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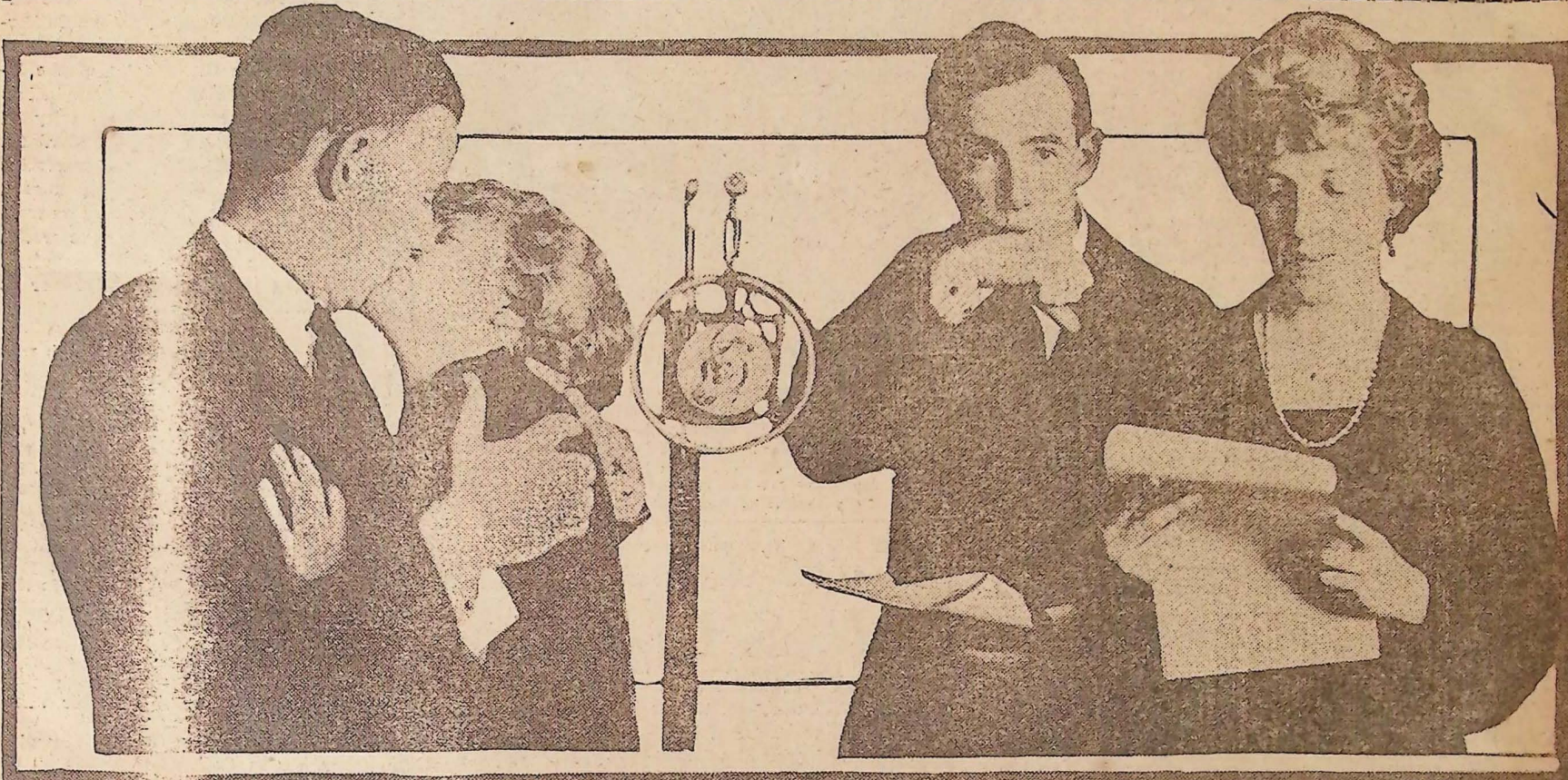
RADIO
MAGAZINE

The Daily News

EVERY
MONDAY

SAN FRANCISCO, MONDAY, MARCH 17, 1924

RADIO TAKES THE KICK OUT OF KISSING



Here's a radio kiss. The one on the right, of course. To the left you see a plain, old-fashioned "ornery" kiss of the variety that made a flapper out of Eve. I put that picture in to show the

difference between a personal, honest-to-goodness osculatory smack and the ossified, oscillated variety which makes the wild radio waves wilder. The gentleman who is kissing his hand is Dan

Tothero and the lady with the disappointed look is Pearl King Tanner, both of the KGO Players, Oakland. After glancing back at the picture on the left we don't think she should look that way.

BROADCASTING TO BE UNDER U. S. CONTROL

BY RUTH WINNEY
Daily News Correspondent
WASHINGTON, Mar. 17.—Leaping ahead of public ownership of water and other public resources, Congress is today seriously considering legislation which would make of the air a public utility under government control.

Such is the purpose of the White bill now before the house Merchant Marine and Fisheries committee, which proposes thorough government regulation of communication.

Entire control of radio broadcasting is placed in the hands of the Secretary of Commerce, by the measure. The secretary would be given power to license all sending stations, regulate their hours of operation, wave length, and power of operation; refuse license to any alien or corporation owned by aliens; and to license operators of stations. He is forbidden to give a license for a period than 10 years.

Little opposition to the bill was shown under the supervision of various government departments, and is believed to have approval of all of them. So far, expected opposition from the American Telephone & Telegraph Co., accused of maintaining a most complete monopoly of radio broadcasting, has failed to materialize. E. S. Wilson, vice president of the company, was one of the first witnesses to appear before the house committee, and he declared himself in favor of the bill, specifying a few minor amendments, which would in no way affect the principle of regulation involved.

Sec'y Herbert Hoover, to whom control of the bill, made the following statement before the committee, on behalf of the White bill:

"It is not conceivable that the American people will allow this new-born system of communication to fall exclusively into the power of any individual or group or combination.

"We cannot allow any single person or group to place themselves in a position to control the

NATURALNESS HARD TO ACHIEVE

When radio broadcasting started, the fan who had any sort of a set at all drew gasps of wonder from his friends when they heard some local station grinding out phonograph music. A year later, and the craze was for long-distance records. Then came loud speakers, whose raucous bleatings were an insult to the public's musical good taste.

Developed by men of brief experience in the art, and having little or no knowledge of the acoustic principles involved, many of the early loud speakers were merely glorified telephone receivers, fitted to a horn and designed "by guess and by gosh." Now that radio is settling down to a means of entertainment that must stand on its own merits in competition with other forms, the public is demanding a quality and volume of reproduction so faithful to the original that the listener can close his eyes and forget that he is not in the studio or concert hall.

Such faithful transmission and reproduction of a radio program is possible only when every link in the chain is carefully designed and skillfully operated.

The system must not fail to

transmit the full range of tones; it must not add any tones of its own, recognized as "blur" or "fuzz," and caused by overloading one or more elements; it must not introduce noise, and it must give enough volume for comfort, yet not so much as to make the lower tones "heavy."

Research Necessary

To avoid these troubles, "cut and try" methods with the human ear and memory as guides will not serve. Present day achievements have been possible only because of measurement methods and standards resting on fundamental researches extending back more than a generation. The high quality carbon microphone of today is a direct transmitter on which Bell System engineers were working as early as 1886.

Some of the practical details which spoil radio listeners' enjoyment were pointed out in a recent paper by W. H. Martin of the American Telephone & Telegraph Co. and Dr. Harvey Fletcher of the Western Electric Co.

Perfectly intelligible speech can be transmitted in which tones ranging from 500 to 2500 cycles only are employed, but in order to obtain naturalness of effect comparable to that of the

original, the range must be extended at both ends to include 100 cycles and 3000 cycles. If music also must still be further extended to 5000 cycles or more. To include so long a range requires close attention to the receiving apparatus, and the tendency for carelessly designed microphones, transformers, lines, etc. is to cut off both ends of the range.

In order to satisfy a radio audience that is growing more and more critical, it is necessary to transmit music with such naturalness that the listener can close his eyes and forget that he is not in the studio or concert hall. In other words, it must reach him in the form in which he would care to hear it if he were free to choose his own location with respect to the source of sound.

Some Reverberations Needed

In the arrangement of a broadcasting studio a room which gives no reverberation is just as bad as one giving too much. It is generally recognized that a bare room is undesirable, as the reverberations cause one note or syllable to follow over into the next producing an unpleasant jumble of sound; but it is a very common error to cover the walls, floor and ceiling of the studio as

completely as possible with sound absorbing material, cutting off all echo and making the music sound "dead." This condition also makes it very difficult for a singer or violinist to keep on the key, as they are accustomed to getting the pitch of each note from the reverberation of the preceding one.

When, as is often the case, the program is presented in an assembly room or concert hall, it is obviously impossible to change the acoustic properties of the room. The best solution of the problem is then in properly locating the microphone transmitter.

When a symphony concert is broadcast, the best place for the microphone has been found to be from 30 to 50 feet in front of the orchestra and 10 to 20 feet from the ceiling.

This location picks up the sound of the orchestra as a whole, and does not catch too much reverberation or incidental noise from the audience.

It is not desirable to scatter several microphones through the orchestra, as with this arrangement the noises from part of the instruments will be transmitted with greater intensity than that from others, and the balance of the ensemble will be lost.

WRITE US YOUR EXPERIENCES

Have you ever been thrilled at catching some distant station?

Every person who ever wielded a tickler must have had some novel experience.

What is your pet story? Write it to the Radio Magazine Editor and share it with the rest of the folks.

Getting Left-Eared?

Use of the telephone receiver at the left ear, more than the right, is making of us a left-eared people, says a scientist. We can hear better on that side than on the right. With the radio so popular the right ear also is being used, so that our hearing will become more balanced.

Radio Prize Contest Will Close Friday

Why are you enthusiastic about radio?

Snap into it, Radio fans!

You only have until midnight, Thursday to tell.

The Daily News Radio Magazine is giving \$20 in prizes for the best replies.

Write 50 words or less legibly on one side of the paper. The essay must be original.

The awards will be as follows: First prize, \$10; second prize, \$5; third prize \$3, and fourth prize \$2.

Here are some interesting replies received from radio fans:

Francis Ashton, 1742 Polonay, S. F., says:

"I am enthusiastic about radio because it helps to cheer the sick, weak and the helpless to enjoy life. Besides, this it makes them cheerful, and it gives them the knowledge of the outside world and of other people. It educates them in every way."

J. Sutherland, 3620 18th-st., is enthusiastic about radio, because:

"It affords entertainment and education at less expense than it

MUFFLER USE IS SUGGESTED

NEW YORK, March 17.—Radio manufacturers are trying to educate fans into the use of non-oscillating hook-ups, to avoid local interference in reception. Major Edwin H. Armstrong, inventor of the regenerative circuit, suggests use of a stage of radio frequency as a "muffler."

Largest Audience

The record for entertaining the largest audience in the world by radio was made recently by the group of broadcasting stations that transmitted speeches from the Waldorf-Astoria in New York as far east as London, England, and as far west as San Francisco. Fifty millions, it is estimated, listened in.

(Concluded on Page 5, Column 3)

(Concluded on Page 5, Column 2)

500 LETTERS RECEIVED IN KPO CONTEST

Enthusiastic junior fans sent KPO more than 500 letters last week in response to the "Why I like to live in Central California" contest.

The judges announced today that in addition to the prizes already offered, the Emporium will give a \$45 Junior bicycle to the children of the second division (ages between 13 and 16 years).

L. R. Tucker of KPO will treat the author of the essay which pleases him the most to a Saturday matinee and a ride around the city.

Here Are Rules

Here are the rules of the contest, which closes midnight, April 16:

Manuscripts must not exceed 250 words. Every child entering the contest must write the title of the subject, name, address and age on the first sheet. Essays are to be written on one side of the paper only. Credit will be given for neatness, phraseology and paragraphing. Essays should be mailed to Big Brother of radio KPO, Hale Bros., San Francisco, and marked "Essay Contest."

WAVELETS

Washington amateur has built a miniature crystal set small enough to place within a single radio headphone.

Great Britain has 580,000 broadcast listeners, compared with only 30,000 a year ago.

Three-fourths of the receiving sets in Great Britain are of the crystal type.

Political campaigners must pay \$100 for every 10 minutes of talking, if they seek to use the WEA, New York.

Lowest priced receiving sets in Japan cost about \$25 or \$30.

Keep a "log" showing the points on all dials of any stations you may get.

A bluish glow in any of your tubes is a sign the plate voltage is too high.

Radio doctors have sprung up—amateurs offering to put up, repair and improve receiving sets.

SCHOOLS OWN 95 STATIONS

Department of commerce radio bulletin shows 95 broadcasting stations connected with educational institutions in the United States. Besides, 46 newspaper or other publishers have broadcasting stations and 20 churches are mentioned in the list.

For Best Results

Two sets exactly alike in construction may not get the same results in reception. For highest efficiency, extreme care must be taken in tuning in, in use of the tubes and in the general coordination of all parts.

9300 Miles by Day

CHATHAM, Mass., March 17.—The long distance record for commercial radio transmission on 600 meters wave length is claimed by station WIM here. Messages sent from here were heard on a steamer 95 miles north of Wellington, New Zealand, or 9300 miles from Chatham. And by day, too.

Buffalo Buffalo-ed By Buzzing Mystery

BUFFALO, N. Y., Mar. 17.—Buffalo fans are baffled by a loud buzzing which interferes with every class of set operated here.

E. L. Converse of 94 Eagle-st. took his set to homes of friends in every part of the city in an effort to locate the source of the trouble but he failed.

One opinion is that the wave is thrown off by a high-powered industrial machine, but this cannot be proved.

ANSWERS

Questions addressed to this department will be answered by L. E. Day of the Day Radio laboratory, 693 Mission-st. No hook-ups will be printed. Judgment will not be passed on the comparative merits of standard equipment.

Joseph Conway, 1463 15th-st. asks:
(1) How high should my aerial be to get the best results?
(2) Can I put a loud speaker on a crystal set?

(1) As high as practical. For a crystal set about 100-foot stretch and clear of the roof by at least 10 feet.
(2) No.

W. C. E., 28 Bennington-st. asks:
Can I use a loud speaker on a Kennedy 311, W. D. 11 tubes by changing the tubes and using more batteries?

There are two types of Kennedy 311s. If yours is one that uses three tubes you may. It should not be necessary to change tubes and batteries. It can't be done with a one-tube set.

William Shuster, 2927 Diamond-st. asks:
Would you mind telling me what does DX mean? And what do meters mean?

DX is the term given to use to describe long distance or difficult reception. A meter is 38.37 inches, a unit used in measuring the length of radio waves.

Harry Kemping, 2041 Eagle-av. asks:

(1) With the Copp circuit shown in your magazine of Mar. 10 could I tune out KGO?
(2) Would it operate loud speaker without amplifying?
(3) What type of peanut tube?
(4) What voltage of "A" and "B" batteries?
(5) What is the proper rheostat?
(6) What type of peanut tube for amplifier?

(1) No.
(2) No.
(3) Either WD12 or C312.
(4) One 1½ volt dry cell for "A" battery; one 22½ volt "B" battery.
(5) Any 20-ohm rheostat.
(6) Same as answer No. 3.

F. L. Lewis, Byron, Calif.:
Look for open circuit in first neutroformer, although the trouble might be elsewhere. Suggest you show set to expert for examination.

THIS SHOWS POPULARITY

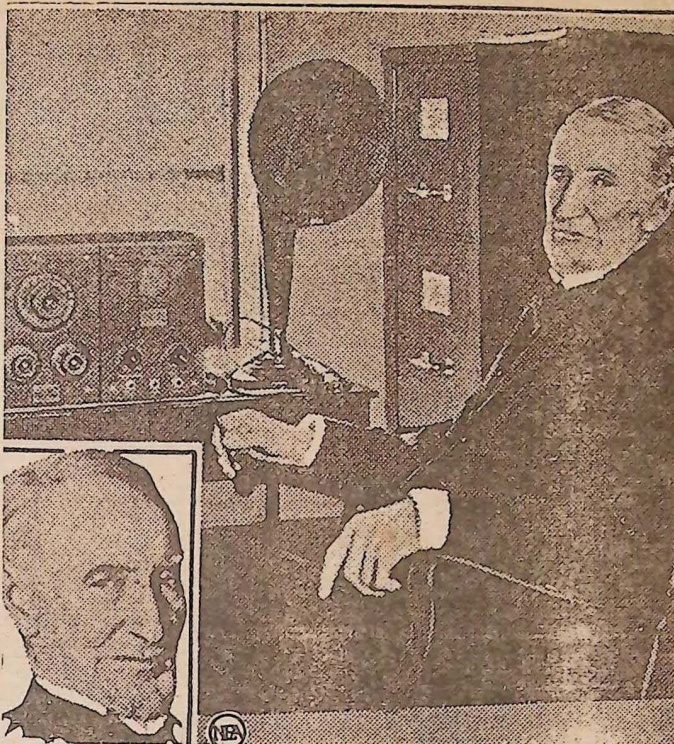
What more proof do we want than this, of the popularity of radio? The facts were presented recently by Pierre Boucheron, member of a large radio corporation. They summarize:

563 licensed broadcasting stations in the United States.
3,000,000 radio receiving sets.
10,000,000 listeners.
250,000 persons connected with the industry.
3000 manufacturers of radio supplies.
1000 wholesale distributors and jobbers.
25,000 retail dealers.
1000 newspapers which carry radio news.
3000 weeklies with radio sections.
30 radio periodicals.
50 magazines carrying radio sections.
250 books on radio.
Seven radio trade papers.
\$175,000,000 estimated expenditure by American public during 1923 for radio material.

Dry Batteries

Dry batteries used with the WD11, WD12 or UV199 tubes ought to last six weeks to two months under ordinary conditions, if kept in good shape. Some batteries, operated infrequently, are known to have lasted six months.

UNCLE JOE LIKES HIS RADIO



"Uncle Joe" Cannon, veteran of many a heated Congressional battle, has passed from the political stage. Yet he still takes a keen interest in the doings down at Washington. Here's his latest picture. If one of his old colleagues is talking over radio, "Uncle Joe," at his home in Danville, Ill., listens. Fellow townsmen recently presented him with the set. Dominoes and motoring are his other hobbies. The former speaker of the House of Representatives will be 88 in May.

World Lags Behind U. S. In Radio Field

We think we have our troubles in San Francisco, but the fact is we are as far ahead of the rest of the world as a five-step amplifier is ahead of a crystal set.

Broadcasting is unknown in some foreign lands. In others it is prohibited. Again, only one service is permitted to send in some nations.

Australia takes the prize for radio control. Where we can (sometimes) tune in on any of the 538 stations, in Australia the receiver is adjusted to pick up only such stations as have been paid a fee and then the government seals them. This limits the number of receivers and in turn cuts down the quality and quantity of programs.

Ireland and France are really just getting into the program broadcasting field while there is

not a single station in Spain and the few receivers must depend on foreign broadcasting.

There are only 200 sets in Chile and the program is principally phonograph records. On the other hand, in the Argentine, enthusiasts are numbered by the thousands. Buenos Aires alone has 9000.

The king controls both sending and receiving in Sweden and fees are collected at both ends. Mexico's stations were shut down by the revolution and are just getting back into the broadcasting field again. There are only three, all in Mexico City.

Poland is getting more liberal and the diet is about to permit government licenses for sending and receiving, subject to rigid control.

Germany is making rapid strides and opera is becoming more popular over radio because many cannot afford to attend the theaters.

Purchase and operation of radio sets is strictly prohibited in China and the rule extends to foreigners with the exception of the Hongkong colonies.

CHARITY IN RADIO PLEA

CINCINNATI, O., Mar. 17.—Evidence of the usefulness of radio in raising money for charity is seen in Cincinnati in results of an address on relief of German children, broadcast from a Cincinnati station.

The day after the address, scores of unexpected contributions were received by mail and telegraph. Wire remittances came from as far away as Los Angeles, Baltimore and Tampa. About 100 checks were marked "Radio appeal."

On Short Waves

EAST PITTSBURG, Pa., Mar. 17.—Broadcasting station KDKA transmits regularly to England on the short wave length of 94 meters, while at the same time concerts are being sent out to receivers in the United States and vicinity on the larger wave length of 326 meters.

Pittsburg to Calcutta

LONDON, Mar. 17.—Pittsburg's broadcasting has been heard in Calcutta, India, according to dispatches from that city. A Calcutta amateur radio fan picked up Saturday's broadcasting from Pittsburg for a half hour.

THE LATEST IN RADIO
Phone Hemlock 40

NEUTRODYNE'S
Easy Terms

BENJAMIN FRANKLIN RADIO STORES
1129 Market St.
One Block Below WHITCOMB HOTEL
—MAIL ORDERS—

RADIO
We have just received another shipment of 3000 ohm Manhattan Headsets to sell regularly at \$7; special at \$3.10

I. S. COHEN'S SONS
1015 Market, near 6th
Mail orders given prompt attention

U. C. ALUMNI ATTEND MEET OVER RADIO

For the second time in the history of the University of California, and perhaps in the history of American life, a great university meeting is to be staged in which the thousands of graduates and former students of the University of California will meet by radio.

The occasion will be the annual dinner given by the California Alumni Ass'n at Hotel Oakland, on the evening of the inauguration of W. W. Campbell as president of the University of California, Saturday, Mar. 22. The president of the university and the distinguished guests, comprising notable educators from various sections of the world, will be the guests of honor at this affair.

In Hotel Oakland

The meeting, which will be the ballroom of the Hotel Oakland, will be completely equipped with broadcasting apparatus, so that the speeches, orchestral music and songs of the evening will be transmitted by radio to all parts of the state, and far beyond its borders, while thousands of alumni are already planning to gather in convenient groups to listen on the proceedings and to be part in the songs and yell college days. The messages will be sent out through the courtesy of the Radio Club of the University of California, operating through Station KLX on 100-meter wave length.

The Alumni Winter Day dinner in Oakland will also be of unusual interest to its local setting.

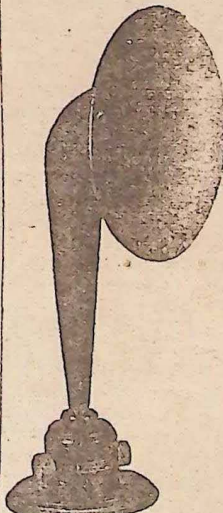
As the seating capacity of the Hotel Oakland ballroom is only 500, precaution is being taken to reserve places for the receipt of written requests to the formal invitation to have been sent out to local members of the California Alumni Ass'n, as no reservations were made in excess of the capacity of the room.

Miss Annie Brown, chairman of the Alumni Centers committee, and member of the Alumni council, will have charge of all arrangements for the dinner.

WJZ Has Fine Talent

Twelve famous New York orchestras are employed by Station WJZ during its week's transmission. Each of them broadcasts their music from their regular surroundings and it is sent on the air by wire to the station.

While They Last
TRUTONE \$8 Trutone
TRADE MARK
Loud Speakers
FOR \$3.50 shipped anywhere



The Type "A" Trutone as illustrated has been discontinued by the manufacturer and in order to clear our present stock of these speakers we will dispose of them at a heavy loss. They have been selling for \$8.00 and they are worth more. Save \$4.50 by purchasing your loud speaker now. This sale will continue only as long as the supply lasts. Don't delay. Bring or mail your order at once, and save money.

FOR ANY MORE TWO-PHONE RECEIVERS

DISCONTINUED MODEL—The base of Type A is designed for ready reception of both receivers without removal of horn. Phones rest against soft rubber ears, blending the strength of both into one. The diameter of the bell is 12 inches, making the horn 12 inches high. While they last, \$3.50.

Any style of receiver made to order. We guarantee to do all any other receiver does. Quality first, price next. Service and courteous treatment always.

Quality Radio Shop
86 Fourth Street, San Francisco
Garfield 1076 Open Evenings

HERE IS SUPERDYNE CIRCUIT

Dietz Explains How To Control Oscillation

BY DAVID DIETZ

Science Editor of The Daily News

NEW circuits make their appearance in the radio world daily. Some of them are good. Others seem to be old circuits fixed up with new trimmings.

And the trimmings don't add particularly, as many amateurs can testify.

Among the new circuits, however, which really deserve the attention of amateurs, is the new superdyne circuit.

Like the superdyne circuit, the superdyne is a radio-frequency circuit equipped with methods for controlling oscillation.

In the neutral ne circuit, the so-called neutrals or neutralizing capacitors turn the trick.

The superdyne makes use of a tickler coil with reversed connections.

This results in a negative feedback and prevents oscillation of the tubes.

Four Tube Set

A four-tube superdyne set is described in this article. The set includes one step of radio-frequency amplification, one detector tube, and two steps of audio-frequency amplification.

The set is equipped with jacks so that the head-phones can be plugged in on the detector tube and loud-speaker on either one or two steps of audio-frequency amplification.

Cleveland, O., amateurs who have already built superdyne sets report that they get Pacific coast stations on the loud-speaker.

The set can be built for about \$30. This, of course, does not include tubes, batteries and loud-speaker.

Tubes will add \$20 to the cost, batteries about \$15, and the loud-speaker from \$10 up, depending upon how good an instrument the amateur cares to purchase.

Apparatus Needed

The following apparatus is required for building the superdyne set:

One panel of insulating material, 24 inches long and 8 inches high

One base of hardwood, 24 inches long and 10 inches wide.

One strip of insulating material for mounting binding posts, eight inches long and one inch wide.

Four special coils—a primary, secondary, tickler and radio-frequency coil. These are explained in detail below.

Two 23-plate variable condensers, .0005 mfd. capacity.

Four six-ohm rheostats.

One fixed condenser, .001 mfd. capacity.

One fixed condenser, .00025 mfd. capacity.

One single-circuit jack.

Two double-circuit jacks.

Two audio-frequency transformers.

Four vacuum tube sockets.

Two rotary switch levers and

four switch-points.

Three dials.

Six binding posts.

Bus wire for making connections.

Winding Coils

It is advisable to use tubes made of insulating material in winding the coils.

A tube four inches in diameter and four inches high is used for both the primary and secondary winding.

The tickler coil is wound on a rotor which fits into the top of the tube in the usual fashion that a secondary fits into the primary of the ordinary variocoupler.

Forms for winding the primary and secondary of a variocoupler can be obtained at any radio store. It is advisable to buy them and use them for winding these coils. It is also advisable to see that the secondary form or rotor purchased is equipped for the so-called pig-tail connections. These make a better set.

Secondary First

Wind the secondary first. This consists of 42 turns of No. 22 double silk-covered wire. A tap should be made in the winding of the twentieth turn.

Mount three binding posts on the tube and connect the beginning of the winding, the tap and the end of the winding to these posts.

The primary winding consists of four turns of No. 22 double silk-covered wire. This is wound directly upon the secondary winding.

The primary winding should not be wound with turns close together, but in a sort of spiral going all across the secondary winding.

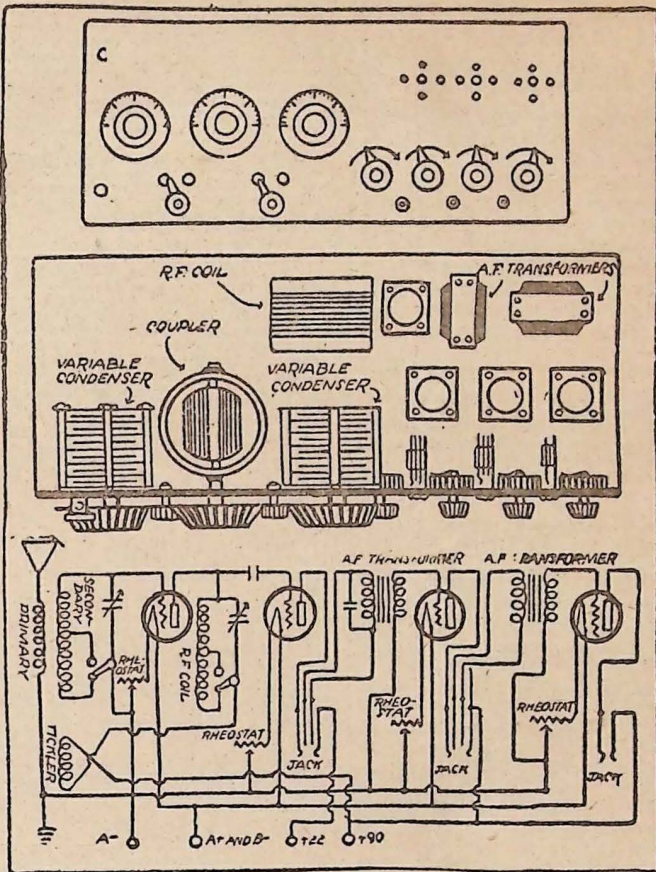
Two binding posts should also be mounted on the tube for the beginning and end of this winding.

Tickler Wound Next

The tickler coil is now wound on the rotor. This consists of 36 turns of No. 22 double silk-covered wire. There should be 18 turns on each side of the rotor.

Pig-tail connections should be made from the rotor to two binding posts, also mounted on the stator tube.

There will be seven binding posts all together on the stator tube. Small binding posts, of course, should be used. Ordinary brass bolts and nuts will also



serve the purpose as well.

There should be three for the connections to the secondary, two for the connections to the primary and two for the connections to the tickler.

Separate Form

The radio-frequency coil is wound on a separate form. This should be a tube of insulating material four inches in diameter and three inches high.

The coil consists of 46 turns of No. 22 double silk-covered wire. It should be tapped at the twenty-fifth turn.

Three binding posts should be mounted on the tube. One should be connected to the beginning of the winding, one to the tap, and one to the end of the winding.

The four coils having been wound, the amateur is ready to begin assembling the set.

The accompanying illustration shows how the front of the panel should look, how the instruments should be arranged on the panel and base and how the connections should be made. No exact dimensions for drilling the panel can be given, as these depend upon the brand of instruments purchased.

First, two binding posts are mounted on the left-hand edge of the panel. These are for aerial and ground connections.

The instruments are then mounted in the following order: A variable condenser, the special-wound coupler, the second variable condenser, the four rheostats.

The two rotary switch levers are mounted at convenient points below the condenser dials. The three jacks are mounted similarly below the

DOCTORS TO SEND ADVICE THROUGH AIR

WASHINGTON, Mar. 17—Old Doc Radio, M. D., who prescribes pills and powders for patients thousands of miles away, may soon improve his methods.

Because of the great humanitarian services of medical advice by radio to ship at sea, Surgeon Gen. Hugh S. Cumming of the U. S. public health service is seeking legislation to compel the adoption of standard ship's medicine chests on American vessels. Medical treatment by wireless, he explains, is partly dependent upon the adequacy of medicines aboard ship.

On vessels too small to carry a doctor, great numbers of lives have been saved since the public health service began prescribing by radio several years ago. When a sailor falls sick or gets injured, a report of his condition is wireless to the nearest shore station of the public health service and directions for the proper treatment are flashed back to the ship.

To further improve the system, Cumming says, all ship's officers should be trained in first-aid work. Efforts toward this end already have begun.

Interesting Cases

Many interesting cases have occurred since this novel way of treating the sick at sea was started by the public health service through its marine hospitals. In one instance, a freighter nearing the port of Baltimore developed engine trouble.

While at anchor, off an uninhabited stretch of coast, one of her crew fell through an open hatchway and suffered a fracture of the leg. The radio was brought into play and the message picked up by a station at Cape May, N. J.

The station advised the marine hospital at Baltimore by long distance telephone, giving the location of the ship. The hospital sent word through the Cape May station that an ambulance would be sent immediately with a doctor to the place where the disabled ship lay, which was some 15 or 20 miles from the hospital.

The doctor directed the removal of the seaman from ship to shore and took him to the hospital.

Radio-Less Flight

Except for the last leg across the Atlantic, the airplanes that will participate in the world flight this spring will carry no radio apparatus. Too heavy, says the chief of the army air service.

on the coils when tuning for stations with a wave-length of 300 meters or under.

Set the switches on the points connected with the ends of the coils when tuning for stations over 300 meters.

TAPPING AUDIO TRANSFORMERS

By BENJAMIN VILKOMERSON

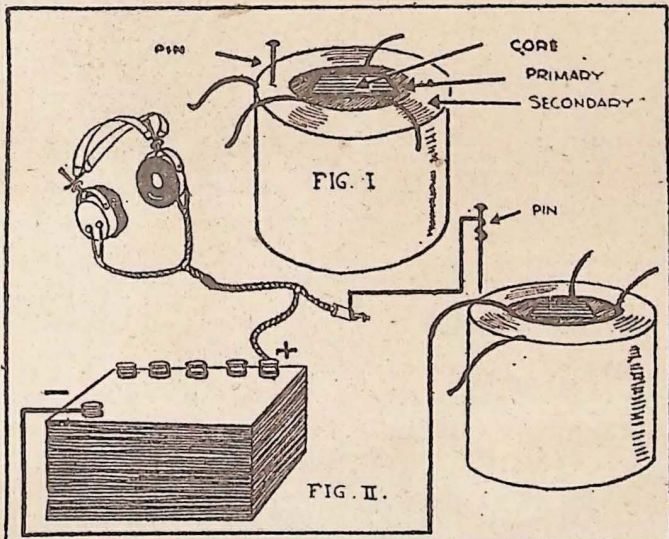
All of the following kinks depend upon the fact that an audio-frequency transformer winding may be tapped by carefully driving a thin pin or needle into the side of the winding, as shown in Fig. I.

An open circuit in either the primary or secondary of a transformer may be easily repaired.

The way to do this is to find out with the pin in which layer of the coil the break is located, and then to bridge that layer. This is done by connecting up a pair of phones, "B" battery and end of defective transformer winding nearer the core, as shown in Fig. II. The pin is gently pushed into the side of the coil at various places.

Test of Clicks

Where the wire is unbroken go to the layer tapped, a click is heard in the phones. As soon as the layer containing the break is reached, and on all the succeeding layers outward after the break, no click is heard. The needle or pin should be driven about three-quarter inch deep



into the layer furthest from the core that still gives a click.

The "B" battery negative should then be discontinued from the inner end of the defective winding and connected to the outer end. This test is repeated, finally driving a sec-

ond pin into the layer nearest the core that still gives a click. It will be found that in most cases the pins are but one or two layers apart. The two pins should then be connected together by soldering a short piece of wire to both of

them. This bridges the layer of the winding which has the break, thereby making the transformer as good as new. In fact, no difference at all could be found between the operation of the repaired transformer and that of a new one.

Testing and repairing in this way can be done in ten minutes. This same principle of tapping the transformer winding with pins can be used for many other purposes. For instance, the secondary of the first transformer (preferably of high ratio) of a two-step amplifier can be tapped at four or five places by driving pins into the side of the winding, as shown in Fig. I. This gives control of the ratio and thereby the volume and clarity just as is done in the Western Electric 10-A power amplifier.

For Push-Pull

By taking a tap from approximately the center of the secondary, an excellent push-pull input transformer can be made from any efficient high ratio (about 6 to 1) transformer. Instead of an output transformer the primaries of two ordinary

transformer were connected in series and used in a choke coil connection.

Using the same detector, tubes, plate voltage and loud speaker, the writer has obtained with this amplifier results which were in every respect equal to those obtainable from a Western Electric 10-A power amplifier, both in clarity and in volume. In fact, when anything more than a 3 to 1 ratio transformer was used on the first stage, the volume became much greater than that given by the W. E. 10-A, but apparently the choke coil output arrangement could not handle all the additional power properly and slight distortion resulted.

Although other transformers could probably have been used with equally good results, the writer had at his disposal and therefore used all Jefferson transformers. A Jefferson Star for the first stage, a No. 33 (6 to 1) tapped with a pin for input transformer, and the primaries of two Stars in series for the output choke.

THIS WEEK'S AIR PROGRAMS

MONDAY, MARCH 17

KPO-HALE BROS., S. F.
423 METERS
Noon—Time signals; reading of the Scriptures.
1 to 2 p m—Rudy Selger's Fairmont hotel orchestra.
2:30 to 3:30 p m—Baritone solos—Jenny, Father O'Flynn, My Love's an Arbutus, St. Patrick Was a Gentleman, Killarney, Wearing of the Green, Avenge and Bright, I Love My Love in the Morning by Clyde N. White, Mrs. Clyde N. White, accompanist.
4:30 to 5:30 p m—Rudy Selger's Fairmont hotel orchestra.
5:30 to 6:30 p m—Children's hour; stories for children by "Big Brother" of KPO, taken from the "Book of Knowledge," Robin Hood and His Merry Men.
Piano solos—A sketch (first time in San Francisco); Tarantella by Jane Cooper.
7 to 7:30 p m—Dinner concert by Rudy Selger's Fairmont hotel orchestra.
8 to 8:45 p m—Bass solos—An Irish Folk Dance, The Shoggiee Shoo, Il Laccato Spittito, Two scenes of Place Retiring, War, Off to Philadelphia, The Little Irish Girl by H. Victor Vogel, Leroy Henshaw, accompanist.
Piano solos—Selected by Leroy Henshaw.
8:45 to 9 p m—An editorial sanctum—a conversation between Stewart Edward White, author and big game hunter, and Charles K. Field, editor of Sunset magazine.
9 to 10 p m—Program under management of Irwin V. Helton, tenor.
Soprano solos—An Irish Love Song, The Little Red Lark, Fair Killarney Across the Sea, by Lela Gordon Saling, Gladys Bostwick, accompanist.
Piano solos—Londonderry Air by Miss Helen McClory.
Baritone solos—Macushla, Top of the Morning, That Old Irish Mother of Mine, by P. H. Ward.
Duet—Number, by Lela G. Saling and Irwin V. Helton.
The St. Patrick's day speaker will be Matthew A. McCullough, attorney.
Soprano solos—Rose of Killarney, The Last Rose of Summer, by Lela Gordon Saling.
Baritone solos—Kathleen Mavourneen, Where the River Shannon Flows, Believe Me if All Those Endearing Young Charms, Mother Machree, by P. H. Ward.
10 to 11 p m—E. Max Bradfield's band playing in the Palace Rose Room Bowl.
KGO-GENERAL ELECTRIC, OAKLAND-312 METERS
1:30 p m—N. Y. Stock Exchange and weather reports.
3 p m—Short musical program; address, "Child Nuture, from the Viewpoint of a Father," Vaughan MacCaughy.
6:45 p m—Final stock, weather and news reports.
KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News items, weather report, market summary.
8 to 10 p m—Program arranged by Radio club, U. of C., from Stephens Union hall, over private wires through KLX.
Campus news by the A. S. S. U. publicity bureau.
Lecture by Prof. J. V. Breitwieser, professor of education; subject, "The Principles of Salesmanship."
Program de luxe by the Treble Cleft society of the U. of C.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KFI-ANTHONY, INC., L. A. 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 hotel—Lyman's Coconut Grove orchestra.
KGW-OREGONIAN, PORTLAND 492 METERS
11:30 a m—Weather.
2:30 to 4 p m—Literary program by Portland Literary Ass'n.
7 to 7:30 p m—Advertising Oregon, by Mrs. B. E. Barrett, city manager, Warrenton.
7:30 p m—Weather and market reports.
8 p m—Piano recital by Beatrice Dierke.
9:30 p m—Concert by artists from the Civic Music club.
KFAE-STATE COLLEGE, PULLMAN, WASH.-330 METERS
7:30 to 8:30 p m—Top grafting, by Prof. O. M. Morris; Birds of a Summer Day, by Prof. W. T. Shaw; orchestra numbers—Pulman orchestra; New Plant Diseases, by Prof. George L. Zundel; Importance of Correct Design in Engineering, by Prof. E. B. Parker; songs—Agnes Ditta, Palouse.
KIL-L. A. TIMES-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.

TUESDAY, MARCH 18

KPO-HALE BROS., S. F.
423 METERS
Noon—Time signals; reading of the Scriptures.
1 to 2 p m—Rudy Selger's Fairmont hotel orchestra.
2:30 to 3:30 p m—Matinee program under management of Jack Hillman, quartet from May Robson's company.
Southern Lullaby, by H. James Montgomery and quartet; Love Sends a Little Gift of Roses, by Robert Ditts; Look, Look in the Book, by Frank Beaton; Every Time, by Robert Ditts; Believe Me if All Those Endearing Young Charms, by Messrs. Beaton, Trowbridge, Ditts and Montgomery.
4:30 to 5:30 p m—Children's hour; stories for children by "Big Brother" of KPO, taken from the "Book of Knowledge." His selections: Little Red Riding Hood, Sleeping Beauty, The Story of Fairyfoot, Keeping Guinea Pigs as pets.
5:30 to 6:30 p m—Rudy Selger's Fairmont Hotel orchestra.
Mary Carr Moore in Mother Goose Songs. Cynthia Grey will speak to the little brothers and sisters of the Junior club.
6:30 to 7:30 p m—Cleveland Six—Before You Go, The West, a Nest and You, Say It With a Ukulele, Saxophone solo—W. Gunzendorfer. Cover Me With Kisses. Violin solo—Ben Lindholm. You're in Love With Everyone, Dancing Honey-moon, Shine, I Don't Want You to Cry Over Me.
7 to 7:30 p m—Dinner concert by Rudy Selger's Fairmont hotel orchestra.
8 to 10 p m—Program under management of Jack Hillman.
Violin solos—Legende, Serenade, by Alice Guthrie Poyner.
Soprano solos—My Laddie, Conspirators, by Mrs. J. R. MacKay.

CHANGES IN PROGRAMS

Often the broadcasting stations are compelled, after announcing their programs, to make changes, because artists are taken ill, or for other reasons. Complete programs, corrected up to the last minute, are published every day in the big radio news section of The Daily News.

Baritone solos—Hear Me, Ye Winds and Waves, Call Me No More (by request) by Jack Edward Hillman.
Piano solo—The Nightingale, by Maybel Sherburne West.
Soprano solos—Habenera, The Open Road, by Margaret Jarman Cheeseman.
Duet—Oasis Scene, "Thals," May Bells, by Mrs. MacKay and Mr. Hillman.
Violin solos—Melody, Melody, by Alice Guthrie Poyner.
Soprano solos—Songs from the Chinese, Aria from L'Oracolo, by Mrs. J. R. MacKay.
Baritone solos—Southern Lullaby, Every Time (by request) by Jack Edward Hillman.
Piano solos—Etude in E Flat, Waltz in E Minor, by Maybel Sherburne West.
Soprano solos—Swing Low, Sweet Chariot, De Ole Ark's a-Movin', by Margaret Jarman Cheeseman.
Duet—Gray Days, Passage Birds, Farewell, by Mrs. MacKay and Mr. Hillman, accompanists, Mary Dietrich, Maybel Sherburne West and Walter Frank Wenzel.
10 to 11 p m—E. Max Bradfield's band playing in the Palace Rose Room Bowl.
KGO-GENERAL ELECTRIC, OAKLAND-312 METERS
1:30 p m—Stock and weather reports.
6:45 p m—Final stock, weather and news reports.
8 to 10 p m—Instrumental selections—Still As the Night March of the Tin Soldiers, by Lyric trio, Modesta Mortensen, violin, Dorothy Dukes Dimm, cello, Martha Dukes Parker, piano.
Vocal selection—Soldiers' Chorus from "Faust" by quartet of First Baptist church, Oakland, Eileen Almstead Piggot, soprano, Ruth Hall Crandall, contralto, George R. Hunter, tenor, Charles Lloyd, bass (director), Martha Dukes Dimm, accompanist.
Tenor solos—I Bring You Hearts, One Day, by George R. Hunter.
Cello solo—The Swan, by Dorothy Dukes Dimm.
Duet for soprano and contralto—Love-Tales of Hoffman, Offenbach; Nearest and Dearest, by Eileen Almstead Piggot, soprano, Ruth Hall Crandall, contralto.
Instrumental selections—Waltz No. 1, Waltz No. 2, by Lyric trio.
Address—European Impressions, by Rev. John Snape, First Baptist church, Oakland.
Vocal selections—Annie Laurie, Absent, by quartet of First Baptist church.
Contralto solos—Pirate Dreams, Passing By, by Ruth Hall Crandall.
Violin solos—Serenade Melancolique, Adagio-Religioso, by Modesta Mortensen.
Duet for tenor and bass—The Moon Has Raised Her Lamp, by George R. Hunter and Charles Lloyd.
Soprano solos—To a Hilltop, To the Sun, by Eileen Almstead Piggot.
Instrumental selection—Andante Molto Sostenuto, Bargell, by Lyric trio.
Bass solos—Viking Song, Calvary, by Charles Lloyd.
Address—European Impressions (second part) by Rev. John Snape.
Vocal selection—Hallelujah Chorus, by quartet of First Baptist church.
Instrumental selections—Deep River, Romance, by Lyric trio.

KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News, weather and financial reports.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KFI-ANTHONY, INC., L. A. 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 hotel—Lyman's Coconut Grove orchestra.
KGW-OREGONIAN, PORTLAND 492 METERS
11:30 a m—Weather.
2:30 to 4 p m—Literary program by Portland Literary Ass'n.
7 to 7:30 p m—Advertising Oregon, by Mrs. B. E. Barrett, city manager, Warrenton.
7:30 p m—Weather and market reports.
8 p m—Piano recital by Beatrice Dierke.
9:30 p m—Concert by artists from the Civic Music club.
KFAE-STATE COLLEGE, PULLMAN, WASH.-330 METERS
7:30 to 8:30 p m—Top grafting, by Prof. O. M. Morris; Birds of a Summer Day, by Prof. W. T. Shaw; orchestra numbers—Pulman orchestra; New Plant Diseases, by Prof. George L. Zundel; Importance of Correct Design in Engineering, by Prof. E. B. Parker; songs—Agnes Ditta, Palouse.
KIL-L. A. TIMES-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.

KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News, weather and financial reports.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
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Distant Stations
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KIL-L. A. TIMES-395 METERS
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KLX-OAKLAND TRIBUNE 509 METERS
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KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
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KZM-HOTEL OAKLAND 360 METERS
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Distant Stations
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KIL-L. A. TIMES-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.

KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News, weather and financial reports.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KFI-ANTHONY, INC., L. A. 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 hotel—Lyman's Coconut Grove orchestra.
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2:30 to 4 p m—Literary program by Portland Literary Ass'n.
7 to 7:30 p m—Advertising Oregon, by Mrs. B. E. Barrett, city manager, Warrenton.
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9:30 p m—Concert by artists from the Civic Music club.
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KIL-L. A. TIMES-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.

KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News, weather, market and financial reports.
8 to 10 p m—Studio program arranged by Willey B. Allen Co., of Oakland. Professionals participating: Genevieve Morris, soprano; L. L. Westling, baritone; Mrs. Westling, pianist; Mildred Martin, violinist; Cecilian trio—Miss June Ulah, violin; Miss Dorothy Ulah, cello; Hazel Hunter, piano; Kathryn Goggin, accompanist.
Soprano solos—Ave Maria, My Lad-

WEDNESDAY, MARCH 19

KLX-OAKLAND TRIBUNE 509 METERS
7 to 7:30 p m—News, weather, market and financial reports.
8 to 10 p m—Studio program arranged by Willey B. Allen Co., of Oakland. Professionals participating: Genevieve Morris, soprano; L. L. Westling, baritone; Mrs. Westling, pianist; Mildred Martin, violinist; Cecilian trio—Miss June Ulah, violin; Miss Dorothy Ulah, cello; Hazel Hunter, piano; Kathryn Goggin, accompanist.
Soprano solos—Ave Maria, My Lad-

die, by Genevieve Morris, Kathryn Goggin, accompanist.
Instrumental selections—Selections from "Hansel and Gretel," Barcarolle, Celebre Menuet, by Cecilian trio.
Violin solos—Caprice de Concert, Chanson Triste, by Mildred Martin, Mrs. Westling, accompanist.
Instrumental selections—Viennese (popular song), Entr'acte (valse), Where Mr. Caravan Has Rested, by Cecilian trio.
Baritone solos—Broadways, Until, The Blind Plowman, by L. L. Westling, Mrs. Westling, accompanist.
Piano solos—A. D. 1620, Melodie, Automne, by Mrs. Westling.
Melodie of Jazz, by orchestra.
Song cycle—"Lover" in Damascus—Far Across the Desert Sands, Where the Abana Flows, Beloved in Your Absence, How Many a Lonely Caravan, If in the Great Bazaars, Allah Be With Us (requiring 12 minutes), by L. L. Westling, Mrs. Westling, accompanist.
Piano solo—Scherzo (requiring 10 minutes), by Mrs. Westling.
Melodie of Jazz, by orchestra.
KGO-GENERAL ELECTRIC, OAKLAND-312 METERS
1:30 p m—Stock and weather reports.
3 p m—Short musical program.
Address, "Spiritual Aspects of the New Education," Florence Rannels, M. A.
6:45 p m—Final stock, weather and news reports.
KPO-HALE BROS., S. F. 423 METERS
Noon—Time signals; reading of the Scriptures.
1 to 2 p m—Rudy Selger's Fairmont hotel orchestra.
2:30 to 3:30 p m—Matinee program under management of R. P. Gillette.
Piano solo—Praeludium, by Maxine Cox.
Baritone solos—When the Roses Bloom, The Trumpeter, Little Irish Girl, by R. P. Gillette.
Tenor solo—Celeste Aida, by Wilson Taylor.
Vocal duets—Battle Eve, My Hero, by Messrs. Taylor and Gillette.
Piano solos—Arabesque, Tarantella, by Maxine Cox.
Tenor solos—Ah, Moon of My Delight; Obstinat, by Wilson Taylor.
Baritone solos—Philosophy, Doan, You, Valurs, by A. P. Gillette; Maxine Cox will accompany the soloists.
4:30 to 5:30 p m—Rudy Selger's Fairmont hotel orchestra.
5:30 to 6:30 p m—Children's hour; stories for children by "Big Brother" of KPO, taken from the "Book of Knowledge." His selections:
Little Goody Two Shoes, The Quest of the Golden Pleece, The Magic Tin-Box, The Three Little Pigs.
Piano solos—Tarantella, Scarf Dance, by Marjorie Fontana, pianist, 11-year-old pupil of Mme. Evelyn S. Ware.
7 to 7:30 p m—Rudy Selger's Fairmont hotel orchestra.
8 to 11 p m—E. Max Bradfield's band playing in Rose Room Bowl of Palace hotel; during the intermissions Joseph Carey, California's blind composer, will preside at the piano; vocalists will present the following of Mr. Carey's latest songs:
She Sang Aloha, Sierra Sue, When Honey Sings an Old Time Song, Drifting Down to Dixie, My Old Irish Mother, You'll Never Be a Sister to Me, A Bungalow in Idaho, In the Harbor of Home Sweet Home, and North, North in California.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KGG-HALLACK & WATSON, PORTLAND-360 METERS
9 to 10 p m—Public health service bulletin; address under auspices of P. A. Ass'n on "Springs," by Gus Benz of the Benz Spring Co.
Address under the auspices of the city and county medical society on "Food Values."
KGW-OREGONIAN, PORTLAND 492 METERS
11:15 a m—Window shopping.
11:30 a m—Weather.
12:30 p m—Concert by Darby's orchestra of Cottillion hall.
3:30 to 4 p m—Children's program.
4:30 to 5:30 p m—Weather forecast and market reports.
8 to 9 p m—Orchestra concert.
9 to 10 p m—Alexander Hamilton Institute, business talk by James Albert.
10 to 11 p m—Dance music by George Olsen and orchestra, Portland hotel.
KFAE-STATE COLLEGE, PULLMAN, WASH.-330 METERS
7:30 to 8:30 p m—Better Hatches, Prof. L. W. Cassel; Fabrics You Will Wear in the Spring—Prof. Edna Irene Avery.
Soprano solos—Margherita Bencke, Spokane.
Piano solos—Fredericka Kershaw, Walsburg.
Use of Whole Grain Cereals—Miss Mary Sutherland.
Goltre and Its Prevention—Dr. D. T. Ford, Pullman.
KFI-ANTHONY, INC., L. A. 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 hotel—Lyman's Coconut Grove orchestra.
KHJ-TIMES, L. A.-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.
2:30 to 3 p m—Matinee musicale arranged by Sou. Calif. Music Co.
6:45 to 7:30 p m—Children's program—Bedtime story by "Uncle John."
8 to 10 p m—Program presented by Kappa Alpha Chapter of Sigma Alpha Iota.

KGO-GENERAL ELECTRIC, OAKLAND-312 METERS
1:30 p m—Stock and weather reports.
3 p m—Short musical program.
Address, "Spiritual Aspects of the New Education," Florence Rannels, M. A.
6:45 p m—Final stock, weather and news reports.
KPO-HALE BROS., S. F. 423 METERS
Noon—Time signals; reading of the Scriptures.
1 to 2 p m—Rudy Selger's Fairmont hotel orchestra.
2:30 to 3:30 p m—Matinee program under management of R. P. Gillette.
Piano solo—Praeludium, by Maxine Cox.
Baritone solos—When the Roses Bloom, The Trumpeter, Little Irish Girl, by R. P. Gillette.
Tenor solo—Celeste Aida, by Wilson Taylor.
Vocal duets—Battle Eve, My Hero, by Messrs. Taylor and Gillette.
Piano solos—Arabesque, Tarantella, by Maxine Cox.
Tenor solos—Ah, Moon of My Delight; Obstinat, by Wilson Taylor.
Baritone solos—Philosophy, Doan, You, Valurs, by A. P. Gillette; Maxine Cox will accompany the soloists.
4:30 to 5:30 p m—Rudy Selger's Fairmont hotel orchestra.
5:30 to 6:30 p m—Children's hour; stories for children by "Big Brother" of KPO, taken from the "Book of Knowledge." His selections:
Little Goody Two Shoes, The Quest of the Golden Pleece, The Magic Tin-Box, The Three Little Pigs.
Piano solos—Tarantella, Scarf Dance, by Marjorie Fontana, pianist, 11-year-old pupil of Mme. Evelyn S. Ware.
7 to 7:30 p m—Rudy Selger's Fairmont hotel orchestra.
8 to 11 p m—E. Max Bradfield's band playing in Rose Room Bowl of Palace hotel; during the intermissions Joseph Carey, California's blind composer, will preside at the piano; vocalists will present the following of Mr. Carey's latest songs:
She Sang Aloha, Sierra Sue, When Honey Sings an Old Time Song, Drifting Down to Dixie, My Old Irish Mother, You'll Never Be a Sister to Me, A Bungalow in Idaho, In the Harbor of Home Sweet Home, and North, North in California.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KGG-HALLACK & WATSON, PORTLAND-360 METERS
9 to 10 p m—Public health service bulletin; address under auspices of P. A. Ass'n on "Springs," by Gus Benz of the Benz Spring Co.
Address under the auspices of the city and county medical society on "Food Values."
KGW-OREGONIAN, PORTLAND 492 METERS
11:15 a m—Window shopping.
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12:30 p m—Concert by Darby's orchestra of Cottillion hall.
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9 to 10 p m—Alexander Hamilton Institute, business talk by James Albert.
10 to 11 p m—Dance music by George Olsen and orchestra, Portland hotel.
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7:30 to 8:30 p m—Better Hatches, Prof. L. W. Cassel; Fabrics You Will Wear in the Spring—Prof. Edna Irene Avery.
Soprano solos—Margherita Bencke, Spokane.
Piano solos—Fredericka Kershaw, Walsburg.
Use of Whole Grain Cereals—Miss Mary Sutherland.
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10 to 11 p m—Hollywood Community orchestra.
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Tenor solos—Ah, Moon of My Delight; Obstinat, by Wilson Taylor.
Baritone solos—Philosophy, Doan, You, Valurs, by A. P. Gillette; Maxine Cox will accompany the soloists.
4:30 to 5:30 p m—Rudy Selger's Fairmont hotel orchestra.
5:30 to 6:30 p m—Children's hour; stories for children by "Big Brother" of KPO, taken from the "Book of Knowledge." His selections:
Little Goody Two Shoes, The Quest of the Golden Pleece, The Magic Tin-Box, The Three Little Pigs.
Piano solos—Tarantella, Scarf Dance, by Marjorie Fontana, pianist, 11-year-old pupil of Mme. Evelyn S. Ware.
7 to 7:30 p m—Rudy Selger's Fairmont hotel orchestra.
8 to 11 p m—E. Max Bradfield's band playing in Rose Room Bowl of Palace hotel; during the intermissions Joseph Carey, California's blind composer, will preside at the piano; vocalists will present the following of Mr. Carey's latest songs:
She Sang Aloha, Sierra Sue, When Honey Sings an Old Time Song, Drifting Down to Dixie, My Old Irish Mother, You'll Never Be a Sister to Me, A Bungalow in Idaho, In the Harbor of Home Sweet Home, and North, North in California.
KFKB-KIMBALL-UPSON, SACRAMENTO-238 METERS
6 to 6:30 p m—Musical program.
KLS-WARNER BROS., OAKLAND 360 METERS
11:30 to 1 p m—Phonograph records.
KZM-HOTEL OAKLAND 360 METERS
6:45 to 7 p m—Code practice.
Distant Stations
KGG-HALLACK & WATSON, PORTLAND-360 METERS
9 to 10 p m—Public health service bulletin; address under auspices of P. A. Ass'n on "Springs," by Gus Benz of the Benz Spring Co.
Address under the auspices of the city and county medical society on "Food Values."
KGW-OREGONIAN, PORTLAND 492 METERS
11:15 a m—Window shopping.
11:30 a m—Weather.
12:30 p m—Concert by Darby's orchestra of Cottillion hall.
3:30 to 4 p m—Children's program.
4:30 to 5:30 p m—Weather forecast and market reports.
8 to 9 p m—Orchestra concert.
9 to 10 p m—Alexander Hamilton Institute, business talk by James Albert.
10 to 11 p m—Dance music by George Olsen and orchestra, Portland hotel.
KFAE-STATE COLLEGE, PULLMAN, WASH.-330 METERS
7:30 to 8:30 p m—Better Hatches, Prof. L. W. Cassel; Fabrics You Will Wear in the Spring—Prof. Edna Irene Avery.
Soprano solos—Margherita Bencke, Spokane.
Piano solos—Fredericka Kershaw, Walsburg.
Use of Whole Grain Cereals—Miss Mary Sutherland.
Goltre and Its Prevention—Dr. D. T. Ford, Pullman.
KFI-ANTHONY, INC., L. A. 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 hotel—Lyman's Coconut Grove orchestra.
KHJ-TIMES, L. A.-395 METERS
12:30 to 1:15 p m—Music, news items, weather report.
2:30 to 3 p m—Matinee musicale arranged by Sou. Calif. Music Co.
6:45 to 7:30 p m—Children's program—Bedtime story by "Uncle John."
8 to 10 p m—Program presented by Kappa Alpha Chapter of Sigma Alpha Iota.

KGO-GENERAL ELECTRIC, OAKLAND-312 METERS
1:30 p m—Stock and weather reports.
3 p m—Short musical program.
Address, "Spiritual Aspects of the New Education," Florence Rannels, M. A.
6:45 p m—Final stock, weather and news reports.
KPO-HALE BROS., S. F. 423 METERS
Noon—Time signals; reading of the Scriptures.
1 to 2 p m—Rudy Selger's Fairmont hotel orchestra.
2:30 to 3:30 p m—Matinee program under management of R. P. Gillette.
Piano solo—Praeludium, by Maxine Cox.
Baritone solos—When the Roses Bloom, The Trumpeter, Little Irish Girl, by R. P. Gillette.
Tenor solo—Celeste Aida, by Wilson Taylor.
Vocal duets—Battle Eve, My Hero, by Messrs. Taylor and Gillette.
Piano solos—Arabesque, Tarantella, by Maxine Cox.
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7 to 7:30 p m—Rudy Selger's Fairmont hotel orchestra.
8 to 11 p m

MUSIC IS BIG WORRY RIGHT NOW IN RADIO

BY THE RADIO EDITOR

What is the greatest worry of most of our local broadcasters today?

Static? Interference? Mechanical puzzles? Finding talent? Questions of thousands of fans which flood the mails daily?

No, none of these, although they are real enough worries.

This thing that is worrying the managers of some bay district radio stations, not all, is music.

Why should music bother him? There's plenty of it. True enough, but—

Most of it is copyrighted by the American Society of Composers, Authors and Publishers.

Most Copyrighted

Name over any ten of the old popular songs and chances are seven or eight of them are copyrighted against reproduction "for public performance."

So the question today for broadcasters to solve is whether they should accept the opinion of the society that a radio performance is a public performance and pay a license to the society, whether to avoid using any music copyrighted by the society or to fight the claim of the society in court.

This latter expedient was tried twice in the east and the society won in both cases.

The result is that bay broadcasting stations are in a quandary which makes framing of a program in advance a somewhat precarious proposition.

A few years ago when radio was in its infancy, the solution was easy. The society was satisfied with a small annual fee which it exacted from hotels, theaters and restaurants. With the coming of the radio, the society was not long in seeing the revenue-producing possibilities of the broadcasting stations and the fees which were then a matter of \$50 to \$100 a year jumped into the thousands and the demands of the society are still pointed skyward, so that the problem of music is becoming a very serious one. There is little doubt that if the society wins its contentions in court and continues to increase the fee, another exodus from the radio field will be seen, one that will leave only the most prosperous corporations still broadcasting.

Herrick Awaits Result of Test

PARIS, Mar. 17.—U. S. Ambassador Myron Herrick is waiting anxiously for reports on his first experience in radio diplomacy, in which a speech he made on Franco-American amity was broadcast over Europe and to the United States.

The ambassador spoke shortly before Friday midnight, so that his address, if it reached the United States, should have been heard in the west about 4 p m Friday.

The address was broadcast by the Radio Union on a wave length of 78 meters, utilizing a new system of wave purification.

Herrick reviewed Franco-American friendship briefly and referred to the recent action of American bankers in establishing large credits in New York to bolster up the franc.

RADIO QUEEN



Miss Mathilda Brooks of Cincinnati, O., was declared winner in the first beauty contest ever staged by radio. Fans throughout the country picked her from a list of four contestants whose individual charms were flashed through the air. Voting was done by telegraph.

LET'S SWAP

What have you that you don't want? What do you want that you don't happen to have?

The radio habit is like the automobile habit—you start with a flivver set and windup tuning in on a Rolls-Royce affair. In making the transition there are many parts left over that somebody else may need. Somebody else may have something that you want badly. Why not swap?

The Daily News Radio Magazine will publish "swap" ads free, but the article to be traded must be radio equipment.

\$20 Radio Prize Contest Near End

(Concluded From Page 1)

otherwise could be obtained.

"It unites the people that are shut in with the outside world. It connects the different countries and races, and helps to encourage peace among the nations."

Miss B. Evensen, 1601 Dolores-st., San Francisco, thinks radio is simply wonderful. She says:

"I am enthusiastic about radio because they give such wonderful programs. They are so interesting that when you first hear the programs you simply can't leave them. The music that is given over the radio simply thrills me and one can't leave them for one minute."

A San Jose radio fan, Irvin Panter, Box 219, is enthused about radio because:

"It not only renders clean concerts, but also business undertakings, religious services and other valuable information. The farmer receives his share in weather forecasts and general pricing of farm produce. The home-loving people, who do not mingle in society, receive good, clean concerts."

EDUCATION IS POSSIBLE NOW ON AIR WAVES

Having succeeded in winning over the American public to the idea of education by radio, colleges and other educational institutions are going a step farther.

They are inaugurating a series of courses on various subjects, by which radio students listening in on them will be eligible for examinations entitling them to "points" toward college entrance, teaching or a degree.

It is a sort of compromise between the correspondence school and direct education.

Almost at the beginning of the popular adoption of radio, the New York board of education took up this form of teaching. At first it was only experimental. Lectures were broadcast from headquarters to a school-room that had a receiving set, while observers watched the effect this had on the children.

Parent Talks

That has broadened out until now the board of education is New York is broadcasting daily lectures not only to its children but to their parents. Thus, it is hoped, closer co-operation will be maintained between the school and the home.

According to William L. Ettinger, New York superintendent of schools, the programs broadcast through the station WJZ between 2 and 2:30 each afternoon will include talks on special phases of education, music lessons, songs, glee clubs, music appreciation, orchestras, recitations in reading English, history, civics, geography, arithmetic, nature study, science, spelling lessons and exercises for special holidays.

Government to License Stations

(Concluded From Page 1)

selves in position where they can censor the material which shall be broadcast to the public, nor do I believe that the government should ever be placed in the position of censoring this material.

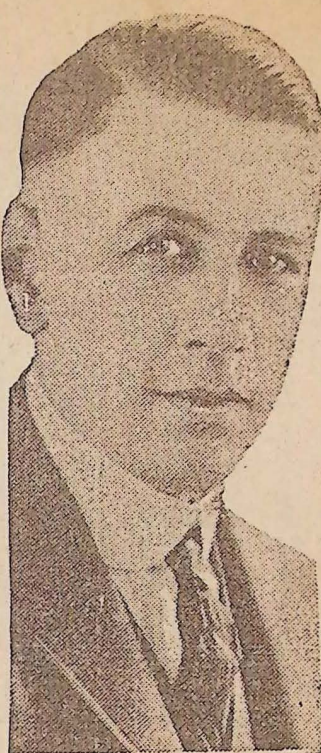
"It seems to me that the fundamental thought of any radio legislation should be to retain possession of the ether in the public, and to provide rules for orderly conduct of this great system of public communication by temporary permits to use the ether. It should be kept open to full and free individual development, and we should assure that there can be no monopoly over distribution of material.

"Among other problems is one as yet totally unsolved. That is, how can we secure perpetually full and complete broadcasting service in such fashion that it will support itself otherwise than in dependence upon the sale of manufactured articles or upon advertising.

"It seems to me we must leave this question to further experience and I do not favor a solution by any license and charge upon receiving sets as is imposed in other countries. So far as I am advised, the United States is the only country which does not impose a license upon or regulate receiving sets."

Hoover also spoke in opposition to the proposal of Comdr. D. C. Bingham, chief of naval communications, that leases be given to broadcasting stations for 50-year periods. Hoover said such action would tend to create monopolies, and that companies given wave lengths for half a century would be apt to claim vested rights to such wave lengths.

BIG BROTHER



Here's "Big Brother" on KPO.

He's the one who tells little boys and girls why the sun gets out of bed so early every morning (except foggy ones). He relates the stories about the Screwworm and Scramble-pipe, the Cobblers and the Cuckoo, and answers the questions that stump papas and mamas in the bay district.

His name is L. R. Tucker and he looks like just what he is—a big brother.

THIS SOUNDS LIKE "BULL" TO US, ALSO

NEW YORK, Mar. 17.—

Ernest Thompson Seaton's vocal imitations of the challenge of a bull were so realistic that a German police dog, Pierre, owned by a radio enthusiast in Woodbridge, N. J., flew from the room containing the receiving set when Seaton roared, according to a letter to WEAF, New York city.

The dog quivered when the loud speaker caught the challenge notes and scurried from the room when the attacking bellow was sounded.

Set Teaches Parrot

Radio and a good loud speaker can be made to serve many an unusual purpose. One young lady in Brooklyn is educating a taciturn parrot to the point of loquacity. If the birds lives to be 100, as his kind often do, he may learn several languages over the radio.

EXPERT SEES GOVERNMENT IN CONTROL

BROOKLYN, Mar. 17.—The only way radio listeners can safely control the class of programs broadcast to them is through federal adoption of this form of entertainment.

Thus only, says Alex Eisemann, radio manufacturer and former president of the National Radio Chamber of Commerce, will the public be able to express its preference for whatever it likes to hear by radio.

"In years to come," Eisemann predicts, "the campaign literature of candidates for office will contain among the pre-election promises assurances that the new man or woman, if elected, will supply better broadcasting than his or her predecessor."

But before this eventually, he says, must come the federal adoption of radio broadcasting, maintained by a special radio reception tax. This will become a necessity, he goes on, and only those broadcasters will survive who will be re paid financially for their service.

"Those stations which are making a charge for the use of their plants," says Eisemann, "are today furnishing the highest quality of entertainment. This is the only kind of broadcasting that will develop a real and lasting public interest in the art."

"It appears to be unsafe to hope for a continuation of good broadcasting unless the broadcasters are properly compensated. It is quite within the bounds of reason to suggest that a federal tax be placed on all receiving sets, based on the number of vacuum tubes. The tax need be nominal, but multiplied by millions of receiving sets, a substantial fund could be thus guaranteed for the maintenance of powerful federal stations operated strictly in accordance with the wishes of the people."

"We can hardly appreciate too keenly," Eisemann concludes, "the marvelous romance of this new means of communication. Its power for good or evil is tremendous. A newspaper can readily be held responsible for anything that it publishes, but the words of broadcasters melt away and no record is made."

"It would appear, therefore, that the ultimate controlling agency in each station should be governmental."

WASHINGTON, March 17.—The bureau of standards is transmitting twice monthly special signals of standard frequency, by which experimenters, transmitting operators and others may adjust their apparatus.

Neutrodyne and Super-Heterodyne Sets

THE RADIO DAY LABORATORY
Repairing Garfield 6635
693 Mission Street, San Francisco

AIR PROGRAM—CONTINUED

(Concluded From Page 4)
KFRB—KIMBALL-UPSON, SACRAMENTO—238 METERS
6 to 6:30 p m—Musical program.
KLS—WARNER BROS., OAKLAND
360 METERS

11:30 to 1 p m—Phonograph records.
KZM—HOTEL OAKLAND
360 METERS

6:45 to 7 p m—Code practice.
Distant Stations

KGW—OREGONIAN, PORTLAND
492 METERS

11:15 a m—Market basket.
11:30 a m—Weather forecast.
12:30 p m—Concert.

8:30 to 4 p m—Lecture provided by extension service of Oregon Agricultural College.

7:30 p m—Weather forecast and market reports.

8 to 8:15 p m—Accordion solos by John Sylvester.

8:15 to 9 p m—Studio program of dance music by George Olsen's Metropolitan orchestra of the Hotel Portland; Herman Koenig, director.

9 to 10 p m—Educational lecture provided by University of Oregon, extension department. "History and Significance of the British Labor Movement," by Dr. Peter C. Crockett, professor of economics.

10:30 to 12 m—Hoot Owls. Darby's orchestra.

SUNDAY, MARCH 23

KFO—HALE BROS., S. F.
423 METERS

11 to 12 noon—Organ prelude, Theodore J. Irwin.

Lord's Prayer, Rev. J. S. Thomas. Solo, "The Lord Is My Light," H. Metcalf, tenor; Irwin at organ.

Scripture reading, Rev. Thomas. Prayer, Rev. Thomas.

Solo, "Pleasant Are Thy Courts Above," Metcalf.

Sermon (20 minutes), Rev. Thomas. Solo, "My God, My Father, While I Stray," Metcalf.

Chimes.

KGW—GEN. ELC., OAKLAND
312 METERS

3:30 p m—Concert by KGO Little Symphony orchestra.

KLX—OAKLAND TRIBUNE
509 METERS

9:30 to 10 p m—Vocal selections, First Baptist church quartet.

Talk by Rev. John Snape, "The Aeroplane or Spiritual Aviation." Songs by quartet.

KLS—WARNER BROS., OAK.
360 METERS

12 to 1 p m—Church services under auspices Radio Church Service of America.

New York "A" Batteries

for Your Radio Set

6 V.-100 Amp. \$12.50
6 V.-200 Amp. \$18.50

New York-Pacific Battery Company

881 Post St.
Prospect 4130

long distance
RADIO RECEIVER

Radyne

Radio at its best—

Be sure to see and hear the RADYNE before you buy a set you will not like so well. The best radio dealers sell RADYNE Receivers because the people who buy them are always so well satisfied afterward. A list of these dealers will appear in The Daily News Radio Magazine next Monday, March 24th. Watch for it. In the meantime, if you wish their names and a RADYNE folder, just send your name and address to—

Atlantic-Pacific Agencies Corporation,
Rialto Bldg., San Francisco, Sole Distr.

TWO-TUBE SET WITH SPEAKER

BY HIRSCH M. KAPLAN

Radio reception, to the vast majority, is past the stage where it is necessary to sit with the headphones clapped tightly to the ears in order to enjoy the program from local broadcasting stations. The game has now reached the point where a loud speaker is considered a necessary prerequisite, so that all in the room can enjoy the entertainment.

Many "fans" find that they are not in a position to spend \$100 or so that is needed for a loud speaker, and therefore have to content themselves with headphone reception.

With the advent of the reflex principle the problem of expense in constructing a set was considerably minimized, for it showed the way to making a tube do "double duty." To date, however, there has been one drawback to the reflex. It has proven rather difficult to get some of the circuits working properly.

When you ask the average devotee how his reflex set is working, he will usually reply: "It isn't reflexing." Why this is he doesn't know, but he does know one thing, that the author of the article, wherein his reflex set was described did not give sufficient instructions and exaggerated claims for what might be expected of it.

To lessen the difficulties in getting the set to operate, without decreasing its efficiency, it is recommended that the constructor use the parts adapted by the writer in the construction of the original set, and with which satisfactory results were obtained. Of course, other parts may be used, but the degree of satisfaction obtained will depend on how good the parts are and how carefully the user assembles them.

Tuning System

Two tubes are employed. One of them functions as a radio and audio amplifier, functions doubly, as a radio and audio amplifier, while the other acts as a straight audio amplifier. The tuning units consist of two coils of wire wound on one bakelite tube, another coil of wire wound similarly on another tube used in conjunction with one tube and one audio transformer. The second coil of wire, referred to above, is shunted by one of the variable condensers and is used as a tuned radio frequency transformer.

As most radio adherents know, reflexing a circuit minimizes the use of tubes, cuts down expense and gives results which are superior to the ordinary two-tube set.

Those who at present own reflex sets have probably learned that in a majority of cases the antenna circuit does not tune sharply enough. In this particular set, to correct this fault, we have employed an aperiodic primary. This increases the selectivity without adding to the number of controls. To still further increase selectivity we have employed a means by which the radio frequency stage may be brought into resonance with the antenna circuit. This method is the well understood tuned impedance coupling, which is one of the most efficient methods of coupling known.

Fixed Detector

To overcome the inconvenience of the usual troublesome and unstable cats-whisker we have employed a fixed crystal detector. The set is very simple to construct. The whole job consists of drilling the panel to mount the rheostat, phone jack, bezel and two variable condensers. On the baseboard are mounted the transformers, sockets, crystal detector and a small hard rubber shelf, on which are mounted the battery, aerial and ground binding posts, to preserve the neatness of the panel layout.

A desirable feature in the tuning of this set is its similarity to the method employed in operating a neutrodyne. In the set in question there are only two tuning controls, and if they are properly set their readings for any station will be practically synchronized.

Due to the sensitivity and extreme selectivity of the set it is possible to tune in distant stations while the locals are in operation.

The set is laid out as in the

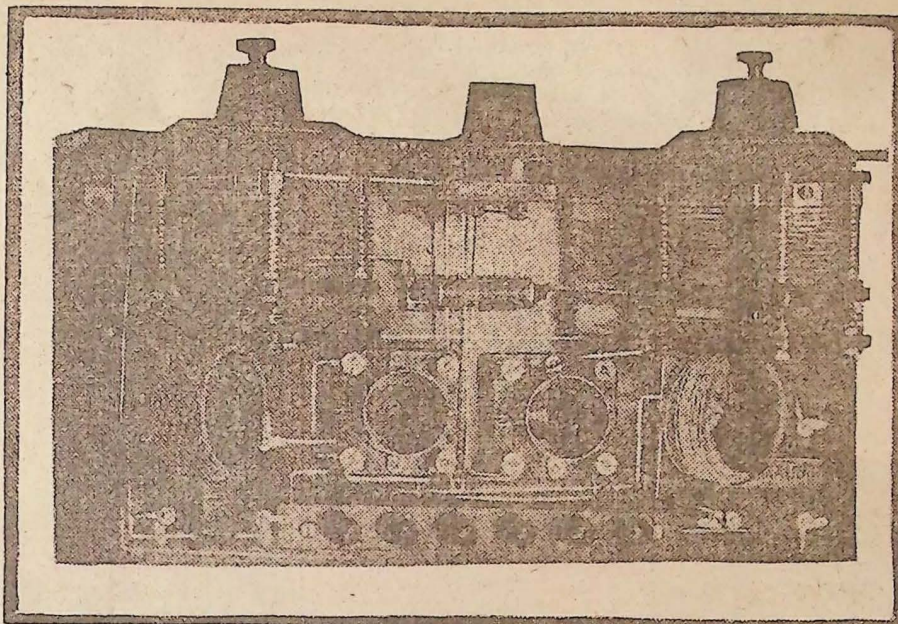


Fig. 1—Rear view of the Sherma-Flex. Note the spacing of the various parts so that short leads are assured. Therefore, it will be best that you follow out the layout.

photograph and, if wired neatly, will make a set to be proud of.

The following parts were used in the set described and are the only ones, therefore, to the efficiency of which the writer can testify with safety:

Two tubes Radiotron 201-A.
Two Federal sockets.
Two Kant Short brass plate condensers, 26 plate verniers.
Two De Forest - unmounted honeycomb coils, 50 turns.
Two fixed Micadon condensers, .001 cap.
Two Sherma-Tran audio transformers, high and standard ratio.

One radio improvement single circuit jack.
One Erla bezel.
One Amsco rheostat
One-fourth pound No. 20 d. c. wire.

Ninety volts "B" battery.
One "A" battery.
One Pyratex detector.
Six binding posts.
One radio panel, 7x14.
One baseboard, 7x13.
One piece hard rubber, 1/2x7.
Accessories include such items as screws, for mounting transformers, and two long screws with nuts to mount the strip on which are to be mounted the binding posts, etc. These last should be long enough to support this strip of hard rubber about 2 1/2 inches up from the baseboard.

In order that no difficulties may be encountered in construction of the set, the writer will endeavor to take you carefully through the various stages of assembling.

Laying Out the Panel

The first step is to lay out the panel for mounting the condenser's rheostat, phone jack and bezel. Divide the width of the panel in half and with the aid of a sharp pointed instrument scratch a line from top to bottom. At a point three inches up from the bottom on this center line, with the aid of a center punch, mark the location for the shaft of the rheostat. Most of the rheostats are accompanied by a template. With the aid of this, and using the point just marked on the panel as a guide, the location of the holes for the supporting screws of the rheostat may be located. After marking these drill the holes, the size of which can be determined by the size of the screw to be used; or, if a template accompanies the instrument, the screw size will be found next to the corresponding holes.

With the rheostat mounted, the next step will be to mark a point on this same center line 1 1/2 inches up from the bottom. Here will be placed the phone jack.

Again, on the same center line, 1 1/2 inches down from the top, inscribe a point for locating the bezel.

The two condensers are mounted three inches in from each side of the panel and three and one-half inches up from the bottom. After determining the location of the center shaft of the instrument with the aid of a template, proceed to lay out the position of the other holes necessary for mounting the condensers. If no template accompanies the instrument, mark the mounting screws with some whiting and place the center shaft through its assigned hole.

Then press the condenser mounting screws against the panel. This will give you a satisfactory means of determining their location.

Templates Facilitate Assembly

In the construction of the original set the writer made a template and found it much more convenient than using whiting. The method of making this template follows: Take a piece of cardboard, as large as the bakelite end of the condenser, and through the center of it drill a hole the same size as the condenser shaft. After drilling this, place the shaft through it and press the card tightly against the mounting screws until they leave a good impression in the cardboard. It will be found that this produces a perfect template. You are now ready to mount the condensers.

Other parts of the set should now be mounted to the baseboard, as shown in the photograph, particular care being taken to mount them so that all

connections will be as short as possible.

For those who do not wish to mount the binding posts on the panel it is suggested, as in our own case, that they mount them on a small shelf 1/2x7, which in turn is mounted on the baseboard. If two screws about three inches long are used, the shelf will be raised off the baseboard.

Next we add a few turns to one of the honeycomb coils so that we have a fixed coupler. This may be easily done by winding ten turns on top of the honeycomb coil. At this point a word of caution might be timely. Do not fail to have the extra ten turns go in the same direction as those on the honeycomb proper.

After having wound the ten turns, secure them with a little sealing wax, which might be obtained from the top of an old "B" battery. The honeycomb coil has now been "transformed" into a fixed coupler, and it is

all ready for mounting.

To do this take a piece of soft brass (of the thin variety) about two inches wide and four inches long. Cut this in half so that you have two pieces of brass one inch wide and four inches long. A quarter of an inch in from each end drill a hole that will accommodate an 8-32 screw. Remove the small nuts on the back of the variable condenser that hold the pieces in place. Place one end of one of the four inch strips over one of the screws from which the nut has just been removed. Tighten up the nut. Now slip on the honeycomb fixed coupler so that it will be at an angle similar to that adopted for neutroformers. Remove the other nut holding the condenser end plates and slip the other holes in the same brass strip over the screw. Again tighten the nut. The coil ought to be held firmly in place. The operation should be repeated for the other coil, save that no extra turns are wound on it.

With all parts mounted, next proceed to mount the baseboard to the panel by means of two small brackets or with three small screws evenly spaced across the panel, about one-half inch from the bottom.

Operating Instructions

Now for the operation of the set. Place the two tubes in their sockets and hook up the "A" battery. Turn on the rheostat and if the tubes light, connect the "B" batteries. To determine whether or not the set is now ready for tuning in the stations, tap the tubes lightly and if they ring it is an indication that you can safely proceed. The dials of the condensers should be set at 0 when the plates are entirely unmeshed. If this is done the operator will find that the dials will read practically the same for any station. If at first results are not obtained, try reversing the primary and secondary connections of both transformers. You may also find that better results are obtained with the two small fixed condensers removed.

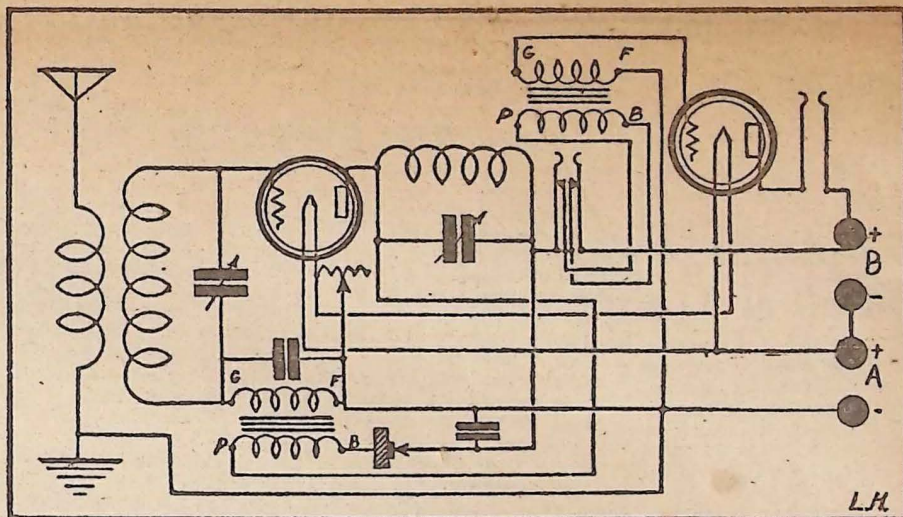


Fig. 2—The schematic hook-up shown above is that of the set described. It will be noticed that the set employs one stage of tuned impedance, r. f. amplification, a crystal detector, one stage of reflexed a. f. amplification, and a straight stage of audio frequency.

BUILDING A WAVE TRAP

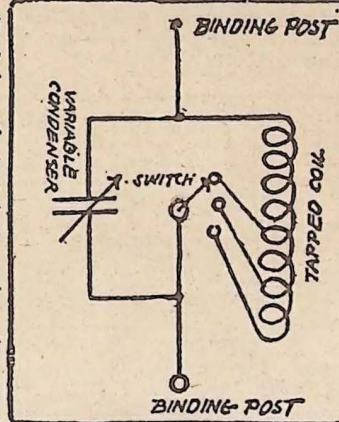
BY ARTHUR COOK

The use of an auxiliary tuning device, known as a wavetrapp, will cut interference to a minimum.

Constructing a wavetrapp is a simple and inexpensive matter. If made in the correct manner, it should equal commercial apparatus of the same type, costing \$8 or \$10.

These are the materials needed in constructing it:

One 23-plate variable condenser.
One cardboard tube 3 1/2 inches in diameter and 4 inches long.
One switch lever.
Three switch points.
One-fourth pound No. 20 D C wire.
Two binding posts.
One panel, 5 inches square.
A reliable variable condenser should be used because the sharp tuning qualities of the trap depend upon this.
Wind the tube with 60 turns



of wire, tapping it at the 19th, 40th and 60th turns. The lead left at the end of the 60th turn will serve as the third tap.

Mount the condenser on the panel. The coil should be mounted at the back of the base, about two inches from the condenser. The switch lever and points, along with the binding posts, should be mounted on the panel.

The electrical connections are made as shown in the diagram. The trap may be used either as an acceptor, or a rejector.

As a rejector it receives only the stations to which it is tuned. In this case it is connected with the aerial lead to the binding post, shown in the upper part of the diagram, with the other post connected to the aerial post of the receiving set.

As an acceptor it is connected across the aerial and ground posts of the set, leaving the aerial and ground wires connected. When tuned to the exact wavelength of the undesired station, it passes its signals through the ground, thereby eliminating it.

The condenser dial may be calibrated in terms of wavelength, thus simplifying tuning.

Another Aerial

If you have trouble tuning out a station to get another, try dropping a wire out of the window and using it in place of the regular antenna. Try to make this wire at least 30 feet long.

MAKING MUSIC FROM SQUEALS

You who are familiar with the annoying howls and squeals of radio, can use them to advantage now. The staccatone, a new musical instrument, originated and developed by Mr. H. Gernsback, editor of several leading scientific and technical magazines, and originator of many scientific developments, utilizes those sounds to produce pure musical tones in perfect tune, but radically different from any musical tone that has ever been produced before.

In describing his new invention in the March issue of Practical Electronics, Mr. Gernsback says: The characteristic squeal rising in pitch from zero to a note beyond the limit of audibility is familiar to all of us. This range of frequencies runs much higher than can be obtained from any known musical instrument. If properly controlled, we have a musical instrument that surpasses in tonal range any other musical instrument, with exceptional purity, practically free from harmonics. With several vacuum tubes harmonic chords can be developed.

With the single vacuum tube used in the particular instrument described here, musical chimes and tunes can be played that are very pleasing to the ear when played alone or in connection with an orchestra.

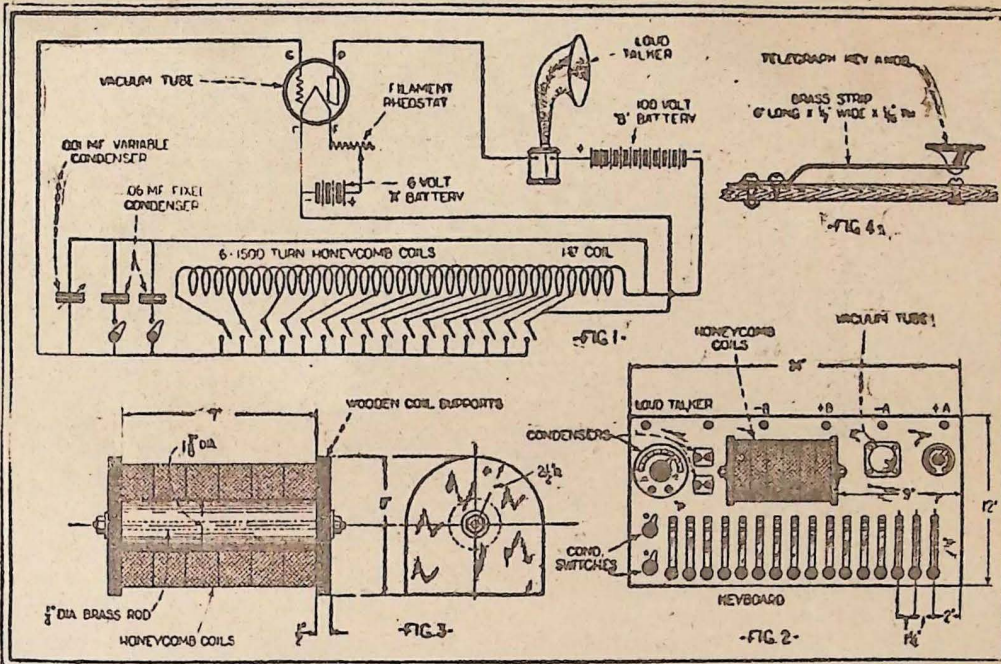
A Musical Oscillator

The experimenter will find much amusement constructing and operating one of these musical oscillators, which the staccatone really is, and if careful in tuning it should have many calls for its use by orchestras, especially those used for dancing, for which this new music, with its weird flute-like undulation, is especially suited.

The squeals heard in radio sets are caused by the interference of two waves of different frequency setting up an audible beat-note. These squeals are difficult to control, since the slightest change in the capacity of the apparatus, such as is caused by moving the hand near the set, etc., will change the pitch of the beat-note considerably.

During the exhaustive experimenting that was required to develop the staccatone this method was found impractical for the purpose, so that the vacuum tube was used and connected to generate low or audible frequency notes sounding very much the same as the beat-notes heard in radio.

Such a circuit requires larger values of capacity and induct-



Various views of the new electrical instrument, the Staccatone. A single vacuum tube is made to produce music, really a version of the so-called static sounds which sometimes arouse the ire of the wireless operator. The instrument is compact and produces sounds of considerable intensity and of good characterization.

ance than are used in the ordinary radio circuit, and for this purpose a number of large honeycomb coils are used with fixed and variable condensers of comparatively large capacities, so that the natural frequency of the oscillating circuit will be at a low audible note.

By employing sufficient capacity and inductance in the circuit to give us the lowest note desired, we can, with a number of switches corresponding with the keys on a piano, cut inductance, or capacity, or both, in and out of the air and raise the pitch to any value we wish, each key or switch corresponding to a musical note of the scale. The tones are heard from a loud speaker connected in the plate circuit of the vacuum tube.

The complete circuit is shown in Fig. 1. Those familiar with radio hook-ups will recognize this at once as the Hartley circuit. The inductance consists of six 1500-turn honeycomb coils, connected in series and clamped together as shown in Fig. 3. Care should be taken while connecting the coils to make certain that their magnetic fields will assist rather than oppose each other, or the circuit may not oscillate. The coils will be properly connected if the outside lead of one is con-

nected to the inside lead of the other, and all are placed so that the wire is wound in the same direction. It will be noted that the negative side of the "B" battery is connected to one of the end coils, which for convenience we will call the first coil. The filament of the tube is connected to the other lead of the first coil, where it makes connection with the second. Taps are brought out and connected to the switch keys, as will be described later.

Twenty Small Condensers

For the fixed condensers about 20 small mica condensers of .006 mfd. each are required. The variable condenser may be of the 43-plate type. The purpose of the variable condenser is to adjust the apparatus to be in tune with other musical instruments, as it has been found by experience that different tubes and different values of A and B battery voltages slightly change the frequency of the generated current. Therefore, to tune the staccatone to other instruments the variable condenser will be found convenient.

The condensers are divided into two sections, as shown; the exact capacities of each will have to be determined when tuning the oscillator. With all of the condensers connected in

the circuit the note should be the lowest desired. The switch keys are connected at the proper intervals so as to cover one octave, including all half notes. Then, cutting out the remaining fixed condensers increases the frequency another octave, and with the variable condenser the frequency can be increased to inaudibility.

With the aid of the reproduced photograph and the plan view of the finished apparatus little difficulty should be experienced in connecting and mounting the instruments. Fig. 4 shows how the switch keys are made. Everything should be connected but the taps to the coils and the condensers. Six binding posts are provided for the A and B batteries and the loud talker. These should be connected up and the tube lighted to test the circuit and determine whether it oscillates. A loud howl should be heard in the loud talker.

Purpose of the Keyboard

The greatest difficulty is to properly tune the oscillator. If a piano is available this will be a great help. If not, a tuning fork in conjunction with any musical instrument will do. To begin, the lowest switch key, marked No. 1 in the diagram, should be connected to the end of the last coil. Then the con-

densers should be added until the desired note is obtained, which for best results should be G. The variable condenser will aid in obtaining the correct frequency, and if not it may be necessary to tap the coil near the end rather than at the end turn. Then the next key should be connected by tapping on the coil until G flat is obtained. There is no way of determining the position of the tap—it must be done by the cut and try method. When separating the coils to make the tap, they should be clamped together again when trying the note, as the pitch will be different with the coils separated. The remaining taps are connected in the same manner, so as to form a complete musical scale of over one octave as follows: G, G flat, A, A flat, B, middle C, C flat, D, D flat, E, F, F flat, G, G flat, A, A flat. When so tuned any musical selection can be played.

Although not necessary, the complete keyboard can be shifted one octave higher by cutting out the proper number of condensers. The correct number must be determined by trial. By adding more condensers the scale can be shifted one octave lower. By cutting out all of the fixed condensers an exceptionally high squeal can be obtained which will rise to inaudibility as the variable condenser is decreased to zero capacity.

Using only one vacuum tube such as the type UV-201, and a B battery voltage of 90 or more, the sound will be so loud as to be heard for several blocks. Of course, a good loud talker must be used. But for inside use in a small room a dry cell tube may be used with a 45 volt B battery. In fact, most of the instruments that are used in radio receiving sets may be employed in the staccatone.

Mr. Gernsback is now completing a staccatone that will be used publicly at the Rialto of New York city by Dr. Hugo Riesenfeld, the well-known conductor of the famous symphony orchestra of that theater, in conjunction with his famous orchestra. It is expected that its use will be witnessed by many of the leading musical directors of the United States.

Mr. Gernsback first used this instrument on the occasion of broadcasting the recent song contest conducted by one of his magazines from WJZ, New York. Many who listened in and heard the strange instrument wrote for a better description of it, which is the purpose of this article.

NAVY ENTERS BIG EXHIBIT AT CAPITOL

WASHINGTON, Mar. 17.—Plans for Washington's first annual radio show, which will be held at Convention hall from Mar. 19 to 20, are going forward rapidly and indications are that it will eclipse all exhibitions of this kind ever held.

The committee of the Radio Merchants' ass'n of Washington, which organization is promoting the show, announced today that an invitation has been extended to John Hays Hammond jr, noted American inventor, and it was expected that he would attend. Among the many inventions accredited to Hammond are a system of selective radio telegraphy and wireless controlled torpedoes.

Asst. Sec'y of the Navy Roosevelt has informed the committee that the navy will display an important part of its radio equipment.

Accepting the invitation of the committee to exhibit at the show, Asst. Sec'y Roosevelt wrote:

"The navy will be glad to exhibit apparatus at this show. A floor space of from 300 to 500 square feet will be sufficient for the navy exhibit."

Bridge Taught by Radio

A good loud speaker is the auction bridge instructor for members of a woman's club in Montclair, N. J. Radio lessons in the game have greatly increased the facility of the ladies.

Puts Set On Bicycle And Solves Mystery

MARION, O., Mar. 17.—Using an especially constructed radio receiving set installed in his automobile, Chester Ulsh, local radio fan, located the source of a disturbance which has bothered

Marion radio fans for the past two weeks.

Ulsh used a loop aerial. After touring the county Ulsh decided the disturbance was in Marion. Returning to Marion he scouted the city and by a series of experiments finally located the cause of the disturbance in a transformer.

RECEIVE 200 FEET DOWN

CLEVELAND, O., March 17.—Radio experimenters tried what they consider a more difficult test than that made under the Hudson river recently. They took a receiving set into a tunnel 200 feet underground, where ground capacity was high, and report they heard signals from Chicago and Philadelphia.

Radio Critic

The dramatic, movie and literary critics of newspapers are being joined by another—the radio critic. He listens in on as many broadcast concerts as possible and criticizes them in the newspaper the next day.

Invents Loop on Tube

A European inventor has devised a loop antenna on a tube, like a bicycle tire. When wanted for use it is inflated so that the wires are held out in loop form.

Towers 210 Feet Up

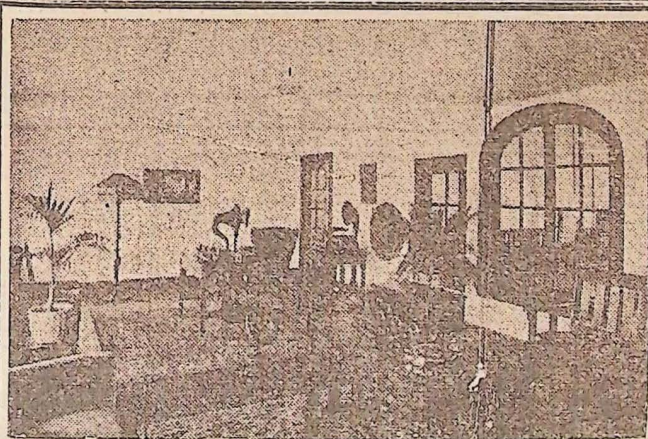
Transmitting antenna towers of Station WOC (Davenport, Ia.) are being raised 80 feet, which will make them 210 feet above the street.

Radio Night School

A night school for radio fans is being conducted three times a week at McKinley Training school in Washington, D. C. Besides learning how to construct sets, the students learn how to tune in properly.

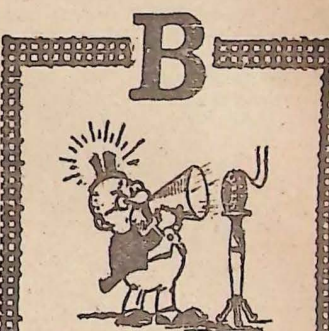
Big Business

Radio apparatus sold in 1924 may amount in value to \$300,000,000 according to Roger W. Babson economist. One manufacturer of insulating material alone expects to sell \$4,000,000 this year.



We invite the public to inspect our radio studio. It is complete in every detail. Come in any Thursday or Saturday evening, or any evening by appointment and we will demonstrate to you as you would hear it in your own home. We sell and install up-to-date Radio Receiving Sets—nothing but the best R. C. A. Atwater Kent De Luxe Radiola Super Heterodyne Sleeper Monotrol Radyne

HANSEN ELECTRIC CO.
620-630 Valencia St., Between 17th and 18th Sts.



Says Little Ampere: "One set of Willard Rechargeable B Batteries will last longer, cost less and give better results than a dozen sets of ordinary B batteries."

Willard Radio Batteries

They're Rechargeable

For Sale by Your Radio Dealer or
Julius Brunton & Sons Co.
1880 Bush St.
Ask for Booklet
Willard A Batteries for less re-tuning

PHOTOGRAPHS ARE BROADCAST

BY MILTON BRONNER

LONDON, Mar. 17.—You sit in your office in San Francisco and, picking up the telephone, say:

"I would like to talk to Mr. Blank of Blank & Co., London, Eng."

After a short pause:

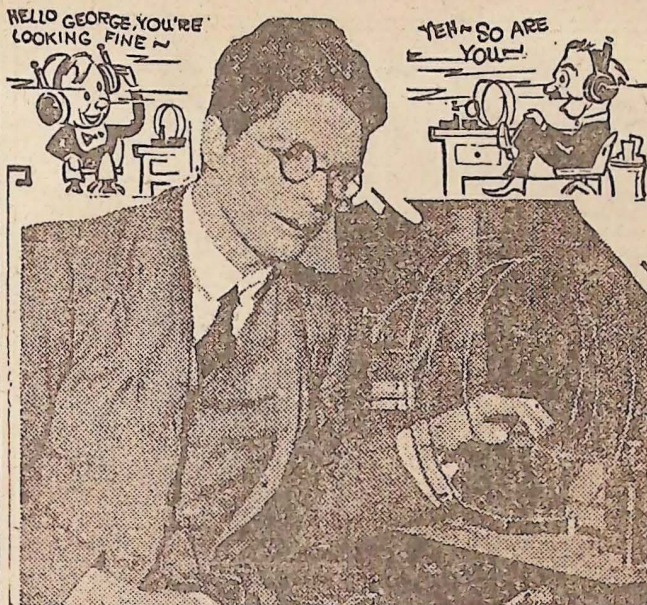
"Hello, Jim, old fellow. It's great to hear your voice. You are looking much stronger than when I last saw you. Your face is fuller and you look fit for anything that comes up. Now about that deal—"

With land wires across the country and wireless across the seas, you hear the person with whom you are speaking, as on the ordinary telephone of today. But what is more, you SEE him.

Is it a scientist's dream?

Edouard Belin, Frenchman, who has invented a method of sending photographs by telegraph, says he already has such

HELLO GEORGE, YOU'RE LOOKING FINE



Prof. A. M. Low, famed radio inventor, with his wireless transformer, one of his products.

an apparatus working over short distances.

Prof. Fournier d'Albe, inventor of the optophone to en-

able the blind to read through their eyes, says television will be accomplished by the end of the present year.

Prof. A. M. Low, who had charge of the British royal air force experimental works during the war and who has nearly 140 inventions to his credit, including sending photographs by wireless, says television will be accomplished in a crude fashion in about 10 or 20 years.

Sir Oliver Lodge, world-famous scientist, says television will be a fully accomplished fact in about a century.

I had a talk with Prof. Low about television.

"Basically," said he, "the only obstacle in the way of television is one of pure mechanics. The theory is worked out. The method is all mapped out."

"When a number of us, working in different countries, discovered a method of sending photographs by telegraph, we also thereby discovered the principle which will one day give us television."

"In simple terms, transmission

of photographs by telegraph or wireless is brought about by the transmission of light through a sensitized photographic plate which acts upon photo-electric cells. These in turn send vibrations along a wire or through the ether to a receiving set. These vibrations open or shut a little shutter arrangement which permits rays of light to fall upon a sensitized plate. The latter receives exactly the picture that was on the plate at the sending end of the line.

"Now the problem of television consists in substituting your eyes for the plate at the receiving end. In sending a photograph by wireless, about 15 minutes are required. To make the same impression upon the eye the sending would have to be cut down from 15 minutes to about four-fifths of a second."

"This first television will, of course, not be in colors. It will be in black and white. The matter of colors would be worked out later just as it is being done in ordinary photography."

RADIO GIVES CHURCH NEW OPPORTUNITY

The number of phases of modern life affected by radio broadcasting increases steadily.

Take a cross section of life almost anywhere and you will find radio—in sports, in music, education, agriculture, journalism, politics, religion, and, recently, even in a funeral service.

For the first time in history the whole nation could listen to the last rites of a former chief executive, when services at the entombment of ex-Pres. Woodrow Wilson were broadcast from the Cathedral of Saints Peter and Paul in Washington. The results on that occasion demonstrated that radio is as well adapted to such a solemn occasion as to cultural and entertainment purposes.

In fact, it is predicted that radio will exert a profound and increasing influence on the religious life of the nation and of the world. The number of churches which broadcast their services regularly in various sections of the country is increasing as clergy and public realize the possibilities in this method of communicating religious teaching, inspiration and comfort.

Sick Benefited

The federal council of Churches of Christ in America is now considering the extension of radio on a wide scale in its work, both for the benefit of communicants and for the hitherto unchurched. The vatican, too, according to advices from Rome, contemplates utilizing radio on a large scale. Individual churches of various denominations have already shown the practicability and popularity of broadcast services of worship. Conspicuous among them, for example, is the famous St. Thomas church, which is becoming as well known throughout the country as it is in New York city.

Hastings, Neb., has won world-wide fame through station KFKX, which has been rebroadcasting concerts from KDKA in Pittsburgh.

GETS REWARD



Practicing on the piano two hours a day has its reward. Jane Cooper, 129 Anza-st 12-year-old pupil of George Kruger, has been practicing for four years, and she is going to play over KPO to-night at 5:30.

Radio fans in Germany are limited to outside aerials only. At the same time they may have to pay luxury taxes if a bill pending is passed.

KPO RELIEVES 18 YEARS OF LONELINESS

For 18 years Samuel Applebaum lived a solitary life in the Iditarod district of central Alaska.

He was cut off from civilization, newspapers were a month or more late coming in and there were few white persons within a neighborly distance.

Then came radio.

Two years ago Applebaum obtained the parts of a set and the results were so gratifying that on his arrival in San Francisco last week he went to station KPO to express his thanks for the fine programs sent out at the Hale Bros. station.

Applebaum left for Seattle and the north today, but he carried along the latest thing in radio equipment.

Clamp Lid On Convicts

KANSAS CITY, Mo., Mar. 17.—Missouri state prison band, which has been broadcasting two concerts a week from station WOS at Jefferson City, Mo., has been limited to two entertainments a month in the future.

Radio Teaches Canary

Mrs. George LaLonde of Vancouver, Wash., credits radio with the return of her pet canary's voice. The bird is 12 years old and had been silent for years before music broadcast to her started the bird singing again.

WELL, ISN'T IT?



This is the original broadcasting set, invented away back beyond the memory of man.

Cynthia Grey to Talk on Tuesday

Cynthia Grey, who has given advice to thousands of Daily News readers, will make her debut over the radio Tuesday at 5:30 p. m., when she will talk for little members of the Junior club and Brothers and Sisters of KPO's "Big Brother."

There is a big treat in store for all the kiddies and grownups who tune in.

McADOO WILL PLEAD BY AIR

First effort to make radio an important factor in the coming presidential campaign is being made by W. G. McAdoo, one of the contestants. McAdoo plans to erect a \$30,000 transmitting plant at his home in Los Angeles, from which he expects to deliver his speeches, and save much traveling.

CROWDS PACK RADIO SHOW IN NEW YORK

NEW YORK, Mar. 17.—Weird shrieks, vocal solos, bedtime stories, piano selections and lectures crash forth from the main ballroom of the Hotel Pennsylvania. The huge crowds flocking toward that ballroom demonstrate the ever-increasing popularity of America's greatest indoor sport—radio.

This could be heard and seen at the fourth annual radio show and convention at the Pennsylvania, under the auspices of the Second District executive council. Paid admissions for the first day were greater than for the entire exhibition last year.

Fifty of the leading radio manufacturing concerns from all parts of the country had their products on display.

Among the leading exhibits was the famous "Grebe CR 13", which succeeded in picking up messages in San Francisco from Macmillan's Arctic ship, by A. H. Grebe & Co.; a turntable which shows every possible hook-up by merely turning the table around, by the General Radio Manufacturing Co., and displayed by the Radio Corporation of America and the United States Signal Corps.

Scattered around the mezzanine floor were the booths for radio clubs, organizations of amateurs who have licenses. A spirit of joy seemed to pervade the atmosphere as the "hams" talked shop. Ludicrous replicas of real apparatus, consisting of dishpans, tin cans, lanterns, hooked together with ropes to burlesque genuine sets, lined some of the booths. There were novelties in abundance for both the broadcast listener and the transmitting amateur. The American Radio Relay League occupied a booth, presided over by F. H. Schnell, the amateur who recently attracted attention by carrying on conversations with another amateur in France.

Largest radio station in Canada is said to be CKCH, of the Canadian National railways, at Ottawa.

MAYBE YOU DID NOT KNOW THIS

The Daily News publishes a radio news department EVERY DAY—the largest and most complete in San Francisco. The Daily News is the ONLY newspaper that prints COMPLETE and ACCURATE programs of ALL the broadcasting stations, corrected every day up to press time.

If you are not already a regular subscriber, fill out this coupon, send it in and have The Daily News delivered every afternoon at your home or office. The price is only 50 CENTS A MONTH.

Name

Street and Number

Mail to 340 Ninth St., San Francisco—or just telephone Market 400 and say "I want The Daily News."

SIMEON BATTS



BY HAENIGSEN