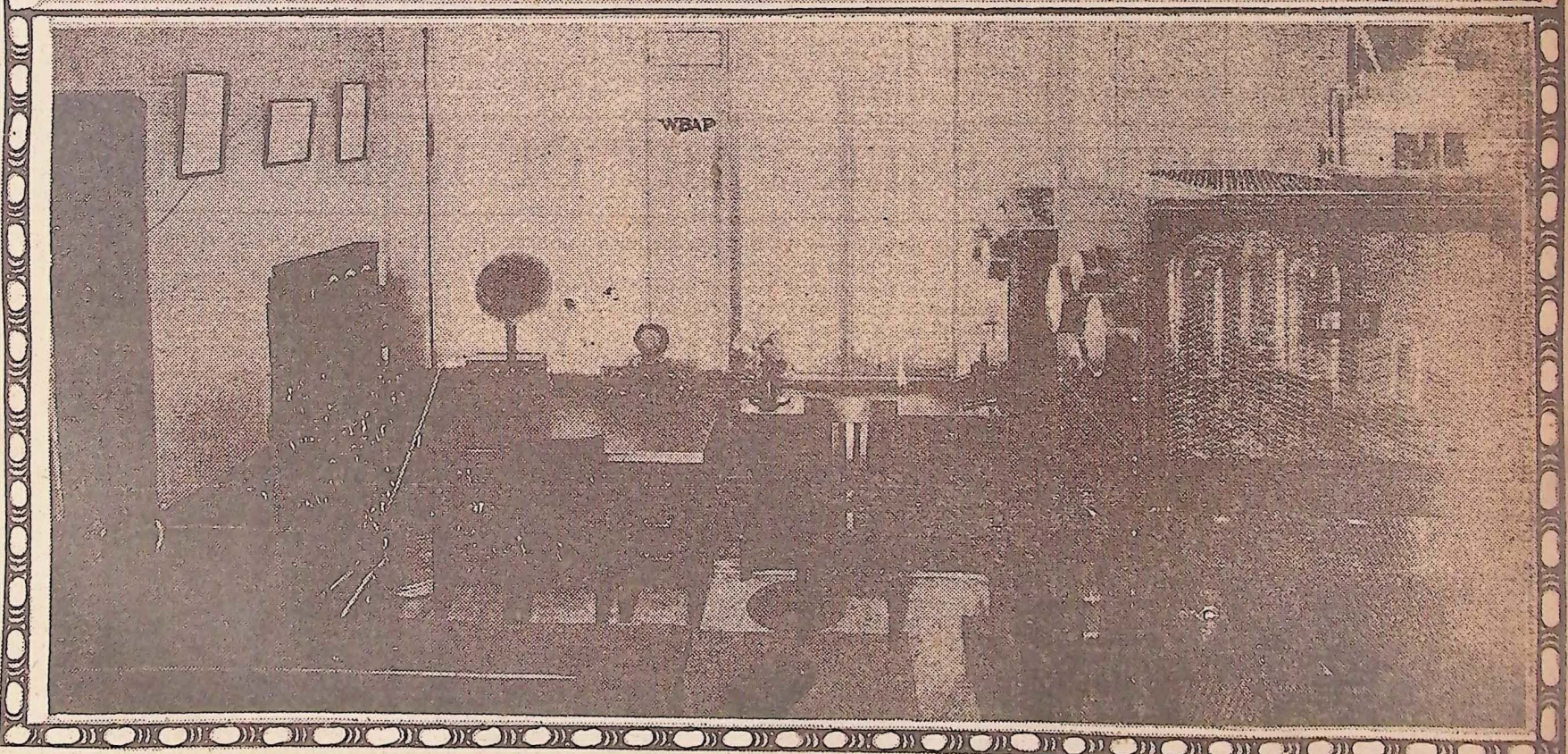
"Yes," testified Mr. Sousa, "I have to pay for my shoes and everything else I buy, so why shouldn't the broadcasters pay me for my music? You say the radio people don't make any profit? Well, well, that's interesting. The radio people charge \$5 for a tube that costs them only \$1 cents to manufacture."

It was also shown that many broadcasting stations are reaping profits on advertising—and so there you are.

Our Invisible Friends



Another page of "inside stuff" from radio stations. Upper left, Hoot Owl Girls at KGW, Portland Oregonian; (right) Alice Shallock, 10, pianist, who played from KPO; (center) KFI's fine studio, and (below) the WBAP control room at Fort Worth.



KGO OFFERING EDUCATION TO SONS OF WEST

Mountains and deserts of the great west need no longer be barriers to anyone seeking an education, for the radio college is now a reality and on Monday nights at 8 o'clock thousands tune in on KGO, the Pacific Coast station of the General Electric Co., and receive instruction in agriculture, language, music, economics and literature.

A course in Spanish, by Prof. Oscar Galeno, is so organized that listeners may send KGO stamped envelopes and receive in return leaflets which will aid them in taking instruction.

Prof. F. L. Griffin, head of the department of agriculture, University of California, conducts the course in agriculture. Among the speakers to be heard are R. L. Adams, "The Cost of Producing Milk," C. L. Roadhouse, "Relation of Dairying to Agriculture and Human Welfare," L. J. Fletcher, "The Farmer as an Engineer," and E. C. Voorhees, "Opportunities in Agriculture for Young Men."

Music Taught
Music is taught by Alice Bumbaugh, instructor of musical history and harmony at Mills college, Oakland, assisted by Carl Anderson. Demonstrations during the lectures will be given by Katherine Urner of the Mills college faculty.

The course in economics will include speakers from the faculty of the University of California, and visiting experts on various economic subjects, under the direction of Edna Kelly Barker.

Wilda Wilson Church has prepared the course in literature, assisted by Dr. Aurelia Rhinehardt, president of Mills college. Joseph M. Jackson, literary editor of the Sunset Magazine and Frederick O'Brien, author of South Sea tales, will contribute talks.

Argentinian Gets Hastings, Neb.

BUENOS AIRES, Apr. 28.—Felix Gunther, a radio fan, living in a suburb of Buenos Aires, using only a detector lamp, recently picked up the American station KFKX in Hastings, Neb. He distinctly heard the announcer, a duet and solos by a man and a woman performer. The program had been retransmitted from an eastern station.

BEHIND SCENES IN STUDIO

SCHENECTADY, N. Y., Apr. 28.—Battling in the ring amid cries of thousands and attempting to deliver a short address over radio amid quiet surroundings of a broadcasting studio, are altogether different, according to Mike McTigue, world's light heavyweight champion boxer, who recently visited WGY, the General Electric broadcasting station here.

Kolin Hager, chief announcer, recalls it as one of the outstanding humorous events of the two years the station has been in existence.

"He was scheduled to deliver a few words on boxing," explained Hager. "Naturally he was the last man in the world we expected would suffer a case of 'microphone fright,' but he did."

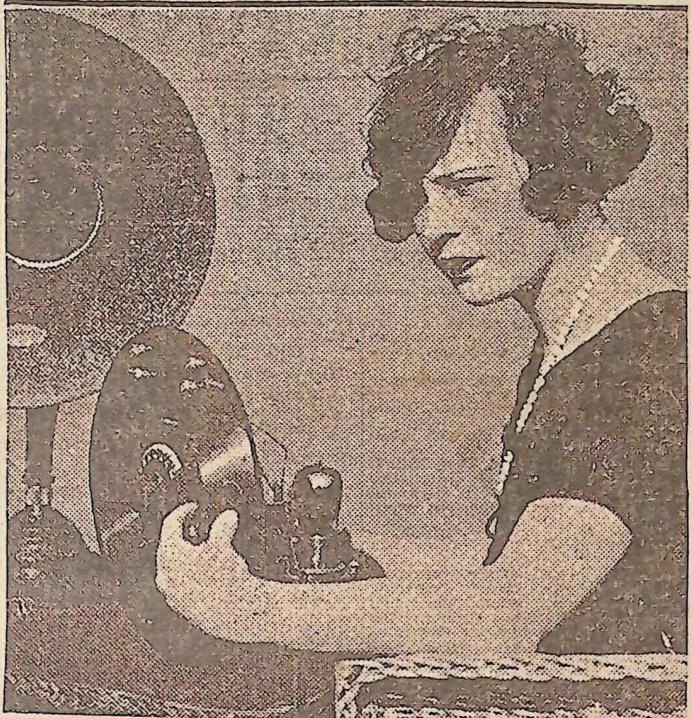
"He stepped up to the pick-up device, but he could not talk. I would rather face Dempsey than talk into that thing," he said. His trainer, who accompanied him to the studio, was compelled to read the written address."

WGy is celebrating the second year of its existence. Hager has been there since institution of the station.

"I made my first announcement on the night of Feb. 21, 1922—with many misgivings," said Hager. "I had rehearsed just what I was going to say 25 or 30 times, and then, when the time arrived, I said something altogether different."

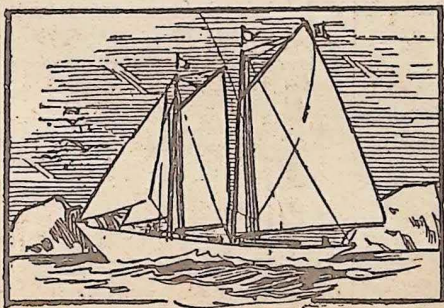
The WGy studio is a comfortably furnished suite of rooms on

THIS SET HOLDS THE RECORD



Whatever else may be said of it, there's no doubt this is a record receiving set. Miss Elma Madsen exhibited it at the New York Radio show recently.

IN TOUCH WITH THE BOWDOIN



NEA Service

MINOT, N. D., Apr. 28.—Leonard H. Weeks, radio amateur of this city, has proved himself one of the few mediums through which Capt. Donald MacMillan and the crew of the Bowdoin, ice-bound 750 miles south of the north pole, are keeping in touch with civilization.

Almost nightly come dots and dashes from the Bowdoin radio operator, Donald Mix, telling the world of the progress the American polar expedition is making. He returns with a program of voice and music which the ship's apparatus can receive.

YOUR FAVORITE RADIO DEALER

Radio Set

3-Tube Radio Set

Used few months; good buy for cash; can hear same.

554 Hill St.

5-Tube Neutrodyne, plays without ground or aerial; brings in Los Angeles and Portland on loud speaker, \$50; 5 tubes and set complete, \$65. Glass case amplifier, \$15; 1-stage also \$7.

WALKER'S

247 Scott St.

Evenings and Sundays

Radio Receiving Set

\$2.50

The Institute of Technology offers to the public a radio set developed by its experts for student use. Remarkable for its range, selectivity and low price. Mail orders filled or hear demonstration at Suite 205, 1161 Market Street. Immediate delivery. Open evenings.

Radio Sets That Kick

All Sets At All Prices

Let Us Put a THOMPSON NEUTRODYNE

in your home and you will never have to kick, for the Thompson is the set with the real kick. Distant stations sound like local. Hear the set speak for itself. See it at 479 Sutter St. Ask for

J. H. Bruce, Radioman

LIBERTY ELECTRIC CO.

479 Sutter St.

Radio Specials

SCIENTIFIC Radio Headset

The world's greatest Headset value \$2.95

Fully guaranteed.

Swedish-American Radio Headset

Complete with Sani- tary Head Band, \$3.35

Regularly sells at \$3.00.

RADIOA, TYPE R. S.

Two-tube Receiving Set, \$21.00

Accessories extra.

DETECTOR AND AMPLIFIER

TUBES (6 volts), manufactured by the Atlantic-Pacific Radio Laboratories (limited supply) \$2.75

Murdoch Crystal Detector, 75c

Knockdown Crystal Detector, 35c

L. S. COHEN'S SONS

1015 Market, near 6th St.

Phone Market 9543

Trial of Radio

Chief Broadcast

HAMILTON, O., Apr. 28.—The first radio trial in history was broadcast from Hamilton recently, when Earl Gaulty, radio inspector, was arraigned before Squire William S. Reed on a charge of speeding.

WRK broadcast the trial.

Japan Gets Newark

NEWARK, N. J., April 28.—The world's long-distance broadcasting record is claimed by Station WOR of Newark, following receipt of a cable from Japan asserting a speech broadcast Saturday was heard in Tokyo, 9000 miles away.

Hiroshi Ando, Japanese radio engineer, cabled that an address delivered in Esperanto by James Benson Sayres at 6:15 Saturday was heard at 8:15 a m on his receiving set, distinctly and clearly.

Do not expect to get 1000 miles radius from a one-tube set during the summer. Receiving over a distance of 200 miles is all that may be expected.

Clean the contacts in the base of the tube, and the prongs on the socket about once a week. This will eliminate chances for unnecessary noises.

Phonograph Records Make Indoor Loop

A novel indoor loop that will prove efficient under all circumstances can be quickly made by the radio novice.

Four 10-inch phonograph records, two sticks three feet long to be used as cross-arms, and an upright supporting rod will be needed.

Cross the two sticks at right angles and fasten them securely with a bolt. The supporting piece may be added at the same time, being fastened with the one bolt. Place the four records on a ta-

RADIO BOOKS

Engineering, Industrial, Technical and Scientific Books

TECHNICAL BOOK COMPANY

Mills Building San Francisco

Phone Garfield 19

Representing

D. Van Nostrand Co., John Wiley & Sons, Inc.; J. B. Lippincott Co., Longmans, Green & Co.

Announcement

We Have Opened at 418 Castro Street

A Radio Store

where we will handle a staple line of Radio Supplies, including the

Atwater-Kent Radiodyne Wonder Set Sold on Terms.

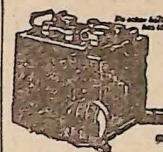
Come in any afternoon or evening and hear the concert.

Webb and Gross

418 Castro Street

Opposite Castro Theater

Recharging



Radio Batteries

50c

Auto Batteries

75c

"A" and "B" Batteries at wholesale prices.

6-volt, 160-amp. hour Batteries, \$14

Day and Night—Phone Pacific 2144

Gerard Battery & Electrical Works
Geary at 13th Ave.

A-1 CRYSTALS

GET DISTANCE

Ideal for Reflex

CRYSTAL SET HOOKUP BLUE PRINT FREE with every order received during week ending May 5, 1924.

A-1 SUPER-SENSITIVE CRYSTAL

SENT POSTPAID, 50c EACH

CALIFORNIA RADIO MINERALS

Harry Grant, Jr.,

901 Oak Grove Ave.,

Burlingame, Cal.

NOTICE—We have been unable to answer all mail inquiries or to advise the many jobbers and dealers whom we are unable to supply at this time.

ALL RETAIL ORDERS FOR A-1 CRYSTALS ARE SHIPPED PROMPTLY BY INSURED MAIL.

CALIFORNIA RADIO MINERALS

Harry Grant, Jr.

A-1 CRYSTALS

GET DISTANCE

Battery Recharging Service

\$1.00

Called for and Delivered

"A" Batteries for Your Radio

100-amp., 6-volt ... \$12.50

200-amp., 6-volt ... \$18.50

New York Pacific Battery Co.

987 Post St.

Prospect 4130

THIS WEEK'S AIR PROGRAMS

Monday, April 28

KPO—Hale Bros., San Francisco (423 Meters)
 12 NOON—Time signals, Scripture.
 1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
 2:30 TO 3:30 P M—Musical program. Violin solos—Sonata, C minor (Op. 45); Allegro; Romanza; Barcarolle (arranged by Leo Ornstein); Swedish folk songs; L. Gitana.
 4:30 TO 5:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 5:30 TO 6:30 P M—Children's hour, stories by Big Brother of KPO, taken from the Book of Knowledge; Fables of Aesop the Slave; answers to children's questions; Merryland, the Fiddler.
 7 TO 7:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 8 TO 9 P M—Talk of Music Week by A. W. Widenham, manager of the San Francisco Symphony Orchestra; organ recital by Theodore J. Irwin, official organist of KPO, at the Wuritzer—March, Maple Leaf Forever; Andantino, D flat (by request); three musical themes will be played in co-operation with music memory contest. Chanson Triste (by request); Pilgrim Chorus, Tannhauser (by request); musical comedy selection, Irene; Symphony Pathétique, Adagio Lamentoso; song, Roses of Picardy; prelude, Tristan and Isolde; Arietta di Balletto; Gluck; Serenata; Hasta Manana. Bass solos, I Have a Rendezvous With Death, Sea Fever, Vale; Noel Sullivan, Theodore J. Irwin, organ accompaniment.
 9 TO 10 P M—Program under the management of Rena Lazelle, by pupils of vocal department of San Francisco Conservatory of Music, assisted by Melva Farwell, flutist.
 Vocal duet from Don Giovanni, Emilio Gavilan, baritone; Alice Talcott, soprano. Daddy's Sweetheart, Rosemary Cunningham. Contralto solos, two Indian songs (arranged by Lianeure), Hazel Wood, flute obligato. Soprano solos, Chinese Mother Goose Rhymes, Alice Talcott, flute solo. Theme and Variations, Melva Farwell. Soprano duets, Where Go the Boats? (Stevenson), Rain (Stevenson), Mrs. Foster and Mrs. Mello. Baritone solo, Songs of the Pyrenees, Emilio Gavilan. Contralto solo, Aria from "Nadeshda," Mrs. Lotus Anderson. Soprano solos, The Nightingale and the Rose, Song of the Shepherd, Lehl, Mrs. Annabelle Turner, flute obligato. Contralto solos, Deep River, De Ole Ark's a-Moverin', Mrs. Margaret Hogan. Flute solo, Nocturne (Op. 9, No. 2), Melva Farwell. Bass solos, Honor and Arms, Invictus, Andrew Robertson. Andalusian song, Mrs. A. Turner.
 10 TO 11 P M—E. Max Bradfield's Palace Hotel orchestra.
KGO—General Electric Co., Oakland (312 Meters)
 1:30 P M—New York Stock Exchange and U. S. Weather Bureau reports.
 3 P M—Musical program. Address, "Boy's Recreation," by A. Hjelte.
 4 TO 5:30 P M—Music by the St. Francis Hotel Dance Orchestra, San Francisco, Henry Halstead, leader.
 6:45 P M—Final reading, stock exchange and weather reports, and news items.
KLX—Oakland Tribune (509 Meters)
 7 TO 7:30 P M—News items; market and financial summary; United States weather bureau report.
 8 TO 10 P M—Program by the University of California Radio Club, broadcast over private leased wires from Stephens Union Hall, university campus, through KLX. Arranged by Blanche Adella Hawkins.
 Campus and college sport news by the A. S. U. C. publicity bureau; "Characteristics of the Birds About the Bay," talk by Charles Keeler; whistling solo by Blanche Adella Hawkins, known as "The American Robin," assisted at the piano by Mildred Jensen; waltz song; half hour of jazz by Claire Debol's orchestra; baritone solos by E. M. Holbrook, (a) "Mother o' Mine"; (b) Kashmiri song; two dramatic readings from "Riley" and "Daly," by Rose Brown; violin solo with bird interpolations—"The Wild Flower," Eleanor Webber, violin; Adella Hawkins, whistler; Helen Crawford, pianist; two dramatic readings from "Kipling" and "Guest," by Rose Brown; violin solos by Eleanor Webber—(a) "The Humming Bird"; (b) "The Call of the Plains; whistling solo by Blanche Adella Hawkins, Mildred Jensen at the piano, "Moon-moths"; baritone solos by E. M. Holbrook—(a) "Roses That Bloom in Picardy"; (b) "Just a Song at Twilight."
DISTANT STATIONS
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
 4:45 TO 5:15 P M—Evening Herald news bulletins.
 5:15 TO 5:45 P M—Examiner news bulletins.
 8 TO 9 P M—Evening Herald concert.
 9 TO 10 P M—Examiner concert.
 10 TO 11 P M—Ambassador-Max Fischer Cocomat Grove orchestra.
KFAE—Washington State College (330 Meters)
 7:30 TO 8:30 P M—"The World Court: What It Will Accomplish," Prof. C. H. Woody. "Spring Work on the Farm," Leonard Hegnauer. Agricultural talk. Readings, department of dramatic art. Songs, Marie Scroggin, Spokane. Instrumental solos.
WBAP—Star-Telegram, Fort Worth, Tex. (476 Meters)
 6:30 TO 6:30 P M—Pupil concert offered by Mrs. Willie Ursey.
 7:30 TO 8:45 P M—Concert by North Texas State Teachers' College orchestra of Denton, Tex.
KFOA—Rhodes, Seattle, Wash. (455 Meters)
 8:30 TO 9:30 P M—"The Bach Society of Seattle presenting a special program of choral music. The works presented will be the celebrated "Missa Brevis," by Palestrina, which will be sung unaccompanied, and selections from the cantata by J. S. Bach with organ accompaniment. The choir numbers some 30 mixed voices and was formed mainly to foster and cultivate a taste for the works of the great masters, especially those of Johann Sebastian Bach. It is the first choir attempting to broadcast the works of J. S. Bach.
 The first of a series of talks on "Filtered Sunshine" will be given by E. L. Weber. Astonishing facts regarding the enviable location of the Pacific Northwest realized by few people. Mr. Weber makes some interesting comparisons with other cities of the United States.
KGW—Morning Oregonian, Portland (492 Meters)
 7:30 P M—Baseball scores, weather forecast and market reports.
 8 P M—Recital by Jane Burns Albert, soprano.
 9:30 P M—Program by musical de-

SAVE THIS COMPLETE SCHEDULE

This is the only COMPLETE broadcasting program published by a California newspaper. Radio fans are urged to preserve this magazine for reference during the week. Its small page size makes The Daily News Radio Magazine a handy accessory to your receiving set. Phone the Circulation Department if you desire another copy. Tell your friends about it.

Tuesday, April 29

KPO—Hale Bros., San Francisco (423 Meters)
 12 NOON—Time signals, Scripture.
 1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
 2:30 TO 3:30 P M—Organ recital by Theodore J. Irwin, KPO official organist, at the Wuritzer: Fox trot, Secrets; waltz, The Skaters; Ballet Egyptian; light opera selection, Ernani; waltz song, When Lights Are Low; selection, Irish Airs; melody; fox trot, Kokomo.
 4:30 TO 5:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 5:30 TO 6:30 P M—Children's hour. Stories by Big Brother of KPO, taken from the Book of Knowledge; The Elf in Hill, the Story of the Months, the Timid Hero.
 6:30 TO 7 P M—Program by Cleveland Six orchestra of the Chandler-Cleveland Motor Co., under direction of Wilt Gunzendorf. Before You Go, Waiting for the Rainbow, Rock-a-Bye My Baby Blues (ballad); piano duet, March of the Minikins, Jones Sisters; From One Till Two; Saxophone solo, Geannina Mia, Wilt Gunzendorf; Say It With a Ukulele.
 7 TO 7:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 8 TO 10 P M—Talk by Admiral W. H. G. Bullard; program by the Olympic Club Glee Club: We Oest Again Tonight; Boys, glee club; On the Sea, Dudley Buck, solo (selected), Frank Muller; Off to Philadelphia (old Irish air); If All the Young Maidens (dedicated to Chicago Mendelssohn Club); Huntley; solo, selected, Harriet Bennett; At the Crossroads, Old Gang of Mine, Erwin Holton; solo, Until, Sometime, Somewhere; waltz, piano solo, La Bien Almee, Friendship, glee club; A. Judson Weller, accompanist; The West, a Nest and You, Farewell Song, Olympia.
 10 TO 11 P M—E. Max Bradfield's Palace Hotel orchestra.
KGO—General Electric Co., Oakland (312 Meters)
 1:30 P M—New York Stock Exchange and U. S. Weather Bureau reports.
 3 TO 10 P M—Program given by the Lions' Club of Berkeley, Cal.: Instrumental selection—Somebody Stole My Gal, Lions' Club Orchestra; Claude Kruse, Arthur Brown and Howard Thurston, saxophones; Arthur Garcia, violin; Herman Reid, drums; Joseph Taylor, banjo; Richard Eisenmayer, piano. Vocal selection—Kentucky Babe, Bohemian Male Quartette; George R. Hunter, first tenor; Philip Ashcroft, second tenor; George C. Pettis, first bass; Scott Beebe, second bass. Vocal solo—Romance, Arthur Garcia. Eva Garcia, accompanist. Readings—(a) How Three Were Made One. (b) A Letter from the South Sea Islands, Irving Whitney. Vocal selection—Winter Song, Bohemian Male Quartette. Contralto solo—Sing to Me, Sing Homer, Ruth Hall Crandall, Eva Garcia, accompanist. Instrumental selection—Linger, Sometime, Lions' Club Orchestra. Address—"Is Happiness for All?" Rev. O. W. S. McCall. Piano solo—Waltz in A Flat, Eva Garcia. Vocal selection—Absence, Bohemian Male Quartette. Soprano solos—(a) Berceuse, from Jocelyn; (b) Syvalin, Mrs. Hugh W. Hogan, Eva Garcia, accompanist. Instrumental selection—Sunkist solo, George C. Pettis. Violin solos—Ave Maria, Arthur Garcia. Readings—(a) This Wife of Mine, (b) If I Were Only Thin. Contralto solo—Friend o' Mine, Ruth Hall Crandall. Vocal selection, West, West, West in California, Bohemian Male Quartette. Instrumental selection—Sunshine of Mine, Lions' Club Orchestra.
 4 TO 5:30 P M—Concert Orchestra of the St. Francis Hotel, San Francisco, Fermin Cardona conducting.
 6:45 P M—Final reading, stock exchange and weather reports, and news items.
 8 P M—Program contributed by Lions' Club of Berkeley, featuring Bohemian Male Quartette.
 10 P M TO 1 A M—Music by the St. Francis Hotel Dance Orchestra, San Francisco, Henry Halstead, leader.
KLX—Oakland Tribune (509 Meters)
 3 TO 5 P M—Baseball scores, all leagues.
 7 TO 7:30 P M—News items; United States Weather Bureau report; market and financial news.
DISTANT STATIONS
KJS—Bible Institute, Los Angeles (360 Meters)
 8 TO 9 P M—Mildred Colville, contralto; Sara Henry, recitations; instrumental selections.
WBAP—Star-Telegram, Fort Worth, Texas (476 Meters)
 5:30 TO 6:30 P M—Concert by Dot Echols McCutchan and assisting artists.
 7:30 TO 8:45 P M—Concert by E. Clyde Whitlock's violin ensemble.
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
 4:45 TO 5:15 P M—Evening Herald news bulletins.
 5:15 TO 5:45 P M—Examiner news bulletins.
 6:45 TO 7:30 P M—Hawaiian program.
 8 TO 9 P M—Ambassador-Max Fischer Cocomat Grove orchestra.
 9 TO 10 P M—Examiner concert.
 10 TO 11 P M—C. Howard Paxton arranging vocal concert.
KGW—Morning Oregonian, Portland (492 Meters)
 11:15 A M—Market Basket.
 11:30 A M—Weather forecast.
 12:30 P M—Concert by Civic Music Club of Portland.
 3:30 P M—Talk by Jeanette P. Cramer, home economics editor of the Oregonian.
 7:30 P M—Baseball scores, weather

forecast and market reports.
 7:45 P M—Talk for farmers, Oregon Agricultural College extension service.
CFAC—Calgary Herald, Calgary, Canada (430 Meters)
 2 P M—Latest news items, grain and cattle prices.
 4:30 TO 5:30 P M—Musical selections.
 8:45 TO 9:45 P M—Red Cross talk and musical numbers.
KHJ—Los Angeles Times, L. A. (395 Meters)
 12:30 TO 1:15 P M—Program presenting Monte Weeks, tenor. Silent the remainder of the day.

Wednesday, April 30

KPO—Hale Bros., San Francisco (423 Meters)
 12 NOON—Time signals, Scripture.
 1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
 2:30 TO 3:30 P M—Jack Falt's Entella Cafe orchestra.
 4:30 TO 5:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 5:30 TO 6:30 P M—Children's hour. Stories by Big Brother of KPO, taken from the Book of Knowledge: The Story of Faithful John, the Shepherd Maid and the Sweep; answers to children's questions.
 7 TO 7:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 8 TO 11 P M—Talk, "Your Boy and Mine," William Elzinga. E. Max Bradfield's Palace Hotel, playing in the Palace Hotel Rose Room Bowl. During intermissions of this orchestra, Jack Delaney, pianist, will play popular numbers. Among his selections will be: If the Rest of the World Don't Want You, Go Back to Mother and Dad (waltz); I'm Going South (fox trot); Nobody's Sweetheart (fox trot); It's a Man Every Time, (fox trot); You're in Love with Everyone (fox trot); Mindin' My Business (fox trot); Tripping Along (waltz); Lovey Come Back (fox trot). Popular songs by Mort Harris.
KGO—General Electric Co., Oakland (312 Meters)
 1:30 P M—New York Stock Exchange and U. S. Weather Bureau reports.
 3 P M—Musical program. Address, "Education and the Community," by Mrs. Edna Alken.
 4 TO 5:30 P M—Concert Orchestra of the St. Francis Hotel, San Francisco, Fermin Cardona conducting.
 6:45 P M—Final reading, stock exchange and weather reports, and news items.
KLX—Oakland Tribune (509 Meters)
 3 TO 5 P M—Baseball scores, all leagues.
 7 TO 7:30 P M—News items; United States Weather Bureau report; market and financial summary.
 8 TO 10 P M—Studio program: Baritone solos by Dean Gross, Mrs. Dean Gross, accompanist—(a) On the Road to Mandalay; (b) "Macusha." Recitation by Fred F. Macubergall—"Spartacus to the Gladiators," piano solos by Lloyd Kremer—(1) Aralia (b) Mazurka; "Psychology in Salesmanship," talk by Mrs. Henri Napier Carmer; vocal solos by Mrs. G. W. McMillan, McMillan, accompanist—(a) Night and Day, (b) Just Awearin' for You, (c) Cherry Ripe; piano solos by Lloyd Kremer—(a) Prelude in C sharp minor, (b) Prelude; baritone solos by Dean Gross, Mrs. Gross, accompanist—(a) Roses of Picardy; (b) Because; selections by Owen Swenson—American theater orchestra, broadcast direct from the orchestra pit over private leased wires through KLX; organ recital (during showing of pictures), broadcast direct from American theater,

over private leased wires through KLX.
DISTANT STATIONS
KEAE—Washington State College, Pullman, Wash. (330 Meters)
 7:30 TO 8:30 P M—"The Outlawry of War," Prof. C. H. Woody. "Finding New Facts for Agriculture," Dean E. C. Johnson. "Two Bouquets of Clover," Lincoln R. Lounsbury. Instrumental music, vocal solos, piano.
WBAP—Star-Telegram, Fort Worth, Tex. (476 Meters)
 5:30 TO 6:30 P M—Concert by Tom Dawson's mandolin orchestra of Weatherford, Tex.
 7:30 TO 8:45 P M—Concert by Dick Gaines dance orchestra.
KFOA—Rhodes, Seattle, Wash. (455 Meters)
 8:30 TO 9:30 P M—A program of vocal music presenting Mrs. Peabody of the Cornish School of Seattle. Myrtle Stewart and Florence Doty will sing a group of popular duet numbers. The second installment of the address on "Filtered Sunshine" will be given by Erwin L. Weber.
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
 4:45 TO 5:15 P M—Evening Herald news bulletins.
 5:15 TO 5:45 P M—Examiner news bulletins.
 6:45 TO 7:30 P M—Nick Harris detective stories and concert.
 8 TO 9 P M—Evening Herald concert.
 9 TO 10 P M—Examiner concert.
 10 TO 11 P M—Hollywood Community orchestra.
 11 TO 12 P M—Ambassador-Max Fischer Cocomat Grove orchestra.
KGW—Morning Oregonian, Portland (492 Meters)
 11:15 A M—Window shopping.
 11:30 A M—Weather forecast.
 12:30 P M—Concert by Darby's orchestra of Cottillon Hall.
 3:30 P M—Children's program.
 7:30 P M—Baseball scores, weather forecast and market reports.
 8 P M—Concert by Columbia Theater All-Artist orchestra.
 9 P M—Alexander Hamilton Institute business talk by James Albert.
 10 P M—Dance music by George Olsen's Metropolitan orchestra of the Hotel Portland.
CFAC—Calgary Herald, Calgary, Canada (430 Meters)
 2 P M—Latest news items, grain and cattle prices.
 4:30 TO 5:30 P M—Red Cross lecture.
 8:45 TO 9:45 P M—Variety program.
KHJ—Los Angeles Times, L. A. (395 Meters)
 12:30 TO 1:15 P M—Program presenting Blanche Nichols, mezzo-soprano.
 2:30 TO 3:30 P M—Program presented through the courtesy of Barker Bros.
 5:30 TO 7:30 P M—Children's program, presenting Evelyn Sheehy, pianist, 15 years old, pupil of Anna Linsbarr. Dick Winslow, juvenile reporter. George W. Hood, reader.
 8 TO 9 P M—Program through the courtesy of Mrs. J. F. Faber, presenting Judge Bledsoe, speaker; Carl Buratti, cornetist; Robert Odell, president of the Board of Education; Burkman Brothers' Hawaiian Quartette.
 9 TO 10 P M—Dr. Mars Baumgardt, lecturer. Appreciation program through the courtesy of Mrs. Cecil Frankel, vice-president of the National Federation of Music.

Thursday, May 1

KPO—Hale Bros., San Francisco (423 Meters)
 12 NOON—Time signals, Scripture.
 1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
 2:30 TO 3:30 P M—Program by Jean Murk and Thelma Pickrle (violin, piano and voice).
 4:30 TO 5:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 5:30 TO 6:30 P M—Children's hour. Stories by Big Brother of KPO, taken from the Book of Knowledge: The Wire That Runs Under the Sea, the Tale of Bob Singleton, Androcles and the Lion.
 7 TO 7:30 P M—Rudy Selger's Fairmont Hotel orchestra.
 8 TO 9 P M—Organ recital by Theodore J. Irwin at the Wuritzer: Swedish Wedding March; fantasy, Scotch Airs. Three musical themes will be played in co-operation with music

HERE, YOU RADIO FANS!

Our Washington Bureau has prepared another bulletin especially for you. It gives a complete up-to-date revised list of all broadcasting stations in the United States and Canada, giving the stations alphabetically by call letter, the owner, location and wave length. This bulletin is separate from another, which tells where and how to get any information you may want about radio. This second booklet contains also a map of radio districts, the international Morse code and other valuable information.

If you want one or both of these bulletins, fill out the coupon below. If you send for only one, enclose five cents in postage stamps; if you want both, send eight cents in stamps.

CLIP COUPON HERE

RADIO EDITOR, Washington Bureau, San Francisco Daily News, 1322 New York-av., Washington, D. C.
 Send me the bulletin (or bulletins) I have checked below, for which I enclose cents in loose postage stamps.
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☐ RADIO BROADCASTING STATIONS.
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memory contest. Andante, C Minor Symphony; Intermezzo, Pas de Deux; waltz, April Smiles; light opera selection, Chimes of Normandy; Minuet in G; Down South; song, Who is Sylvia; old time popular favorites; fox trot, I Love You, from "Little Jemie James."

9 TO 10 P M—Program by the California Federation of Music Clubs, under the management of Mrs. Lillian Birmingham, president of Federation of Music Clubs of California.
 10 TO 11 P M—E. Max Bradfield's Versatile Band, playing in Rose Room Bowl, Palace Hotel.

KGO—General Electric Co., Oakland (312 Meters)
 1:30 P M—New York Stock Exchange and U. S. Weather Bureau reports.
 3 TO 10 P M—Daddy Long-Legs, a comedy in four acts by Jean Webster, presented by KGO Players under the direction of Wilda Wilson Church. Cast—Jervy Pendleton, Roger Noble Burnham; James McBride, Richard Ehlers; Cyrus Wyckoff, J. Spencer Riley; Abner Parsons, David Barnwell; Griggs, Conrad Kahn; Walters, Gerald Malsby; Judy, Rose Brown; Miss Pritchard, Vera Morse; Mrs. Pendleton, Evelyn Avery; Julia Pendleton, Mary Miller; Salie, McBride; Lenore Everett; Mrs. Semple, Mary Harper; Mrs. Lippett, Mrs. Palmer; orphan children at the John Grier Home; Sadie Kate, Roberta Hoyt; Gladia, Helen Bacon; Loretta, Jane Barker; Mamie, Ruth Mason; Freddie Perkins, Barnston Smeaton; instrumental selection, Claremont Orchestra.

Act 1—The dining room of the John Grier Home on Trustees' Day. Instrumental selection, Claremont Orchestra.
 Act 2—Judy's college study; an afternoon in May, one year later. Instrumental selection, Claremont Orchestra.
 Act 3—The sitting room at Lock Willow farm; summer, three years later. Instrumental selection, Claremont Orchestra.
 Act 4—Mr. Pendleton's library; two months later. Instrumental selection, Claremont Orchestra.
 4 TO 5:30 P M—Concert Orchestra of the St. Francis Hotel, San Francisco, Fermin Cardona conducting.
 6:45 P M—Final reading, stock exchange and weather reports, and news items.

8 P M—"Daddy Long-Legs," a four-act comedy, KGO Players Music by Claremont Orchestra.
KLX—Oakland Tribune (509 Meters)
 3 TO 5 P M—Baseball scores, all leagues.
 7 TO 7:30 P M—News items; United States Weather Bureau report, market and financial news.
DISTANT STATIONS
WBAP—Star-Telegram, Fort Worth, Tex. (476 Meters)
 5:30 TO 6:30 P M—Concert by Owen Crockett's Yocoman orchestra.
 7:30 TO 8:45 P M—Concert by the old time fiddlers of Lewisville, Tex.
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
 4:45 TO 5:15 P M—Evening Herald news bulletins.
 5:15 TO 5:45 P M—Examiner news bulletins.
 6:45 TO 7:30 P M—Y. M. C. A. concert; sales lecture.
 8 TO 9 P M—Ambassador Hotel concert.
 9 TO 10 P M—Examiner concert.
 10 TO 11 P M—Concert arranged by Birkel Music Co.

KGW—Morning Oregonian, Portland (492 Meters)
 11:15 A M—Window shopping.
 11:30 A M—Weather forecast.
 12:30 P M—Concert provided by Seiberling-Lucas Music House.
 3:30 P M—Woman's story program. Installment of "The Midlander," by Booth Tarkington.
 7:30 P M—Baseball scores, weather forecast and market reports.
 8 P M—Accordian solos by Johnny Sylvester.
 8:15 P M—Studio program of dance music by George Olsen's Metropolitan orchestra of Hotel Portland; Herman Kenin, director.
 10 P M—Dance music by George Olsen's Metropolitan orchestra of the Hotel Portland; intermission solos by Naomi Miller, soprano.

CFAC—Calgary Herald, Calgary, Canada (430 Meters)
 12 NOON—Latest news items, grain and cattle prices.
 4:30 TO 5:30 P M—Musical selections.
 10 P M—Dance orchestra.
KHJ—Los Angeles Times, L. A. (395 Meters)
 12:30 TO 1:15 P M—News items, weather report and music.
 2:30 TO 3:30 P M—Program presented through the courtesy of Barker Bros.
 5:30 TO 7:30 P M—Music Memory Contest, conducted by Fitzgerald Music Co. Prof. Walter Sylvester Hertzog telling stories of American history. The Hollywood School for Girls Glee Club. Weekly visit of Dickie Brandon, screen juvenile. Bedtime story by Uncle John.
 8 TO 9 P M—Program presented through the courtesy of the Fitzgerald Music Co.
 9 TO 10 P M—Albert Bryant, tenor. Susan Frances White, reader.

Friday, May 2

KPO—Hale Bros., San Francisco (423 Meters)
 12 NOON—Time signals, Scripture.
 12:45 P M—Talk broadcast from the Commonwealth Club luncheon at the Palace Hotel.
 1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
 2:30 TO 3:30 P M—Organ recital by Theodore J. Irwin, official KPO organist, at the Wuritzer: Operatic selection, Cavalleria Rusticana; selection, Old English Airs; Chaconne; waltz song, Sleep; light opera selection, Robin Hood; waltz, Pearl of Iberia; fox trot, There's Yes, Yes in Your Eyes.
 4:30 TO 5:30 P M—Rudy Selger's Fairmont Hotel orchestra.
KLX—Oakland Tribune (509 Meters)
 3 TO 5 P M—Baseball scores, all leagues.
 7 TO 7:30 P M—News items; United States Weather Bureau report; market and financial summary.
 8 TO 10 P M—Special studio program.
 On this program KLX will endeavor to respond to every request that is received up to and including Wednesday, April 30.
 It will be an "Old Favorites" night and the program will be arranged according to the requests received. Anyone who has heard and liked any artist, orchestra, Hawaiian troupe, speaker, dramatist, may write to KLX immediately, requesting the reappearance on this night of the artist or musical organization they liked best during some program of the past, and (Concluded on Page 5, Column 1)

The Radio Column

BY CARLTON E. BUTLER
Radio Engineer

Saturday I explained how the loop aerial picked up and utilized the energy from the waves emitted by the broadcasting station. The statement was made that a loop aerial receives the most energy when it is pointed in the direction of the station.

A very elementary law of electricity explains that whenever a conductor or wire is placed in the field or force surrounding another conductor carrying current, and the current is changed or varied in the current carrying conductor, a current will be set up on the other conductor.

The radio wave from the broadcasting station, lines of electrical force, are traveling at the speed of light to all points of the compass from the transmitting station. When these waves pass around or cut the wire of the loop antenna they induce a current in the wire of the loop.

The oncoming radio wave cuts the wires on one side of the loop before it cuts those on the other side. The time difference between the instant that it cuts the wires on one side and the time it cuts the wires on the opposite side is so small that it would have to be measured in millionths of a second.

This difference in time is sufficient for a phase difference to result. That is, the wave cycle of the front half of the loop will be slightly ahead of the cycle of the opposite half. This will cause a current to flow in the inductance of the receiver in much the same manner as if a regular aerial and ground were used.

If the loops is turned so that it is facing the sending station, then it is obvious that the wave will cut all of the wires at the same time and no phase difference can occur. Then no current will flow through the inductance of the receiver from the two end of the loop and you will not hear the station.

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Australia Near

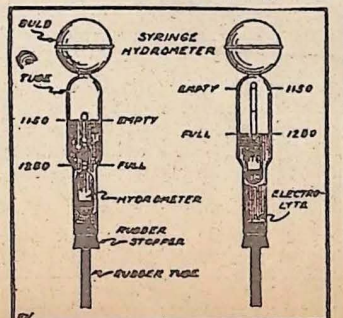
Australia is brought within a flash of a second to the United States by means of radio. It is not uncommon nowadays to transmit to that far-away continent and hear its calls here. Several such instances have been reported.

RADIO FROM THE GROUND UP

Chemical action causes the electric pressure or voltage of a storage battery in the same way as it does with the dry cell. The difference between the two forms of cell lies in the manner in which they are renewed. New chemicals are used for the dry cell; in other words, a new cell replaces the old. But with the storage battery, the chemicals which are changed by the process of supplying current are changed back to their original condition by sending current through the cell in a reverse condition.

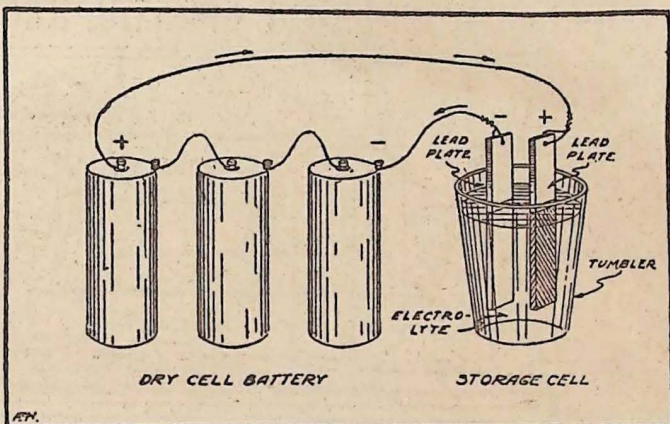
The lead cell is the most common unit which is used in making up a storage battery. A simple experiment which any one may perform will serve to illustrate the actions within the storage cell. Two clean lead strips are immersed in a glass containing a dilute solution of sulphuric acid and the strips connected to a battery of several dry cells.

Changing Plates
Bubbles of gas will be given off from each strip, although a great many more bubbles will come from one than from the other. One of the strips will soon turn dark brown while the other remains light in color. However, the plate which did not change in appearance will be observed, on close inspection, to be covered with spongy lead



instead of the hard metallic lead of which it originally consisted. The plate which turned brown is the positive, and is the plate at which current from the dry battery entered the cell.

The other plate, which was the one from which most of the bubbles were given off, is the negative. While the "charging current" is passing into the cell, the voltmeter would show about two and a half volts across its terminals, but with the current stopped the cell alone will show a voltage of about 2.1. The cell is now capable of delivering a small amount of current for a short time, and if the voltmeter



is left connected so that a small current flows out of the cell through the voltmeter the voltage will gradually become less and less. Finally, no current can be taken from the cell, and the plate which was formerly dark brown has become a 6-volt battery. The amount of service we can obtain from a storage battery depends upon the area of the plates and their number. Radio storage batteries have a capacity of about 80 ampere hours as a rule. This means that we can draw 10 amperes of current for eight hours, or five amperes for 16 hours, or two amperes for 40 hours. After that we have to place the battery on charge and send into it an equivalent amount of current. Ordinarily the battery is charged at the rate of about five amperes, and hence an 80 ampere-hour battery would take 16 hours for a charge.

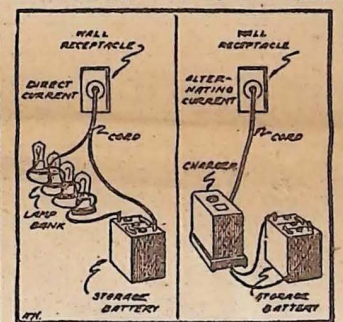
Since sulphuric acid is formed as the battery is charged, the density of the liquid in the cells becomes greater. Therefore anything floating in the liquid would rise higher out of the liquid when the battery is charged than when it is discharged. Similarly, we know that it is much easier to swim in salt water than in fresh water, because the density of the salt water is greater and it has more buoyancy on that account. The hydrometer is the device by which we determine the condition of the storage battery. It is a syringe with a rubber bulb at the top for drawing the liquid from the cell into its glass portion. Here there is a come almost as light as the other one. And the voltmeter will show that the current left the battery at the dark brown or positive plate—just the opposite of the direction of the current

which charged the cell.

The charging current changed the metallic lead of the positive plate into lead peroxide, a brown compound, and changed the negative plate from metallic lead to spongy lead. When the current is drawn from the cell the lead peroxide is changed to lead sulphate, and the spongy lead is changed to lead sulphate. Both of these sulphate compounds are on the plates, and since the two plates are then alike, there is no electric pressure difference between them. Upon charging, the positive again becomes lead peroxide and the negative becomes spongy lead—the sulphate portion of the lead sulphate going into the liquid, or "electrolyte," to form sulphuric acid.

Storage Battery

A storage battery consists of several lead cells whose plates are made much larger than those of the simple experiment just described, and which are hung in glass or hard rubber tanks with sealed tops. The radio storage battery has three



such cells, and since each cell has a voltage of about 2, the radio storage battery small glass float is weighted at the bottom with lead shot and arranged to float vertically. A discharged battery will not float the indi-

cator high out of the water, but the little scale printed on it will show about "1150." This means that the battery is "dead" or discharged, and that the acid in it is only 1.15 times as heavy as pure water.

When the battery is fully charged the float shows about "1280," showing that the electrolyte is then 1.28 times as heavy as water. This is on account of the sulphuric acid present in the water when the cell is charged.

Where "direct current" is supplied for house lighting, the battery may be charged by several 100-watt lamps connected in parallel as a resistance for reducing the 110 volts house supply to a low enough voltage for charging. Most homes, however, have "alternating current," and in that case a vibrating battery charger, or vacuum tube rectifier, may be used for charging the battery.

ANSWERS

Questions addressed to this department will be answered by L. E. Day of the Day Radio Laboratory, 693 Mission-st. No hookups will be printed.

Irene Hildebrand, 2022 Jones-st, asks:

Can long distance be obtained on a home-made radio set?

Many home-made sets are working very well for distance. But your success depends on the type and workmanship.

Mrs. A. J. Reuter, 3136 Geary-st, asks:

I am enclosing diagram of my set. Why is it noisy?

It is a standard type and should not be noisy. Suggest pig-tailing your variometer, radio coupler and variable condenser. Examine your set for improper connections. Perhaps your "B" battery is nearly dead. It grows noisy then.

Subscriber "Z" asks:

- 1—What is meant by DX?
 - 2—What distance should I get with a modified Hartley oscillator?
 - 3—What hookup do you suggest?
- 1—DX is long distance receiving.
- 2—There are so many factors that I could not tell without testing the set.
 - 3—Any standard hookup.

"Broad-Catchers"

"Broad-catchers" is the name a radio advertiser in England gives radio listeners. It might well be adopted for this class, as contrasted to broadcasters.

WEEK'S AIR PROGRAMS, CONTINUED

(Concluded From Page)

every effort will be made to fulfill the request.
KGO—General Electric Co., Oakland (312 Meters)
1:30 P M—New York Stock Exchange and U. S. Weather Bureau reports.
3 P M—Musical program. Reading by Wilda Wilson Church from the drama, "Lightnin'," written by Frank Bacon.
4 TO 5:30 P M—Concert Orchestra of the St. Francis Hotel, San Francisco, Ferdin Cardona conducting.
6:45 P M—Final reading, stock exchange and weather reports, and news items.

DISTANT STATIONS

KHJ—Los Angeles Times, L. A. (395 Meters)
12:30 TO 1:15 P M—Program presented through the courtesy of Barker Bros. Capt. W. F. Cannon will give a "Traffic Talk."
2:30 TO 3:30 P M—Program presented through the courtesy of Barker Bros.
6:30 TO 7:30 P M—Music Memory Contest conducted by the Fitzgerald Music Co. Prof. Walter Sylvester Hertzog, Program through the courtesy of Barker Bros. Weekly visit of Richard Headrick, screen juvenile. Bedtime story by Uncle John.
8 TO 10 P M—Program presented through the courtesy of Barker Bros.
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
4:45 TO 5:15 P M—Evening Herald news bulletins.
5:15 TO 5:45 P M—Examiner news bulletins.
6:45 TO 7:30 P M—Concert.
8 TO 9 P M—Evening Herald concert.
9 TO 10 P M—Examiner concert.
10 TO 11 P M—Vocal and instrumental concert.
11 TO 12 P M—Ambassador-Max Fischer Coconut Grove orchestra.
WBAP—Star-Telegram, Fort Worth, Tex. (476 Meters)
6:30 TO 6:50 P M—Concert by Texas Christian University under arrangement of Prof. H. D. Guellick, head of school of music.
7:30 TO 8:45 P M—Concert by Fred Wagner and his Hawaiian steel guitar players.

KFAE—State College, Pullman, Wash. (330 Meters)

8:30 TO 9:30 P M—Vagabonds' orchestra, Leighton Bailey, Spokane, leader. "Farm Crops," C. L. Vincent. "Is The Pacific Right?" Rev. Clay Palmer. Cornet solos, W. F. Hanson, Michigan, N. D. "Transferring Bees," B. A. Slocum. Instrumental selections. "Highways of the Northwest and Their Condition," H. E. Phelps. Book chat, Alice Webb.
KGW—Morning Oregonian, Portland (492 Meters)
11:15 A M—Market Basket.
11:30 A M—Weather forecast.
12:30 P M—Program by Peck Holton's orchestra of the Winter Garden.
3:30 P M—Lecture by Esther B. Cooley, clothing expert extension service, Oregon Agricultural College; subject, "Who Notched the Coat Lapel?"
7:30 P M—Baseball scores, weather forecast and market reports.
8 P M—Lecture provided by Portland School of Social Work.
8:30 TO 10:30 P M—Silent.
10:30 P M—Hoot Owls.
CFAC—Calgary Herald, Calgary, Canada (430 Meters)
2 P M—Latest news items, grain and cattle prices.
4:30 TO 5:30 P M—Musical selections.
Silent night.

Saturday, May 3

KPO—Hale Bros., San Francisco (423 Meters)
12 NOON—Time signals, Scripture.
1 TO 2 P M—Rudy Selger's Fairmont Hotel orchestra.
2:30 TO 3:30 P M—Program by United States Naval Station Band, Mare Island, Cal.; Thomas G. O'Leary, director; March, Pasadena Day; selection, Lucrezia Borgia; fox trot, Lovey Came Back; waltz, Buenos Seductor (Mexican); fox trot, Linger While; selection, Hawaiian (compiled and arranged by M. L. Lake); Smear Swanke Pete.
3:30 TO 5:30 P M—Tea dansant; E. Max Bradfield's Versatile Band playing from the Palace Hotel Rose Room Bowl.
8 P M TO 12 M—Dance music by Art Waldner and his popular dance orchestra. During intermission the KPO Trio, Bennie Berman, Jimmie

KUO

KUO—S. F. Examiner (360 Meters)

Daily except Sunday, Monday and Saturday
9:05 TO 9:20 A M—Weather forecast and news bulletin.
11:00 TO 11:30 A M—Market reports.
3:30 TO 3:50 P M—Sporting news and financial bulletin.
6:30 TO 6:50 P M—Sporting news and financial report.
6:40 P M—Weather forecast.
Monday Only
9:05 TO 9:20 A M—Weather forecast and news bulletin.
11:00 TO 11:30 A M—Market reports.
3:30 TO 3:50 P M—Sporting news and financial bulletin.
6:45 TO 6:50 P M—Sporting news and financial report.
6:40 P M—Weather forecast.
Saturday Only
9:05 TO 9:20 A M—Weather forecast and news bulletin.
3:30 TO 3:45 P M—Sporting news.
6:30 TO 6:50 P M—Sporting news and financial report.
6:40 P M—Weather forecast.
Sunday Only
9:05 A M—Weather forecast.
6:40 P M—Weather forecast.

Raymond and Harry Hume, will sing popular songs.

KGO—General Electric Co., Oakland (312 Meters)
12:30 NOON—New York Stock Exchange and U. S. Weather Bureau reports.
3 TO 10 P M—Program furnished by the Plymouth Congregational Church, Oakland, Cal. Rev. Harry S. McCready, minister; Lowell Redfield, director of music. Quartette; Dorothy Buechner, soprano; Catherine Peterson, alto; Merville Yetter, tenor; Lowell Redfield, baritone; accompanist, Arthur McHoul; assistant pianist, Rosamond Gilmour.
Part 1—Baritone solo, Invictus, Lowell Redfield; soprano solo, Jewel Song from Faust, Dorothy Buechner; due for tenor and baritone, Tuscan Folk Song, Merville Yetter and Lowell

Redfield; piano solo, Rosamond Gilmour; tenor solo, Mattinata, Merville Yetter; alto solo, My Love Is a Muleteer, Catherine Peterson; original reading, "A Connecticut Yankee in California," Harry S. McCready; due for soprano and alto, By the Waters of Minnetonka, Dorothy Buechner and Catherine Peterson; piano solo, Country Gardens, Arthur McHoul.
Part 2—Song cycle for mixed quartette, Love Songs (Liebeslieder), sung by the Plymouth Congregational Church Quartette, Dorothy Buechner, soprano; Catherine Peterson, alto; Merville Yetter, tenor; Lowell Redfield, baritone; Arthur McHoul and Rosamond Gilmour, accompanists; Lowell Redfield, director.
4 TO 5:30 P M—Concert Orchestra of the St. Francis Hotel, San Francisco, Ferdin Cardona conducting.
8 P M—Program furnished by the Plymouth Congregational Church, Oakland, featuring a song cycle by the mixed chorus of the Plymouth Congregational Church.
10 P M TO 1 A M—Music by the St. Francis Hotel Dance Orchestra, San Francisco, Henry Halstead, leader.
KLX—Oakland Tribune (509 Meters)
3 TO 5 P M—Baseball scores, all leagues.
7 TO 7:30 P M—News items; Unfitted States Weather Bureau report.

DISTANT STATIONS

KFOA—Rhodes, Seattle, Wash. (455 Meters)
12 M—A special midnight matinee of late song hits of the Leo Feist Publishing Co. Leo Feist will listen in for this Pacific coast program at his home in Mt. Vernon, N. Y. A special receiving equipment will also be installed in the Boston office of the Leo Feist Publishing Co.
KFI—Earle C. Anthony, Inc., Los Angeles (469 Meters)
4:45 TO 5:15 P M—Evening Herald news bulletins.
5:15 TO 5:45 P M—Examiner news bulletins.
6:45 TO 7:30 P M—Vocal concert.
8 TO 9 P M—Gardiner Hart, baritone, arranging program.
9 TO 10 P M—Examiner concert.
10 TO 11 P M—Popular concert.
11 TO 12 P M—Ambassador-Max Fischer Coconut Grove orchestra.
KHJ—Los Angeles Times, L. A. (395 Meters)
12:30 TO 1:15 P M—Special pro-

gram for Music week arranged through the courtesy of R. E. Wales, presenting Gladys Blackwell Pickering, soprano, and Raymond Harmon, tenor.

2:30 TO 3:30 P M—Matinee musical.

6:30 TO 7:30 P M—Children's program. Music Memory Contest conducted by Fitzgerald Music Co. Prof. Walter Sylvester Hertzog, telling stories of American history. Kathryn Sawyer, 4 years old, reader. Caryl Boardman, pianist, 12 years old, pupil of Clara Gordon Seefeld. John T. Brown, harmonica; bedtime story by Uncle John.

8 TO 10 P M—Program arranged through the courtesy of the Paul G. Hoffman Co.

KGW—Morning Oregonian, Portland (492 Meters)

11:30 A M—Weather forecast.

3 P M—Special musical program.

3:30 P M—Children's program. Story by Aunt Nell.

10 P M—Baseball scores, weather forecast and dance music by George Olsen's Metropolitan orchestra of Hotel Portland (two hours).

CFAC—Calgary Herald, Calgary, Canada (430 Meters)

2 P M—Latest news items, grain and cattle prices.

Sunday, May 4

KPO—Hale Bros., San Francisco (423 Meters)

11 TO 12—Organ prelude, Theodore J. Irwin. Prayers and sermon, "Calm Amidst the Storm," by Rev. A. W. Sarlander, pastor of the Emanuel Evangelical Church of San Francisco. Solos by Mr. Syl Burkenroad, basso.

8:30 TO 10 P M—Rudy Selger's Fairmont Hotel Orchestra, Oakland, KGO—General Electric Co., (312 Meters)

3:30 TO 4:30 P M—KGO Little Symphony Orchestra, direction Carl Rhodhamel.

KLX—Oakland Tribune (509 Meters)

9:30 TO 10 P M—Rev. John L. Snape, First Baptist Church of Oakland.

DISTANT STATIONS

CFAC—Calgary Herald, Calgary, Canada (430 Meters)

12 NOON—First Baptist Church.

8:30 P M—Knox Church.

HERE'S A SHARP TUNING CRYSTAL RECEIVER

A great many people are under the impression that a crystal set can be thrown together with any kind of apparatus and will work satisfactorily. Also that good material and careful workmanship is only necessary with a tube receiver.

This together with a general impression that a crystal receiving set can only bring in the local concerts, has deterred many from building radio receivers using a crystal detector. A great many fans report that they are hearing concerts regularly from distances of over 100 miles with this type of set.

A great deal of this may be due to the energy from a reradiating receiving set nearby. The question of whether the crystal receiving set itself is capable of pulling in the distant stations unaided, is under considerable discussion.

I have heard broadcast music from a distance of 90 miles with the above receiving set in a district where there were no vacuum tube receivers within a distance of ten miles. Be that as it may, you will make no mistake in constructing this type of a receiver, as there are many other things in its favor.

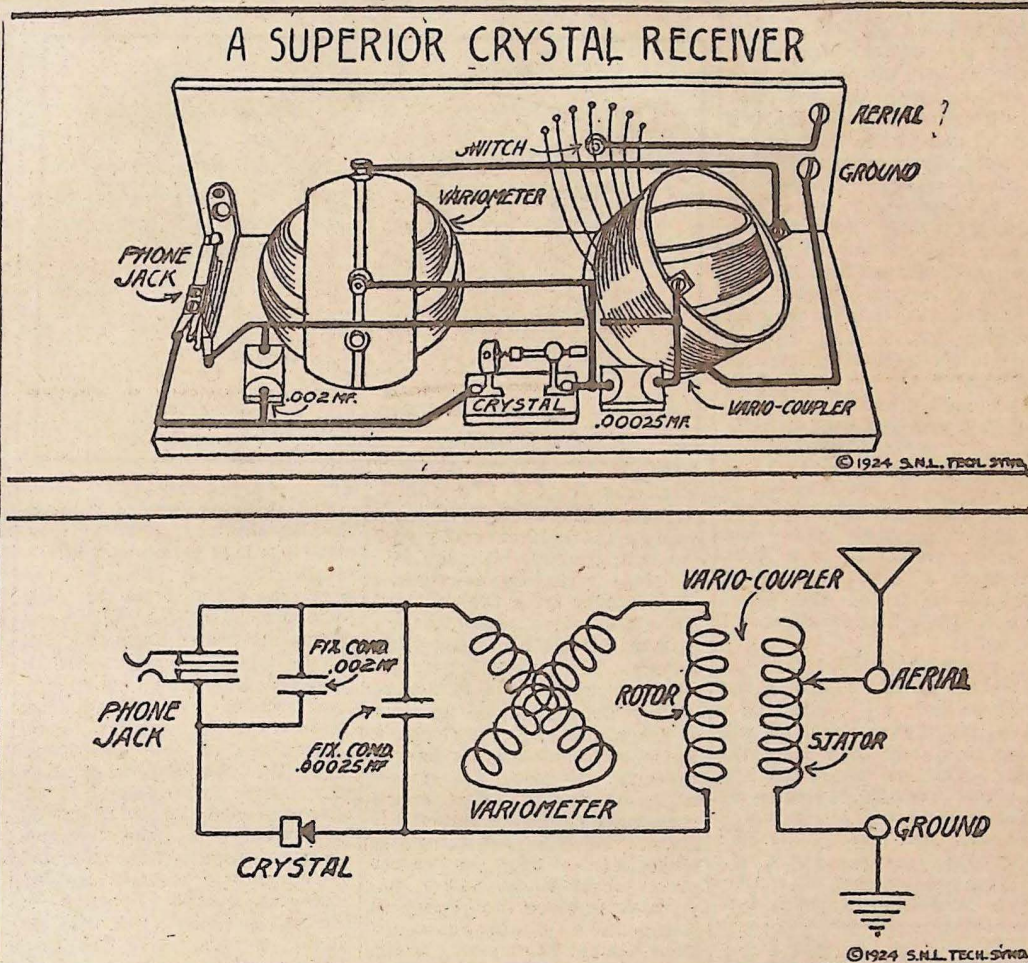
No Upkeep Cost

There are no batteries or tubes to replace with this receiver. The first cost is the last, with the exception of wearing out a telephone cord or the replacement of an aerial once in several years.

The cash investment is very low, there are no upkeep charges such as recharging a battery, and the parts are all standard and can be converted into a tube receiving set at any time without discarding anything but the crystal detector.

Sharp Tuning Necessary

The amount of energy that is



obtained from a crystal receiving set can never be more, and is always less, than the amount that is received from the antenna. Unlike a vacuum tube set the crystal receiver cannot amplify the signals as well as detecting them.

For this reason alone the set

should be carefully constructed to eliminate any possible losses.

Why the impression that crude tuning apparatus can be used with a crystal receiver is hard to understand. The most efficient type of a tuner should be used to conserve the weak signals received. For the same

reason the tuner should be capable of tuning sharply.

When a single slide tuning coil is used for the inductance of a tube receiving set you will find that it tunes very broadly. The same will be true of a crystal receiver, only more so, due to the fact that it is not

possible to secure regeneration with a crystal.

Good Aerial and Ground Needed

The same holds true with the aerial and ground installation. Be sure that your aerial and ground are as good as if you were installing it for the best vacuum tube receiver. To make doubly sure install three or four ground connections on different sources of ground and connect them all together.

A single wire antenna from 100 to 200 feet in length, including length of lead, will be satisfactory. Be sure that the wires are free from surrounding objects, such as trees, buildings, etc., and that it is up in the air at least 30 feet.

Apparatus Required

A variocoupler, a variometer, switch lever, switch contacts, binding posts, phone jack and a crystal detector is all of the apparatus necessary to construct this receiver. The variometer and variocoupler may be of the wooden or moulded type, but obtain the best of parts the same as if you were constructing a vacuum tube receiver.

The apparatus is plainly shown in the picture diagram with all connections, so that additional information as to how to construct the receiver should be unnecessary. Carefully solder all connections and use large wire in connecting up the various pieces of apparatus.

Do not touch the surface of the crystal with your hands. If you do you will deposit a film of oil on the surface that will greatly reduce the efficiency of the crystal as a detector.

Build this set, then watch for later article which will show how to change this set into a tube receiver.

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HAMS PROBING MYSTERIES OF RADIO WORLD

HARTFORD, Conn., Apr. 28. —Believing that the radio problems affecting the transmission and reception of signals are a long way from being solved to the entire satisfaction of the radio public, the technical department of the American Radio Relay League is giving an increasing amount of thought to the development of its experimental section. The most bothersome questions have been classified and distributed for detailed investigation.

The fact that the experimental section of the A. R. R. L. consists of highly skilled radio men, variously located over a wide area and having access to the most improved type of laboratory equipment gives rise to the opinion that hitherto little known fields in radio will be explored and much valuable information gained from aggressive application to the subjects outlined.

The various phenomena connected with radio reception will be studied under a variety of weather conditions by men whose different geographic locations add much to the importance and value of the data gained in this manner. The effect of the moon's phases upon reception, signal strength in daylight, dead spots and efficiency of wave lengths below 90 meters will be studied.

The experimenters have been asked to conduct tests with filters, rectifiers, counterpoises, special coils and helices. Included as a part of the current radio work it has been suggested that information be sought as to the desirable material for condenser insulation, best disposition of this material, effect of frequency upon condenser resistance, effect of the material and thickness upon coil resistance and other kindred subjects.

Radio Protests

Radio manufacturers have entered a protest against the plan to tax radio instruments. The proposed tax, arranged by the Senate finance committee, would bring in an additional revenue of \$10,000,000 from this industry.

TOOLS YOU NEED TO BUILD

BY DAVID DIETZ

Science Editor, The Daily News

The ranks of radio fans are growing continuously. This means that there are as many beginners in radio at the present time as there are experienced amateurs.

The experienced amateur needs only a hook-up and he can proceed to build a set.

The matter of panel design is an old story to him. As soon as he looks at the hook-up, he visualizes the completed set.

It doesn't even matter to him whether values for condensers, grid leaks and the like are given. He knows enough about general radio practice to compute these for himself.

But this isn't true of the beginner. Especially of the green novice who says, "Well, I guess I'll get into this radio craze, too."

To him, radio diagrams are hopeless puzzles. All radio apparatus look alike. And the design of a panel is about as simple as the design of a dirigible balloon.

Consequently this department has decided to run a series of articles designed to help the beginner get acquainted with radio.

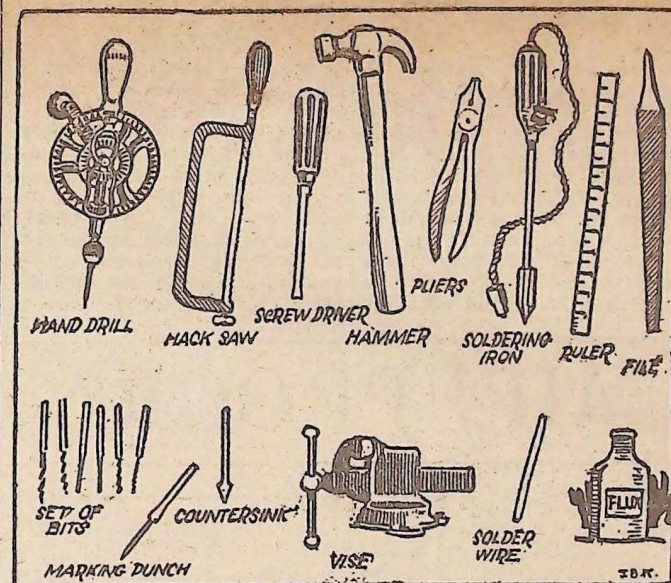
The first thing the radio amateur must have is a set of tools. An elaborate equipment is not required. But unless the amateur has a fairly good outfit, he cannot build a radio set which will be either neat in appearance or efficient in operation.

If the amateur can set up a little workshop, so much the better. A corner of the cellar makes an excellent workshop.

A work bench is also advisable.

An old kitchen table makes an excellent work bench. If the legs of the table have become wobbly, get some 2x4 stock and put in cross braces.

However, there is very little heavy work connected with the making of a radio set, and the work can be carried on easily enough in the kitchen without



doing damage to the furniture.

The following tools are needed for building radio sets:

One hack-saw.
One screwdriver.
One hammer.
One pair pliers.

One hand drill and set of bits. The following sizes are needed: three-eighths, one-quarter, three-sixteenths, five-thirty-seconds, and one-eighth. Also one countersink.

One marking punch.
One soldering iron, soldering wire and flux. (An electric soldering iron is the handiest.)
One ruler. An ordinary 12-inch ruler is sufficient.
One flat file.

Other Aids

The list just given includes the tools that are absolutely essential to the building of a radio set.

Other tools can be added to the equipment if the amateur wishes. These make the work simpler.

A vise will be found a convenience. A small vise which fastens to the edge of the table by means of a set screw, is the proper type to get.

A set of socket wrenches will also be found handy. Frequently in tightening connections it is difficult to get at the lock-nut

with the pliers.

Cabinets

The socket wrench is most convenient in such cases.

The tools needed are only those required for drilling and sawing panels and bases and for mounting instruments and making connections.

It is assumed that the amateur will use a panel made of some insulating material and that the amateur can get a piece of smooth board for the base.

If the amateur wishes also to build containing cabinets for his radio set, the usual set of woodworking tools such as any carpenter uses must be obtained also.

These include plane, crosscut saw, vise and try-square.

Care

A word should be said about the care of tools. For unless they are taken care of they will not give good service.

Get some sort of cabinet for the tools. A small empty box can be fitted up for such a cabinet.

Arrange it in such a way that each tool fits into a definite place. Do not throw them in one on top of the other.

And always keep them in a dry place. Moisture will make them rust.

Illustrated Air Programs Soon

(Concluded From Page 1)

no recognition, no assurance of his success or intimation of failure.

But, perhaps, this is only parallel to what the movie actors went through in the primary stages of that industry. Perhaps radio actors will get used to this bothersome, nerve-racking silence which they get in reply to their work. Perhaps the mash notes and publicity movie actors get now will be duplicated in the case of radio actors.

More likely there will come a time when sight will be transmitted by radio, just as there is coming the day when sound will be included with movie performances, when the actors' voices will be heard while their actions are projected on the screen.

Some optimistic inventors are at work on some sort of apparatus to effect these results.

Then, it is hoped, the actor will be seen by the radio audience, as well as heard—Al Jolson's jokes, for instance, will get over fully as well as before an immediate theater gathering.

And even more, it may be arranged so the broadcasting actor might be able to see his multitudinous, scattered audience, enjoy their applause and be encouraged to better performances.

It is almost too much to expect, but—

You never can tell.

WAVELETS

Hanwell (Eng.) fire department has a radio alarm system.

An engine bell is the signal for entering and signing off, adopted by CKCH, Ottawa.

Arrangement and beauty of a receiving set should be secondary to its efficiency.

For every dollar spent on furniture in this country, 33c go for radio equipment.

It is estimated some 30,000,000 vacuum tubes are in use in this country.

THE FUTURE OF RADIO---By Gen. Harbord

BY GEN. JAMES G. HARBORD

Pres. Radio Corp. of America
(In Farm and Fireside)

I believe that radio's greatest opportunity lies in its usefulness to the farm. I believe that radio broadcasting is destined to become a greater boon to the farm than to the city home. It can be made a thing of greater benefit and more practical use to the thirty-nine millions of you who live on farms than to the rest of us who live in cities. And this very soon.

Those of us who are trying to direct this gigantic new industry that has sprung up over night have been thinking about your problems and your needs—about how radio can be made to serve you.

We have just completed some nation-wide inquiries on the subject of how radio can help you farmers. We have asked questions of thousands of farmers, school teachers, agricultural professors, farm paper editors, farm agents, Grange officials, country editors and bankers. Ordinarily common sense tells me—"farm grown" myself—what a blessing radio can be to the farm; but the unanimity of the evidence which our national inquiry brought us was amazing.

I can't go into it all here, nor can I tell in detail what our program of developing radio for the farm will be, because we are only now digesting our information and formulating plans. But a good many possibilities can be indicated. We will work with the colleges of agriculture, with Farm Bureau and Grange organizations, and with county agents to make radio perform a real service, worth dollars and cents to you as a farmer.

Consider for a moment the amazing growth of the radio broadcasting industry as a whole.

We point to the automobile industry as having experienced an amazingly rapid growth. In about 25 years the motor has come into such general use that there are now 14,000,000 automobiles in the country, two for every three homes in the country. But radio broadcasting is only two years old and already there is one radio set to every seven homes!

We have been riding in automobiles for so long that we have forgotten, almost, the day of the horse-drawn carriage, while it was only day before yesterday, one might say, that we learned we could have an inexpensive radio telephone in our homes. Yet as against 4,000,000 cars made last year for us, we bought and constructed 2,000,000 radio sets.

The phonograph had a startlingly abrupt leap into popularity. Offhand, it is likely that you would say that it will take radio many years to catch up with the phonograph. The Department of Commerce estimates that we have spent a little less than \$150,000,000 in a year for phonographs and records. We estimate that "radio fans" spent \$150,000,000 last year for sets and parts.

Here is a summary which shows how big radio already has grown. At the beginning of 1924 there were in this country approximately:

Three million radio receiving sets; 10,000,000 listeners; 654 licensed broadcasting stations; 250,000 persons directly and indirectly connected with the industry; 3000 manufacturers of radio apparatus; 1000 wholesale dealers in radio sets; 20,000 retailers of all kinds who handled radio equipment; 1000 newspapers carrying radio programs and radio news departments; 2500 country weeklies which featured radio; 50 exclusively radio periodicals; 50 magazines with radio sections; 250 popular and technical books written on radio, and 7 trade papers devoted exclusively to radio.

But of the 3,000,000 radio sets now being used in the United States we estimate that only about 150,000 are on the farm. Although farmers constitute a third of the population, you are as yet using only one twentieth of all the radio sets in existence

in America. There is only about one set to each forty farm homes.

But the radio is designed to become for you not only an accepted form of recreation and an educational agent, but a recognized part of your business equipment as well.

You may yet sit in that familiar living room in the old farm house and hear the president and others speak, enjoy grand opera as thoroughly as the 3200 who actually have found seats in the Metropolitan opera house in New York. Paul Whiteman and Paul Specht, the jazz kings, have come to you already as stars of the phonograph record; but you may pluck their syncopations from the air tonight, and on many another night if you wish.

The nearest agricultural college, the one that knows about your own peculiar local problems, will be brought into your little sitting room of an evening to help guide you in tomorrow's farm work. The general educational and entertainment lectures of the Chautauqua type need not longer wait upon summer time and the big tent. The business of arranging broadcasting programs is barely in its infancy. Hundreds of the best things in the world are going to be brought to your very doorstep.

If you live in Nebraska and have a load of hogs to ship to market, you can know the quotations up to the last minute on the Chicago market—by radio. The newspaper will not get these quotations to you until many hours later. This of course is a fact of the present, and no forecast of radio future.

Soon we shall be able to render great service to agriculture by broadcasting weather warnings that have a bearing on the care and shipment of crops and farm stock. In periods of epidemics, such as hoof and mouth disease, radio will deliver instant advice on prevention and treatment, even to the most remote localities. Radio will tell you how to fight insect pests that are devastating your crops.

The radio telephone also will be able to broadcast calls for

RCA CHIEF



Gen. J. G. Harbord

farm help for districts in which labor shortage exists. If, because of a sudden change in weather, crops are spoiling in Kansas while men seek jobs in Nebraska, a veritable labor army could be started for the Sunflower state over night. Your instant familiarity with crop conditions in such faroff places as Russia and the Argentine will become a commonplace. You don't have quite so much to do in the winter, but still it is enough to keep you at home from the short winter course on crop rotation which the agricultural college is giving. We will bring the college to you. And you will find that the domestic science department will have something to say over the wireless waves that will interest everybody in the family at meal time.

We will try to make radio give you just the kind of service you need—at the time when you need it most.

Wireless can link up the government services direct with the farm. It will become the servant of the various farmer co-operative movements. In one state where there are 200 Grange halls arrangements are being made to place receiving

sets in each hall. Some one has pointed out to us that by the use of radio broadcasting, farm bureaus could get their information and proposed policies into the hands of individual farmers "with the speed of light." Grain elevators and livestock shipping associations can get market information instantaneously by wireless. That is almost a literal use of the word instantaneous. Wireless circles the globe in one-seventh of one second.

The spread of advanced farming methods through the teaching of agricultural colleges has added hundreds of millions to farm productivity, and yet only about 150,000 students are enrolled at these colleges at any given time. Faculties of agricultural colleges are aroused to the tremendous magnification of teaching opportunity which broadcasting gives. One has suggested that the farmer be given a wave length all his own. This sort of a teaching program is being worked out: Illustrations and charts and text books to be sent by mail, instruction and guidance reading the studies to be by radio lectures—a great radio extension university, in which hundreds of thousands will be enrolled and work at home, to travel to their alma mater only on completion of the courses, when they go to receive a diploma. The benefits in dollars and cents to the nation of such an increase in scientific farm knowledge would be beyond calculation.

If you are already among the wireless listeners you heard the last public utterance of Woodrow Wilson, dictated to him by Mrs. Wilson and repeated in his feeble voice, because toward the last, although he retained his mental grasp, some disturbance of his nervous centers made it impossible for him to read and speak at the same time. You also heard the voice of Harding, and later of Coolidge; and these men seem to become personally known to you because you hear their actual voice tones—though you may never have seen them.

If we pick up and retransmit a message, it is possible today to speak to 10,000,000 persons

with a single voice. No such thing has ever been possible in the history of the world before.

Personally I believe that radio development is going to continue at such a rapid pace that in a period of three to five years it will be possible for one man to speak to 50,000,000 persons in the United States, and to many millions in Canada, South America and Europe, if stations there relay his voice.

We believe that there will come to be perhaps three or four great super-broadcasting stations. These then can broadcast identical programs by retransmission from one station to another. With such technical resources at their command, consider what wonderful programs a national entertainment institution could provide.

I like to visualize what radio means by thinking of the boys around the grub wagon at round-up time on some far western ranch. In the old days they would cuss the cook and play cards. Now they can carry a radio outfit on the wagon, and pluck out of the night voices of many distant cities, while in a mean room in some city slum the owner of a \$15 set may hear John McCormack, Mary Garden, Chaliapin. Neither the cowboys on the plains nor the victim of city poverty need any longer be isolated.

I was asked what radio "has up its sleeve," and I have therefore taken a look into the future of broadcasting with you, with special emphasis on what that future has in store for the farm.

My reply to specific questions about radio transmission of power, radio destructivity in future wars, and so on, always is: "Ask the radio engineers; they will make all the guesses you want. In my position as president of the Radio Corporation I cannot engage in wild guesses."

And yet you can make wild guesses about the future of radio and never be sure that they are wild, that they will not be proved to be true guesses after all.

There is one forecast that perhaps I can make for you.

Generally speaking, we have progressed so far now that almost anything that can be done by wired telegraphy can be done by wireless. Pictures have been sent by wire, as we all know. They have also been transmitted through the air by wireless. Wireless transmission of photographs is yet, however, a slow and imperfect process.

It seems probable, judging by experiments already made, that, in the course of four or five years of research, engineers will have perfected methods of rapid, accurate and detailed transmission of photographs by wireless. They will then work on the more difficult problems of reducing at a distance moving pictures of moving bodies.

Judging by past progress it ought to be a safe prediction that we will get a solution of this transmission problem in time. This will mean, then, that some day we may witness a current event, radio transmitted, as it is occurring.

You will sit before your radio set out there on the farm and hear the presidential address while you watch his gestures and the crowds about him. Opera and drama in a distant city you will both see and hear. You may have almost ringside seats at the world championship match, and thrill to the swat of the "Babe" Ruth of that day—all in your own sitting room. This will never be a complete substitute for seeing and hearing the opera and the play or the great political or sporting event—but then indeed will the farm cease to be "isolated."

Hearing Again

Another example of restored hearing through radio comes from Farmdale, Ill., where Helen Houston had lost use of her ears after an operation. A high note from a singer from WOC, Davenport, Ia., is said to have broken her deafness.

SIMPLE 3-TUBE RECEIVER

BY ISRAEL KLEIN

NEA Service Radio Editor

The receiving set of the future, say prominent radio engineers, will be a simple three-tube outfit—perhaps the single radio and single audio frequency amplification or just double audio frequency amplification.

Therefore, the fan who plans such a receiver for his own use is certain to enjoy an outfit that will last through the various stages of changes and improvements now being experienced in radio. The ultradyne, the monodyne, the phliodyne and many another "dyne" may come and go, but there can be little doubt about the survival of the simple three-tube receiver.

Therefore, for the beginner, a single tube receiver is the safest bet. Then, if he wants more distant reception and use of a loud speaker, the next logical step is a two-stage amplifier. It is hardly worth while adding only one step of amplification, because it would still be ineffective for the application of a loud speaker.

Parts Required

Hook-up diagram and layout of a typical two-stage audio amplifier are given here.

Parts for the amplifier cabinet alone are:

Two audio frequency transformers, low ratio, about 4½ to 1.

Two rheostats, 20 ohms each.

Two double circuit jacks.

One single circuit jack.

Two tube sockets.

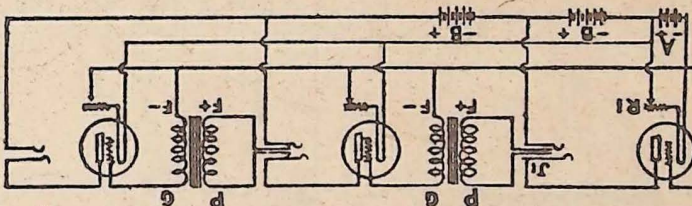
Five binding posts.

One dielectric panel, 7 by 11 inches.

One wood base, 6 by 11 inches.

Bus connecting wire.

The single circuit jack may be the one used with the single tube receiver, if that arrange-



ment has been made.

Following changes should be made in the detector circuit, for the addition of the amplifier.

Double circuit jack should be put in place of the single circuit jack, or the two phone connections.

The two inner connections of the detector jack should be connected to the primary or the first transformer.

One of the outer connections of the detector jack goes to the plate of the detector tube. The other connection goes to the 22½-volt tap of the B battery.

Other connections in the detector circuit remain the same.

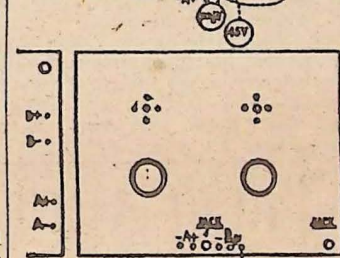
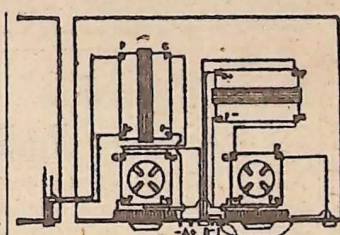
Other Connections

A 45-volt B battery is required to take care of the amplifier tubes, both amplifier jacks being connected to the 45-volt positive end. The rheostats and negative F of the transformer secondaries are joined to the negative of the A battery.

The second double circuit jack is attached between the first and second stages of amplification. The outside connections join with the plate of the first amplified and the positive 45-volt tap of the B battery. The inside connections go to the P and B—plus binding posts of the second transformer.

Transformers must be placed at right angles to each other.

UV201-A or C301-A vacuum



Hoop-up, above, and panel and base layouts of the two-stage amplifier.

tubes may be used on this amplifier and a 20-ohm rheostat with each.

Tuning is accomplished just as though there were no amplifier to the detector circuit, except for the adjustment of the amplifier tubes to their highest efficiency by means of the rheostats.

This amplifier allows for use of a loud speaker for local broadcasting and DX stations up to 1000 miles.

HOW DRY CELL VACUUM TUBES ARE MADE

BY R. W. BREWSTER

Pacific Division, Radio Corp. of Am.

Although hundreds of thousands of dry-cell vacuum tubes are now in use by radio enthusiasts, it is safe to say that only a very small percentage of the users know anything at all about their process of manufacture.

These little tubes, because of their convenience and low operating cost, added tremendously to the interest in broadcasting and gave to the great general public an opportunity to obtain tube receivers. Before the coming of radiotrons WD-11 and UV-199, the greater number of receiving sets used the crystal detector and thus were limited in range.

Great care is necessary in the manufacture of these tubes, which despite the fragile character of the material are sturdy bits of apparatus, well adapted to stand fair handling and give

constant service during long periods.

There are 13 steps or processes of assembly before the tube, starting as raw material, takes its completed shape. There is also a test made after each assembly, and still further tests after the tube is completed. These tests are so severe that once a tube has passed through them it is rarely returned because of failure in operation.

The raw material from which the tube is assembled consists of the following: A glass blank, a thin glass stem a short tube of glass; the filament; the plate and grid. The plates are shaped from rectangular bits of metal and the grid wires are wound into the spiral form they take in the completed tube. The illustrations show these various parts clearly.

The first step in the assembly process is spinning a flare on the end of the short glass tube. This tube is then called the flare.

Next is the inserting of the five wires in the flare. Looking at the WD-11 one can see five wires on the inner unit, though there are but four leads at the base. The fifth wire is a blind insert to act as a support for the plate. The five wires are inserted in the end of the glass tube opposite the flare and the glass melted to the shape seen in the completed tube, thus holding firmly in place the wires. The glass tube with its wires inserted is now called the press.

The five wires are next cut to their proper lengths so that the plate, grid and filament can be mounted. These units are spot-welded in place by girl operators, each of whom is a highly skilled worker. The filament used in the WD-11 is a metal wire coated with oxides.

Now the glass blank is tabulated, or in other words the thin glass tube is placed on its end, after a small hole has been melted in the glass blank with

a gas flame.

Next the press is sealed to the bottom of the blank. In this process the flare is held tightly to the bottom of the blank and a flame melts the glass sufficiently so that they weld together.

As the long glass stem is placed on the blank for the purpose of exhausting the tube, this process is the next in order. The long glass stem is inserted into a piece of rubber tubing which leads directly to the pumps, which are two in number. An oil pump and a mercury vapor pump are used to exhaust the tube down to the required vacuum. Before the pumps are turned on, a covering which serves as an oven is pulled down over them and they are subjected to a high temperature to drive gases from the glass walls and metal parts.

Then the pumps are turned on and the tubes exhausted to a very low pressure, which is at a much higher point of ex-

haustion than that given the electric lamp.

A coil of wire surrounds the tube when placed in the exhausting machine, and by means of a high-tension spark the vacuum is tested. Next the plate of the tube is heated red hot by a high-frequency oscillating current generated from transmitting tubes to remove the gas from the plates and metal supports. The plate oscillations are next turned off and the filament heated to obtain the proper chemical reaction on the filament oxide, and thus increase the possible electron emission. The pumps are turned off and a gas flame run around the bottom of the long glass tube until it melts off and forms the tip of the vacuum tube.

The tube is now complete except for the base, which is baked on by a machine, and then the tips which contain the leads from the inner unit of the tube are neatly soldered and surfaced.

AMATEURS IN NATIONWIDE DAYTIME CHAT

SCHENECTADY, N. Y., Apr. 23.—Amateur signals have been transmitted across the continent in daylight. Earnest Hobbs, operator of station 2ADM in this city reports that he recently received messages on amateur wave lengths from station 6XAD, owned by Lawrence Mott of Catalina island, soon after sunrise.

The two amateurs had been conversing with each other by radio telegraph as they had been accustomed to do a short time before daybreak and it was not until the times at both stations had been checked up that Hobbs realized the full significance of the feat. Of course, the three hour difference of time was taken into consideration.

For six months amateurs conveniently situated across the country have endeavored to relay messages from ocean to ocean in daylight. At one time six stations worked on schedule. Always as soon as the sun appeared the signals began to fade. The failure of this relay makes the final success the more remarkable.

Both Surprised

Both operators used the regular wave length of their station, 2ADM transmitting on 195 meters and 6XAD on 230 meters. Their ability to converse with one another under daylight conditions was a total surprise to both as at the time no definite tests were being carried out. It was just a friendly conversation.

The original tests which were prompted and supervised by the technical department of the American Radio Relay League indicate that the real daylight conditions follow about 90 minutes after sunrise—excepting on cloudy days when signals do not fade out completely until sometimes 120 minutes after.

"On ordinary days," says S. Kruse, technical editor of QST, "the very best west coast signals are received about 19 minutes after the sun gets clear of the horizon, although this may be delayed 20 minutes on a cloudy day. After that the signals begin to die down slowly and at the end of the 120 minutes there appears to be full noontime conditions."

Rush New Station

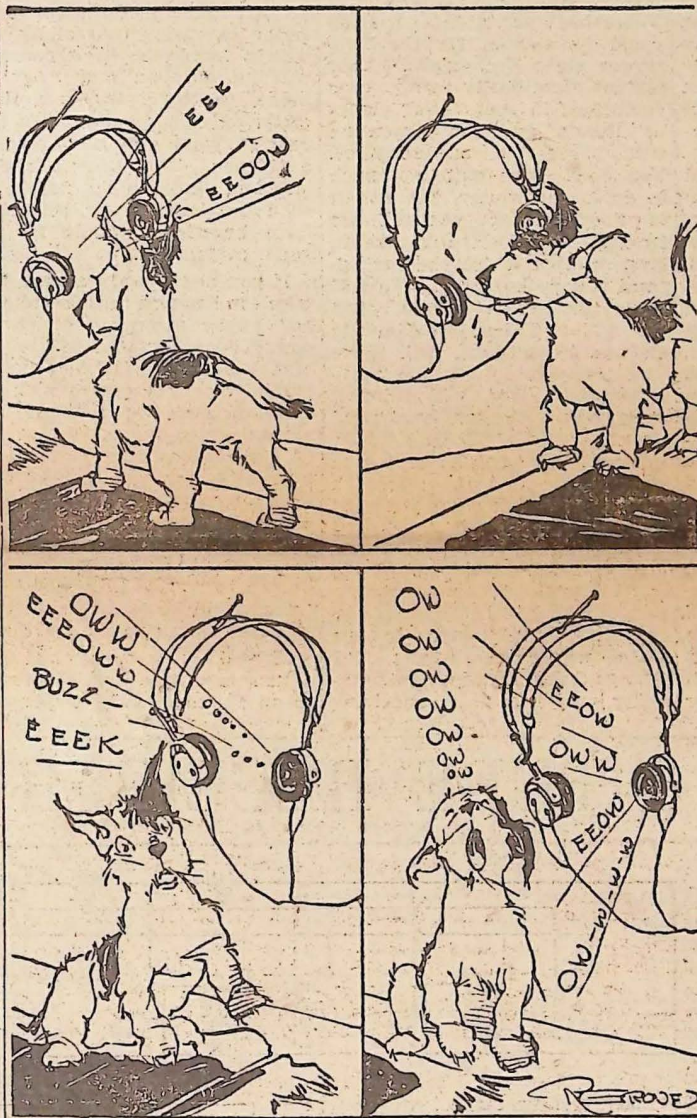
The new Sears-Roebuck Agricultural Foundation broadcasting station, planned to go on the air early this month, will be called WBBX. It is located in Chicago. Work is being rushed not only on the station but also the loop station in the Hotel Sherman.

Esperanto Program

Esperanto, the "international language," is being used for broadcasting programs out of some stations. Recently a lecture and songs were delivered in Esperanto and broadcast from Moscow and heard as far as 5000 miles off.

BUGS

By Roy Grove



Break Record in Receiving Radio

A. E. Gerhard of the Radio Corp'n of America has broken a world's record by receiving 59½ words per minute.

This unusual speed was shown at the fourth annual convention of the Second District Executive Radio Council at the Pennsylvania hotel, New York, Mar. 7.

Seek Set for Dallas Shut-ins

"Bringing Sunshine to the Shut-In," is the slogan of the Dallas (Tex.) Rotary Club. It has been announced by this organization that an appeal for funds to buy a receiving set for the home of every shut-in in Dallas county is under way.

FOR ACCURATE NEWS

There is only one way to be certain of getting the best of the news of the radio world as it occurs daily. That is by having The Daily News sent to your home each afternoon. If you are not a regular subscriber, mail this coupon to the Circulation Department and receive The Daily News. The price is only 50c a month.

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SEN. DILL SEES ONE LANGUAGE RADIO RESULT

BY HARRY B. HUNT

NEA Service

WASHINGTON, Apr. 23.—C. C. Dill, juvenile senatorial insurgent from Washington, believes that radio will ultimately unscramble the confusion of tongues resulting from the attempt to build the tower of Babel and that it will, in addition, accomplish more than all the statesmen and diplomats in history toward establishing world peace.

"I foresee the day," says Dill, "when a universal language will result from the world-wide broadcasting by radio."

"The better understanding, the friendlier relationships, that will be promoted by this means of communication, will be the biggest factor in bringing universal peace."

If this end is to be accomplished, however, Dill maintains radio must be kept "free to the people."

"The air," he says, "is the only natural resource not already cornered for private exploitation."

HOWLING!



There's none too young or too old to listen in. This youngster would rather hear the waves squeal than squeal herself. She's Audrey Levinson, daughter of Charles Levinson of Del Ray, Va.

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