

Hetduogen Questions and Answers; Over 300,000 Copies Printed This Issue; Tuning in Broadcasters on Their New Waves; The New Knox Two Tube Reflex

Radio Digest

EVERY WEEK **Illustrated** PROGRAMS **TEN CENTS**

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No. 5

SUN AFFECTS RECEPTION

RADIO WAVE THEORY HIT BY EXPERIMENTS

PROF. ARTHUR COMPTON IN TESTS SHOWS FAULTS

Says Research Proves Light and Radio Impulses Are Composed of Small Solid Particles

CHICAGO.—That light and Radio impulses are composed of small solid particles which, striking an article they cannot penetrate, "kiss" and bound off just like billiard balls, is the recent statement of Prof. Arthur Compton of the University of Chicago, whose discoveries, it is said, may turn topsy-turvy the wave theory of light and Radio.

Professor Compton's experiments, covering a considerable period of time, show that light consists of "discrete bits," each proceeding in a definite direction. The research was based on the X-ray.

The professor photographed the tracks of electrons ejected from air by the X-ray.

(Continued on page 2)



Above, Miss Florence McDonald, who sails from New York February 7 on board the S. S. Berengaria for Europe. She will log various U. S. stations en route, using a receiver she is taking with her especially for this purpose. On a previous trip Miss McDonald constantly received broadcasting stations in this country until a few miles off the coast of France. Left, Jeannette Ginter, viola player in the Bactolien String quartet, recently heard from KGO. Right, Julia Glass, latest addition to "Roxy's gang" at the Capitol theater, New York.

SHORT WAVES HELPED; LONG ARE HINDERED

Eclipse Puzzles Experts

Static and Fading Disappear During Totality—WIP Crosses Atlantic in Special Daylight Test

Static, much maligned partner of Radio, is not a local condition, but as country-wide observations made during the recent total eclipse proved, is affected by the sun to a remarkable degree; short wave Radio transmissions follow the sun; and long wave Radio transmission, irregular before the eclipse, became noticeably regular during totality.

Such were the astounding, if not revolutionary, deductions made by the engineers

(Continued on page 2)



SOLO HALTED WHEN PROFESSOR SQUINTS

COLUMBUS, Ohio.—A staid university professor, making funny faces at the tenor while the latter was singing at WEAO recently, broke up the show, and as a penalty the program director caused the singer to start all over. The professor is A. P. McManigal, WEAO's chime player.

New WCCO Open March 1 Using Super Power Outfit

MINNEAPOLIS, Minn.—The new 5,000-watt transmitter for Station WCCO, is scheduled to go on the air about the beginning of March. This will be one of the finest super power stations in the northwest, and will cost approximately \$100,000 complete.

The transmitting apparatus will be located 13 miles equidistant from St. Paul and Minneapolis, two miles southeast of Anoka on the East River road.

Technical Advice on Sets Given from Station WAHG

RICHMOND HILL, N. Y.—Radiophans who enjoy the thrill of having their names called out over the air from a broadcasting station are about to have their inning. "Ole Bill" Diehl is to conduct a Radio question box for WAHG and all sorts of technical Radio queries will be answered. For this role of "answer man," WAHG has made a happy choice, for William F. Diehl is one of the best informed engineers in the Radio industry.

SUN AFFECTS RADIO

(Continued from page 1)

of the Radio Corporation of America and many famous scientists following Radio tests carried out during the short interval that the sun recently hid behind the moon as the two traveled across the corner of the northeastern part of the United States and into Canada.

And as a result, although no theories have been upset, scientists will "lock themselves up in a room after all the data are collected, and then some of the puzzles may be solved." Such was the statement made by Dr. Alfred N. Goldsmith, chief broadcast engineer for the Radio Corporation of America, who directed the eclipse tests made by the corporation.

Static Leaves with Eclipse

Both 75 and 380-meter wave length signals were sent out by WGY, Schenectady. These were received on a "fading recorder" in New York city by Dr. Goldsmith's staff. He said:

"The short wave could not be heard until just before sunrise when it came faintly. As the sun appeared the waves grew stronger. As the short wave lengths increased the static increased. During totality the short wave was blotted out and conditions were exactly the same as before the sun rose. When the eclipse ceased the short waves and static returned as the sun appeared.

"The long 380-meter waves were irregular before the eclipse but became noticeably regular during totality. As the sun began to shine again the irregularity increased and the static returned."

Dr. Goldsmith's only general conclusion was that the eclipse had proved Radio waves were notably affected by the pouring of the sun's light and energy into the atmosphere through which they traveled.

WIP Crosses Atlantic in Daylight

Short wave signals (on 75 to 100 meters) were intensified when sent at from 9 a. m. to 9:10 a. m. Eastern time from stations located in and beyond the path of the eclipse, according to bureau of standards observations made at Washington, D. C. The direction of the waves was also altered during this time.

WIP, Gimbel Brothers store station in Philadelphia, added a touch of romance to the tests when it was learned that the Quaker city broadcaster had been heard in London, England, at 8:12 a. m., Eastern time, while sending a special eclipse test program. The reception was made known by cable from Station 2LO, London, and indicated the first successful 500-watt transatlantic daylight broadcast.

Stations KDKA and WGY were also heard in London.

CFCA Makes Discovery

That the increased strength in Radio signals did not agree perfectly with the time of absolute totality, but lagged behind it sixty seconds, was found to be the case by officials in charge of Station CFCA, Toronto Star, Toronto, Canada. Dominion government officials confirmed the CFCA results.

At Waterbury, Connecticut, where the Bristol company conducted Radio direction tests during the eclipse, results obtained by Dr. William H. Bristol and David Grimes proved conclusively that the direction of Radio waves changed as much as eight degrees to the west from normal. WDAR, Lit Brothers, Philadelphia, was the station listened for in an experiment which was one of four directed by Dr. G. W. Pickard, well-known Radio engineer of Boston.

Other Broadcasters Report Results

Results reported by a number of other broadcasters checked with the observations cited. During the eclipse their signals were received louder and over a greater distance. Some of the stations said that their fading had been less and static was less noticeable.

Among the stations so reporting were CKAC, Montreal; WHAS, Louisville; WJAZ, Escanaba, Michigan; KYW, Chicago, and WGR, Buffalo.

In practically every case local reports were unreliable because the eclipse did not make sufficient difference in local signal strength.

Frank D. Urie, at Iron Mountain as observer for a watch company, was tuned into NAA's long wave signals during the eclipse and reported that while the moon wholly covered the sun's face, he detected a slight increase in NAA's clarity and volume.

Airplane and Airship Aid

Allied with Radio in aiding astronomers to make the tests were two other modern inventions, the airplane and the airship. The giant dirigible Los Angeles went aloft one mile in the path of the eclipse while airplanes at many places carried observers above the clouds and a shade closer to the phenomenon.

At Minneapolis WCCO rebroadcast a running story of the eclipse as told and broadcast from a plane 5,000 feet in the air. The plane carried a 5-watt Radio-telephone transmitter and was piloted by Lieut. G. M. Palmer who was assisted at the microphone by Hugh McCartney, WCCO operator.

In Argentina, when a broadcasting station interferes with governmental communication, its owner and operator are suspended.

WM. BRADY WOULD PROTECT SHOWMEN

By William A. Brady



Wm. A. Brady

I AM a Radio bug. It is a joy and a comfort, but it is a business which threatens to encroach on another equally important one.

One will willingly admit Radio as a wonderful boon to the wounded service men and other shut-ins, but I take it for granted that no one will dispute the fact that the theater and its people have done their part to help make life bearable for our soldiers. They have done much more, I have reason to believe, than other groups who talked more and did less.

It is quite possible that the day is not far distant when even the press will have to take steps to protect its news and talents it pays for. I believe I am speaking truthfully when I say that the Associated Press has already sounded an alarm such as I have just done to the other men in my business.

Recently a well-known American author was listening in, when much to his surprise, he heard one of his popular plays being acted, or rather, murdered—on the Radio. On inquiry he found no consent had been given. On his protest the Radio people said that it was not a public performance for profit—but a few million people more or less were hearing the play free.

Hence my protest to arouse my brother managers to the necessity of a proper organization to protect our interests against the many serious business conditions that they are facing.

LEE SHUBERT CAN'T SEE RADIO-THEATER

By Lee Shubert



Lee Shubert

I'M NEUTRAL on the topic of Radio. When we've tried it on some of our shows, we have found absolutely no effect. As a matter of fact, if anything, I believe it hurts the box office value. If we announce a Radio performance, people will sit home that evening to listen in. And, of course, if they aren't satisfied with the performance, we are the losers.

A play can't be given to full advantage over the Radio, especially when just a part is given. It doesn't mean a thing to a Radio audience, and only proves detrimental.

I am not in favor of it for the producer.

WAVE THEORY IS HIT

(Continued from page 1)

The angles and velocities were measured and found to agree with the quantum theory, a revival of the old Newton theory that light consists of minute streams of particles.

"We found that the wave lengths of the scattered X-rays were what they should be if a quantum of radiation bounced from an electron," the professor said, "just as one billiard ball bounces from another." He said that while the wave theory probably will stand until another is found capable of explaining the things it has so well interpreted, "it is unable in its present form to account for the results of our experiments."

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Looking Ahead

Factors That Limit Range and Volume are pointed out by E. T. Jones in the next article of his series. Location, antennas and set construction are among these points which enable one fan to get "the coast regularly" and his neighbor to get locals only.

The Reverse Feedback Reflex begun on page 25 this week is assembled next week by W. H. Knox. This issue explains the principles involved and the winding of the spider web coils so the second article will include panel and baseboard layouts.

Did You Ever Tune in WFI, Philadelphia, and wonder what its studio and equipment look like? What is behind the station and who its staff members are? See WFI in next week's issue.

Mr. Standiford's Article on Set Construction, which was scheduled prematurely for this issue, will appear next week. The little things that make a receiver either a DX success or an expensive disappointment should be read by novice and experienced fan alike.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest, 510 N. Dearborn St., Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name

Address

City.....State.....

London, Madrid Newcastle, Aberdeen-- that's just a few of them

AGAIN Elgin Super-Reinartz leads all others! Every trans-Atlantic report investigated was found to be ABSOLUTELY authentic! Many happy owners of Elgin sets again tuned in the European stations.

ELGIN Super-Reinartz "The Ford of Radio"

will give you the selectivity and distance it has given others. And you can save \$50.00. Let us tell you how—

FREE

Mail the coupon TODAY for the complete working drawings of the famous Elgin Super-Reinartz, the set that gets the distant stations. They are free—no obligations, just a stamp for postage, please!

tear out this coupon—

ELGIN RADIO SUPPLY CO., Dept. A, 207 E. Chicago St., Elgin, Illinois.

Send the FREE drawings of the Elgin Super-Reinartz at once. Also tell me how I save \$50.00 on this set. I enclose a stamp for postage.

Name

Address (Please PRINT in pencil)



Feel Its Pulse

When noise or faintness spoils your radio entertainment replace worn tubes—The Heart of your Radio—with Meco Tubes.

More and more radiophans are standardizing on Meco Tubes for experience has shown them they obtain greater volume without sacrifice of exceeding clarity as well as longer service with these tubes. Look for the Meco stamped on the base if you want genuine Meco Tubes. Your dealer has them or will get them for you from recognized radio jobbers.

Metropolitan Electric Co. Des Moines, Iowa



ENGLISH FAN HEARS OUR STATIONS WELL

WRITES PUBLICATION FOR MORE INFORMATION

CNRA, KDKA, WGY and WOR Among Many Listed—Radio Digest Data Found Helpful

CHICAGO.—From 5 Carver road, Hale, Altringham, England, to the shores of Lake Michigan may seem far to the man who attempts to travel the journey, but Radio waves and reader interest in Radio publications seem to overcome the distance with great ease.

According to a letter from A. M. Turner at the address in England noted, CNRA, Moncton, N. B., Canada; KDKA, Pittsburgh; WGY, Schenectady; WOR, Newark, and many other American stations are often tuned in loud and clear.

Mr. Turner wrote Radio Digest for further information concerning the stations he had heard. He assured that he found the Radio Digest station information of great help to him, and that the American stations furnished the English Radiophans with much enjoyment.

Mr. Turner's letter is but one of a score of similar ones.

So England isn't really so far away after all.

STATION WEEI GIVES WAVE TRAP TO NAVY

BOSTON, Mass.—Proving that they are willing to go to any length to insure uninterrupted programs, officials of the technical and operating staff of Station WEEI have constructed and installed for the Naval Radio station at the Charlestown Navy Yard, a wave trap, making it unnecessary for the naval station to request a discontinuance of broadcasting during cases of emergency. When tested, the wave trap proved to be very successful, cutting out other broadcasters as well.

BURDEN OF JAILBIRDS LIGHTENED BY RADIO

OAKLAND, Calif.—Does being in jail have any terrors in this Radio age? It would seem from a letter addressed to KGO from the inmates of the Marin county jail in California, who signed themselves the "Happy Five," that the question might be answered in the negative. "There are over one hundred prisoners here in the county jail listening in," the letter said, "the baptismal service was very impressive, and caused a marked silence among the prisoners."

TO PICK AMERICA'S RADIO BEAUTY SOON

WLW ANNOUNCES SECOND ANNUAL PRIZE CONTEST

Listeners Telegraph Votes to Station After Hearing Broadcast Descriptions of Four Contestants

CINCINNATI, Ohio.—Who will be named America's Radio beauty in the second annual Radio beauty contest to be conducted next Saturday, St. Valentine's night, from Crosley Station WLW, here?

The first Radio beauty contest, held one year ago by WLW, aroused much interest. People wondered how a beauty contest could be conducted over the air and tuned in to find out.

The four contesting girls, picked by a committee of five from many photographs submitted, will be described over the microphone, beginning promptly at 8 p.m. Central time. Their names will not be given. Only numbers will be used to designate the four. The winner will be chosen by telegraphic vote of the invisible audience. Nothing but telegrams will count.

Not only will the four girls receive prizes, but every listener who sends a telegram will be mailed at least a half-

(Continued on page 4)

Wampus Club's Thirteen Baby Stars Broadcast from KFI's Microphone

For Thirteen Days Before and After Annual Frolic February 5 of Motion Picture Publicity Men Their Lucky Young Women Protesges Go on Air

By G. L. King

THE biggest event in all flmdom is the annual ball and frolic of the Wampus club, which, translated, means Western Association of Motion Picture Advertisers. Each year the advertising and publicity men of the screen industry gather together to nominate and elect thirteen lucky young women from the ranks of the players as the Wampus Baby Stars. Out of the thousands struggling toward fame and luxury only thirteen are selected each year.

The fact that the Wampus club's selections, to a very high degree, carry on to real stardom, accounts for the importance with which this event is heralded.

First Time Broadcast

This year thousands upon thousands of people will be able to hear the voices and get an idea of the personalities of the thirteen "baby" stars who otherwise could not hope to be among those present when the frolic and ball takes place, because each baby star will be presented before the microphone both before and after the frolic, and it is the intention to broadcast the frolic itself.

The Examiner remote control station of KFI's super station has been broadcasting the voice of a baby star, one each night, between the hours of 9 and 10 p. m., Pacific time, for thirteen days before, and will continue for thirteen days after the lucky day of February 5, 1925, the night of the frolic.

There is a city ordinance in Los Angeles prohibiting dancing after 1 a. m., and because the Wampus ball is a frolic, the promoters found it necessary last year to remove its locale to the city of San Francisco, where the film colony of Hollywood had a pleasant taste of northern California hospitality.

There is a great deal of rivalry between southern and northern California, and this year the city fathers of Los Angeles found it convenient to pass an emergency ordinance for the night of the Wampus ball and frolic so it could continue on through the night and until the last dancer had enough.

Baby Stars Rise to Stardom

The Wampus frolic has been in vogue since 1922. Since that time the percentage of baby stars selected who have risen to real stardom has exceeded that of any other method of selection, indicating clearly that the publicity men of the movie industry know what they are doing when they pick a girl as a baby star. Among those who have been baby stars, and who now are vested in full stardom, may be counted Lois Wilson, Bebe Daniels, Julianne Johnson, Dorothy Mackaill, Gertrude Olmstead and Alice Lake, to mention only a few as they come to mind.

The Wampus frolic is the ball of the screen, introducing the thirteen lucky girls for 1925, and broadcasting to the world through Radio their first initiation into the ranks of stars.



Left column top, exotic Dorothy Revier, a perfect "dark type." Center, Violet Avon, a striking blonde beauty. Bottom, Madeline Hurlock, of Mack Sennett comedies, who was selected unanimously as one of the 1925 Baby Stars. Right, top, Edna Gregory. Center, Evelyn Pierce. Bottom, Anne Cornwall.



Above, the Wampus Baby Stars of 1925. Every year a selection of thirteen girls are picked to typify the forthcoming stars of future motion picture productions. This selection has been made by the club every year since 1922. Eleven of the thirteen are shown in the group photo.

"LINE NIGHT" AT WGN CREATES SENSATION

RICHARD HENRY LITTLE IS
INTRODUCING POETS

Famous War Correspondent Who Acts
as "Colyum" Conductor in Chicago
Tribune Has Large Audience

A LADY LIVED IN LESBOS

A lady lived in Lesbos a weary time ago;
So many years have overpassed, it's little we can know;
So many wars have worn away with gods and creeds
and kings,
It's little we remember now of older, happier things.

For men go up and down the land, under and over the
seas
(A lady lived in Lesbos, but what is that to thee)?
And men sit watching, night by night, how Mars the
planet spins,
And women sit and gossip over marriages and sins.

We have forgotten beauty and all our gods are good,
And little we remember now the dryads and the wood,
And only old philosophers and foolish dreamers know
What lady lived in Lesbos a weary time ago.
—The King of the Black Isles.

CHICAGO.—The poets' foolscap and the
poets' lyre are attaining a greater audience
through Radio than ever they had in
history.



"R. H. L."

The audience of
WGN, the Chicago
Tribune station on
the Drake hotel, is
hearing poetry and
humor from the lips
of the poets and wits
themselves. Eugene
Field had an audi-
ence—where the
newspaper was read;
and Mark Twain had
an audience—when
they found his books;
but Richard Henry
Little, the famous
humorist of the
Tribune, betakes
himself and his en-
tourage and his mag-
ic bag of tricks
into every isolated
living room.

Richard Henry Little, humorist, war
correspondent and dramatic critic, is con-
ductor of the "Line o' Type or Two" col-
umn on the editorial page of the Chicago
Tribune. He is the successor to the late
Bert Leston Taylor—"B. L. T." He has
probably the finest band of poetical and
witty contributors of all "colyums" in
the country. Poets have produced excel-
lent books of prose and verse from works
which first appeared in "R. H. L.'s" column.
There is "The King of the Black Isles,"
by J. U. Nicholson; "Black Babylon," by
Dorothy Dow, and others.

"Line Night" at WGN

Mr. Little conducts a "Line Night"
every third Thursday evening at WGN,
during which he is ringmaster of a varied
program, featuring readings by his best
known contributors themselves. His coun-
try-wide audience knows each "contrib"
only as a nom-de-plume and wonders
"what he is like." So Dick Little presents
each star contributor—and the studio is
jammed to the stairway on "Line Nights."

Among those who have already read
from their works over WGN are: "The
King of the Black Isles," "Bitterroot Bill,"
"Helen Henna," "Mel-o-Dee," "The Phant-
tom Lover," "Marjorie F. W.," "Snowshoe
Al," "Peter Pan," "The Long Shot," and
"Le Mousquetaire."

The next "Line Nights" on WGN will be
Thursday, February 12; Thursday, March
5; and Thursday, March 26.

YEAR OR MORE DELAY FOR WHITE RADIO BILL

Sponsor of Legislation Expresses
Beliefs Concerning Law

WASHINGTON.—Probably more than
a year will elapse before Radio legisla-
tion is enacted by Congress. This is the
belief of Representative Wallace White,
Jr., of Maine, author of the White Radio
bill.

While Mr. White does not agree with
Secretary Hoover's theory that Radio
legislation should be deferred for another
year or two, he is willing to be guided
by the former's views.

Mr. White has not introduced the bill
suggested by Mr. Hoover, which would
enact into law the recommendations of
the third Radio conference, because he is
convinced it would have no chance of
passage during the short session.

KYW Artist on Tour

CHICAGO, Ill.—Charlie Schultz, one of
the Westinghouse Station KYW artists is
now a real "wandering minstrel." Mr.
Schultz is making a tour of the middle
west and all the large cities of the east,
under the auspices of a large music house.

His tour will take about two months,
during which time he will visit the vari-
ous Radio stations and theaters in the
more important cities.

Rebroadcast of Victor Concert Through WHB

Picked Up with Super-Heterodyne
for Midwest Fans

KANSAS CITY.—Station WHB, the
Sweeney School here, it has been learned,
successfully rebroadcast the first Victor
artists concert for the benefit of crystal
set owners around Kansas City and in-
cidentally created quite a thrill for distant
listeners, judging from the hundreds of
letters received from practically every
state.

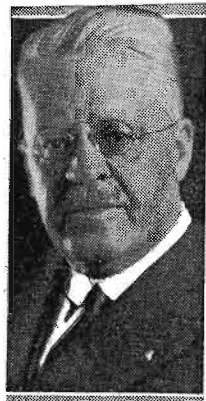
The receiver employed for the occasion
used a two foot loop and was a seven tube
super-heterodyne built in the Sweeney
laboratory. Besides rebroadcasting Sta-
tion WEA, this unusual national re-
broadcast test included selections from
WBZ, WSB, WSAI, KFKX, KYW, WQJ,
WCX, WFAA, KFI, and CNRW.

The Sweeney receiving set has been
operated inside the studio of WHB only a
few feet from the transmitter, but on the
night of January 1, the receiving set was
located in the home of R. M. Lott, man-
ager of the Sweeney Radio and Electrical
company. The output of the set was con-
nected through about five miles of indirect
telephone line to the transmitting station.

An interesting feature in the program
broadcast from Station 2LO, London, on
January 22, was the reading of their own
poems by six well-known poets of Oxford
university.

JOHN LUND DIRECTS ORCHESTRA AT WGR

JOHN Lund, composer, leader, instruc-
tor, and arranger of orchestrations,
intimate of Sousa, and a musical fig-
ure of international importance, has
signed a contract with the Larkin com-
pany of Buffalo to direct a twelve piece
orchestra which it has arranged to put
on the air from Station WGR every Fri-
day night from 10 to 11 o'clock, East-
ern standard time.



John Lund
Colgrove Studio Photo

M. A. Riggs, Jr., general manager of
WGR, in announc-
ing the new feature,
stated that, without
doubt this will be
one of the greatest
features which WGR
ever put on the air,
and the fact that
the series will run
for an indefinite
period should be of
more than passing
interest not only to
the friends of WGR,
but also to the
friends of the Larkin
company, which
covers North America
in its activities.

The fact that John Lund is in charge
and will personally direct the orchestra

gives assurance that the productions of
this musical unit will be second to none
in the field. His productions will be of a
classical or semi-classical nature.

With Harold Gieser so ably leading the
Vincent Lopez dance orchestra and John
Lund in charge of the new unit, WGR will
have one of the best balanced schedules on
the air; the best of jazz for those who like
it and the best of the classical for those
who prefer that type.

PICK RADIO'S BEAUTY

(Continued from page 3)

pound box of Dolly Varden chocolates.
The beauty contest is being sponsored by
the Dolly Varden Candy company in con-
junction with the Crosley Radio corpora-
tion.

Radiophans so fortunate as to vote on
the winner will receive two-pound boxes
of Dolly Varden chocolates. Those tele-
graphing their choice for the second prize
contestant will receive one-pound boxes of
candy. Listeners will be allowed but one
vote each.

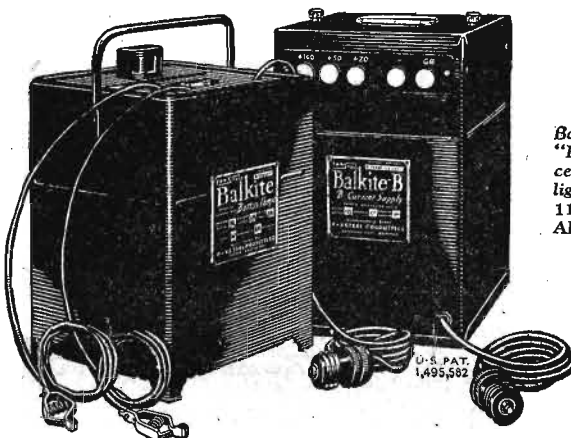
Telegrams should be worded, "Number
my choice annual Crosley-Dolly
Varden beauty contest", and signed with
full name and address.

The girl selected as America's Radio
beauty will receive a cash prize of \$300.
Second prize winner will receive \$100,
while the remaining two will be awarded
\$50 each.

A number of broadcasting stations are
being erected in Sweden by the govern-
ment. There are more than 37,000 re-
ceiving set licenses in the kingdom.

Balkite Battery
Charger. Charges
6 volt "A" storage
batteries.

Price \$19.50
West of Rockies \$20
In Canada \$27.50



Balkite "B"—replaces
"B" batteries and dry
cells. Operates from
light socket, 60 cycle
110-120 A. C. current.
Also 50 cycle model.

Price \$55
In Canada \$75

A uniform, constant power supply for both "A" and "B" circuits

Here at last is a convenient and
unfailing power supply for your
radio set. Balkite Radio Power
Units furnish constant uniform
voltage to both circuits, and will
give your radio set greater clarity,
power and range. The Balkite
Battery Charger keeps your "A"
storage battery charged. Balkite
"B" replaces "B" batteries entirely
and supplies plate current from
the light socket.

Based on the same principle, both
the Balkite Battery Charger and
Balkite "B" are entirely noiseless.
They have no bulbs or moving
parts, and nothing to break, ad-
just or get out of order. They
have a very low current consump-
tion, are simple and efficient in
operation, and can be put in use
at any time by merely connecting
to a light socket. Both are guaran-
teed to give satisfaction.

Sold by leading radio dealers everywhere

FANSTEEL
Balkite Radio
Power Units

BALKITE BATTERY CHARGER—BALKITE "B" PLATE CURRENT SUPPLY

Manufactured by FANSTEEL PRODUCTS COMPANY, Inc., North Chicago, Illinois

WHO, the Bankers Life Insurance Station



William H. Heinz, better known as "Billy," who is the manager and instigator of Station WHO.

Bankers Life Radio orchestra of Station WHO. They are known on the air as the California Collegiates, and have made a host of friends through their concerts.

WHO? It's Billy Heinz at Des Moines

By Vera Brady Shipman

WHO, THOSE interrogating call letters which cause the listener to lift his eyebrows—WHO—it sounds like an owl and the answer is "Why, it's Billy Heinz of Des Moines, of course!"

W. H. Heinz is not at heart an insurance man. You can't make an insurance man out of a General Electric man any more than you can make a pie out of waffle dough. He tried though, tried as hard as he could, to be an insurance man (being the son-in-law of the president of the company), but twelve years at Schenectady was too powerful an influence.

Then the Radio idea came to Billy. He figured every detail of cost of operation and results to be gained both financial and from advertising view, before he laid the question before the president. Then sufficiently armed with figures that do not lie, he approached the president while motoring to the office in the morning.

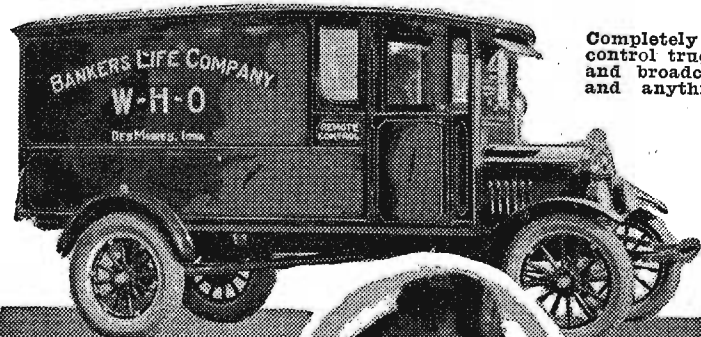
And the result (for they tell me Billy usually gets what he wants) was the installation of a Radio station at Des Moines on the ninth floor of the Liberty building, a station which does pay its own bills, for WHO opened and is operated as a commercial station.

WHO has a beautifully equipped and furnished operating room and studio. The station has operated on 526 meters but is scheduled to change to 522.3. It opened on April 1, 1924. Isn't it a coincidence that WHO with its owl-like call letters should open on April Fools' Day?

WHO has been planned and personally supervised since its beginning by Heinz. His years of technical work made him familiar with the operation and the station may be called his very own "brain child" although his official title is manager of the station. Heinz is secretary of the National Association of Broadcasters and has taken a prominent part in its activities.

The operators who work under Mr. Heinz' directions are Willard D. Ryan, chief operator, and Harold Bennett. N. D. Cole is the studio director and chief announcer, while J. C. Scovel, a baritone, and Hibbard Cleveland, bass, intersperse their announcing with songs. Musical direction is given by Dean Holmes

(Continued on page 8)

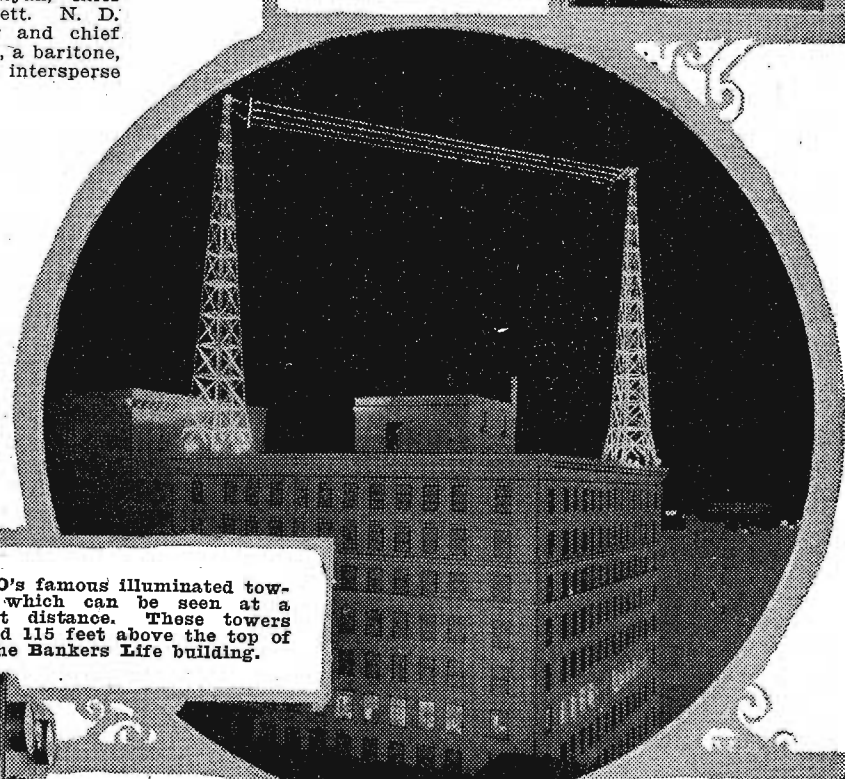


Completely equipped remote control truck, used to pick up and broadcast football games and anything of importance throughout the city, by WHO.

Below, Miss Myrtle Williams, assistant musical director and soprano soloist; Holmes Cowper, musical director of WHO, and a musician of note.



Left, D. Carlos Meier, at the console of the Capitol theater organ.



WHO's famous illuminated towers which can be seen at a great distance. These towers stand 115 feet above the top of the Bankers Life building.



Operating room of WHO. Operator Willard D. Ryan at desk, operator Harold M. Bennett at the panel.



A. Dean Cole, chief announcer and studio director of WHO, announcing a WHO program.

Music Master

Success

—its True Significance



Model VI, \$30
14" wood bell,

Model VII, \$35
21" wood bell,

Connect Music Master in place of headphones. No batteries. No Adjustments.

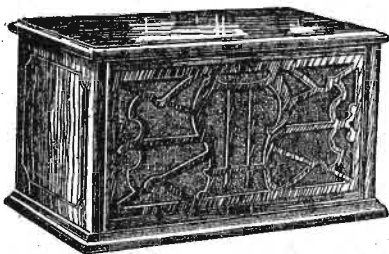
Resonant Wood Insures Natural Tone Quality

THE advent of Music Master sounded the death knell of the mere "loud speaker" and transformed the radio receiving set into a musical instrument—a triumph of re-creative art.

Music Master's full-voiced volume and characteristic tone qualities heralded the New Era of Radio Art. It made possible the re-creation of the supreme expression of Music, Song and Speech in the wonderful stellar programme now an established feature of American nation-wide broadcasting.

Music Master does more than reproduce—it interprets, it re-creates. It is the standard of comparison, by which all "loud speakers" are judged. While it has been inadequately imitated, Music Master remains the supreme musical instrument of radio—and there IS no substitute.

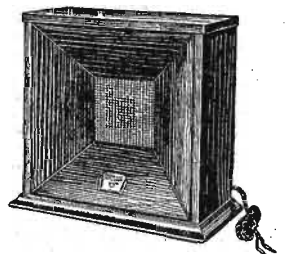
MUSIC MASTER—The Ultimate of Artistic Radio Re-Creation



Model VIII, Mahogany Cabinet with "full-floating" horn \$35 of natural wood

Music Master's precision instrument is the acme of scientific perfection. Music Master's tone chamber of heavy cast aluminum is a marvelous mold of sound without distortion. Music Master's bell of resonant wood gives to every sound its full, virile, vibrant qualities, its natural and life-like characteristics.

Music Master's purchase carries with it an implicit pledge of unreserved and unconditional protection. You can rely upon your dealer for full and unfailing service; but back of him stands the Music Master Corporation to guarantee its products to anyone, anywhere, any time.



Model V, Metal Cabinet, Mahogany finish \$18

Music Master Corporation

Makers and Distributors of High-Grade Radio Apparatus

10th and Cherry Streets

Chicago PHILADELPHIA Pittsburgh

PROGRAMS HELP TO AMERICANIZE HERE AND OVERSEAS

25-KILOWATT PLANT GOING UP IN BRITAIN

WILL REPLACE CHELMSFORD ON 1,600 METERS

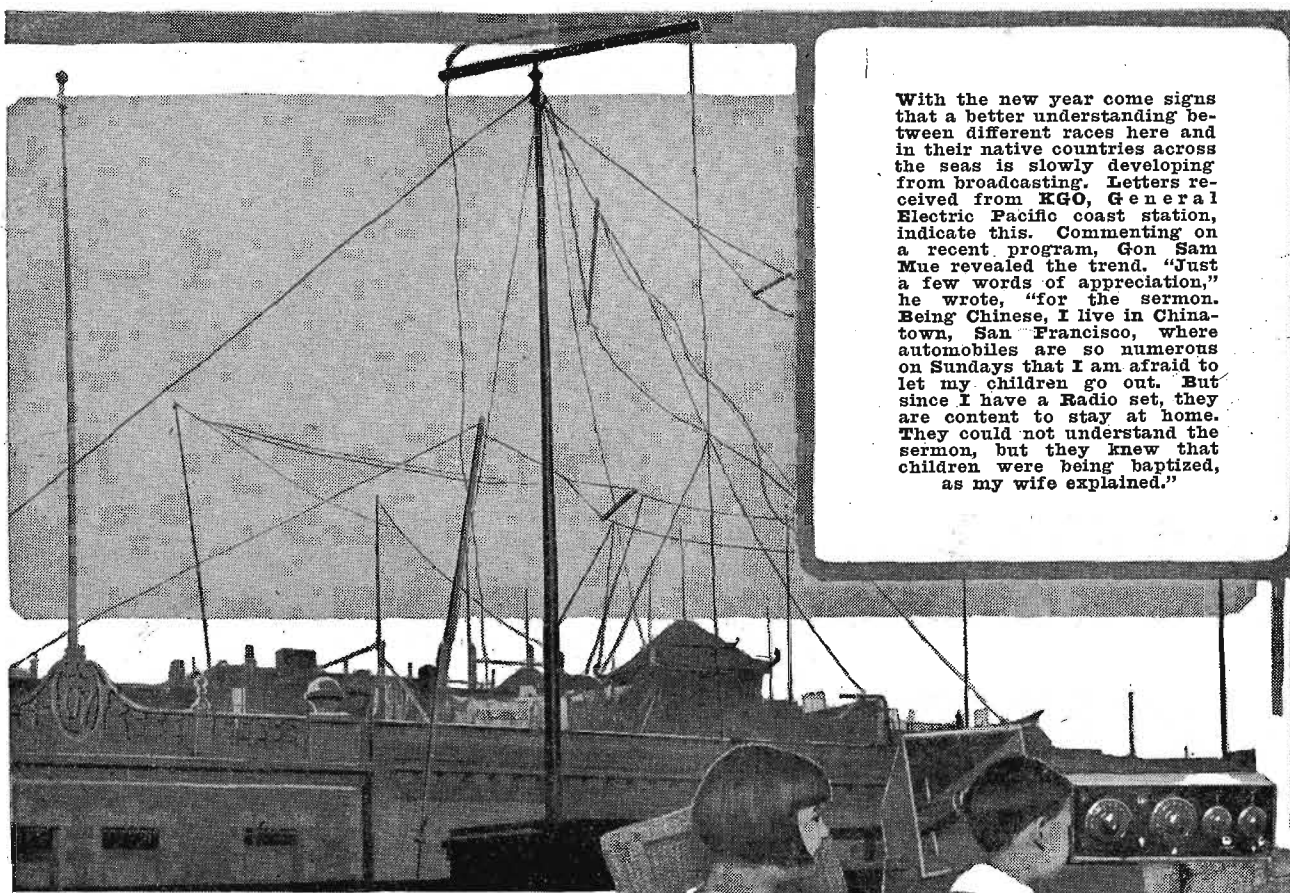
New Station, on Air by Spring, May Be Heard in America on Sensitive Receivers

LONDON, England.—The British Broadcasting company has now well under way the construction of its new super power station at Daventry, which is to replace 5XX, Chelmsford. The new station will incorporate a number of interesting features designed to give a maximum output for the 25 kilowatts of power to be radiated.

Two masts, 500 feet high and 800 feet apart, are being erected to take a T-type aerial—that is, the lead-in drops from the center of the aerial. A wave length of 1,600 meters, that on which 5XX, Chelmsford, is now working, will be used.

The new location for the B. B. C.'s super power station is the center of a 100-mile circle for crystal range, which will make it possible to pick up transmissions throughout a thickly populated area, including such large cities as Liverpool, Portsmouth, etc. Moreover, two tube sets will be able to pick up the transmissions anywhere in the United Kingdom.

The new station should be open in the spring, and will work in the afternoon and evening, providing programs of its



With the new year come signs that a better understanding between different races here and in their native countries across the seas is slowly developing from broadcasting. Letters received from KGO, General Electric Pacific coast station, indicate this. Commenting on a recent program, Gon Sam Mue revealed the trend. "Just a few words of appreciation," he wrote, "for the sermon. Being Chinese, I live in Chinatown, San Francisco, where automobiles are so numerous on Sundays that I am afraid to let my children go out. But since I have a Radio set, they are content to stay at home. They could not understand the sermon, but they knew that children were being baptized, as my wife explained."

RADIO FIRMS INSURE OPERA BROADCASTS

UNDERWRITE OPERA COMPANY'S PERFORMANCES

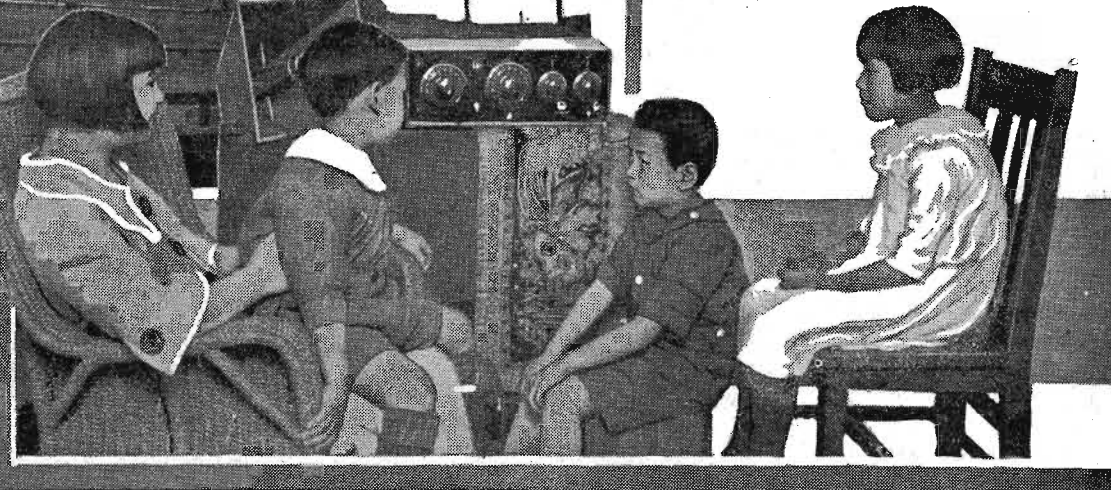
First Time in History That No Deficit Has Been Guaranteed Because of Microphone

BOSTON.—For the first time in the history of grand opera and the Radio industry, performances of opera broadcast by a Radio station have been underwritten prior to their performance. Radio absolutely guaranteed that the stay of the Chicago Civic Opera company in Boston would not result in a financial loss for its two weeks' visit here.

Following the leadership of WNAC, The Shepard Stores broadcasting station, twelve other firms, prominent in the Radio industry of New England, joined in underwriting the deficit the opera company would face if it did not sell practically every seat for every performance during the two weeks' engagement.

Four of these performances were to be broadcast by WNAC. "Aida" was heard

More sets than in any other part of San Francisco are in this block. Mrs. Gon Sam Mue and children at right.



January 26, and on the following Friday evening "Carmen" was broadcast. Two other operas were to be broadcast during the second week.

Without a doubt the four Radio-underwritten performances will do much to settle in the minds of theater managers whether theatrical broadcasts in Boston are box office attractions. The firms underwriting the opera company's season here were convinced that the broadcasts will lure people to the opera house to hear subsequent performances in person, and are gambling on this conviction to the extent of thousands of dollars that they will have to put up if it proves otherwise. The result remains to be seen.

B. G. Hubbell, President of Federal, Dies in East

BUFFALO, N. Y.—Burt Gage Hubbell, president of the Federal Telephone and Telegraph company, manufacturers of Radio and telephone equipment and owners of Station WGR, died here Saturday, January 24, after a comparatively short illness. Born July 6, 1867, Mr. Hubbell made an enviable record as an organizer and business man. At one time he was president of seventy-five independent telephone companies between Syracuse and Buffalo.

Direct Tug Boats by Radio

NEW YORK.—For the first time in any port, the New York Central recently did the despatching of a tug boat in the harbor by Radio. The system is devised to replace the present practice of directing the movements by the chief dispatcher of railroad tugs and lighters.

Miguel Fleta, Tenor, in Victor Broadcast

Third Concert Includes Songs by Lucy Isabella Marsh

NEW YORK.—Miguel Fleta, famous young Spanish tenor of the Metropolitan opera; Lucy Isabella Marsh, lyric soprano, and the Flonzaley quartet, none of whom had ever broadcast before, were the attractions offered last Thursday, January 29, on the third Victor broadcast concert program. The successes of the previous two offerings was repeated in the third.

The recital included four numbers by Fleta, "La Donna e Mobile," "Ti Flor," "Mi Tierra" and "Ay, Ay, Ay." Miss Marsh sang "Ave Maria," "The Swallows," "Within a Mile of Edinboro" and "Beautiful Lady." The Flonzaley quartet played a movement from the Quartet in D, "Music of the Spheres," "Nocturne," by A. Borodin, and "Drink to Me Only with Thine Eyes."

The broadcasting was done as before, with Stations WEAf, WCAP, WJAR, WDBH, WGR, WCAE, WFI and WEEI participating.

Entertainers Engaged by Radio

LONDON, Ont.—While listening to the broadcasting from Station WBAV, the officials of the Madison County Fish and Game Protective association here decided that the quartet who were on the air would be fine entertainment for their annual dinner. A long distance call to the station "sold" the job to the entertainers.

own two days weekly, a provincial relayed program on a third day, and relays of London programs for the remainder of the week. It should be heard easily in America on sensitive sets.

New Feature on the Air

CINCINNATI, Ohio. — Realizing that real humor was needed on the programs, the Crosley Radio station, WLW, arranged with E. D. Leonard of the Cincinnati Post to give a humor review each Saturday night. Mr. Leonard is a former college wit and newspaper columnist.

The feature, called the "Lafafone," is a collection of the best two-line jokes received during the week.

Youngest Harpist



Geraldine Vito, nine years old, said to be the world's youngest harpist, gave her first Radio concert through Crosley WLW recently. Miss Vito is the daughter of Joseph Vito, solo harpist with the Cincinnati Symphony orchestra, who had a special small harp built for her.

Red Grange Talks



Harold "Red" Grange, famous All-American halfback with the University of Illinois football team, recently made his ether debut when he broadcast a speech from the Palmer school station, WOC, at Davenport. Many college football enthusiasts are well acquainted with him.

Results of Gold Award Set Contest

RESULTS of the Radio Digest Gold Award Set contest, which closed on January 17, will be announced in the issue of Radio Digest dated February 21. Radiophans who have been anxiously awaiting information concerning the outcome, should not fail to order this issue now from

their news dealer, or direct. Many interesting sets have been received. Although none might be called revolutionary by Radio engineers of note, their points of difference from standard construction are unique, and will be greeted with approval and applause by home set builders.

OPEN NEW CROSLLEY SUPER POWER UNIT

FIRST REMOTE CONTROL
STATION OF ITS TYPE

New Transmitter Located at Harrison,
25 Miles From Studios—Only
One Operator Necessary

CINCINNATI, Ohio.—The first remotely controlled super power station in the world, is the claim laid by the Crosley Radio corporation when it opened its new station located at Harrison, Ohio, about 25 miles from the studios and auditorium of the Crosley company.

Powel Crosley Jr., officiated at the formal opening of the station which took place January 27, and many prominent artists were on the program arranged by Fred Smith, studio director.

The initial program was of the sort that appealed to every class of Radio listener, embracing symphonic music, vocal quartets, vocal solos and dance music. The fame of Cincinnati as a musical center will now be broadcast to a greater distance than ever before, by the new station.

Introduce New Artists

An extraordinary feature of the program was the first studio appearance of Fritz Reiner, conductor of the Cincinnati Symphony orchestra, who conducted an orchestra composed of fifty musicians from that organization. The program rendered by this unit will long be remembered in the annals of broadcasting, as one of the finest ever put on the air.

Numerous other artists who have appeared on the WLW programs in the past were present during the inaugural concert. Many others who have never been before the microphone, were also introduced to the listening public in their first debut.

Control of Set Simple

One operator can look after the operation of the set, which is started by merely pushing a button, despite its multiplicity of controls and equipment. Tests made, using selective receivers and the present transmitting equipment, show that it is possible to tune WLW either "in" or "out" within two degrees on the dials.

Visitors are welcome to inspect the new station and equipment and will be shown through the station with all the finer points explained to them by an operator. This also applies to the studios in Cincinnati which are open to the public.

No time is lost between numbers as an arrangement is used whereby as soon as one artist is through broadcasting, the microphone is switched to another studio. This does away with the long waits between numbers so prevalent in a large number of broadcast stations.

Madame Frances Alda Is Pleased by Recital

Metropolitan Opera Prima Donna
Deluged with Letters

NEW YORK.—Following her recent Radio debut, Madame Frances Alda, prima donna of the Metropolitan Opera company, has been deluged with communications from friends and admirers, many of them celebrities themselves. To the long list of artists who have felicitated the famous soprano, the name of Mario Chamlee, tenor of the Metropolitan opera, was added yesterday.

The prima donna herself was highly pleased with the response to her first Radio recital, as a result of which she has probably become an ardent Radio enthusiast. "I like Radio very much indeed," she said, "and I shall be glad to sing again any time the Victor company wants me."

Heavy mails continued to pour into the offices of the Victor company at Camden, N. J., and the studio of WEAJ here, all day yesterday, all of them congratulatory and expressing appreciation of Madame Alda's recital.

Interesting Stories Are Told Regarding Museum Exhibit

CHICAGO.—The first of a series of weekly Radio talks on "Visual Stories in the Field Museum," was given Wednesday afternoon, January 28, over WLS here, by Mrs. Dorothy R. Cockrell, of the museum's visual education staff.

During this series Mrs. Cockrell will tell the stories that are woven around some of the anthropological, zoological, botanical and geological exhibits in the institution. The series is under the auspices of the Chicago Federation of Women's clubs.

WCCO Broadcasts Concert

MINNEAPOLIS, Minn.—The private opening concert of the State theater's new \$75,000 Wurlitzer organ, in this city recently, was broadcast by the Gold Medal station, WCCO.

STORY LADY HELPS TO ENTERTAIN TOTS



Grace Sorenson

GRACE Sorenson's stories for children are unique. In the first place, Grace doesn't tell any hair-raising stories about ferocious animals, but confines herself to telling stories about the thing she is interested in more than everything else—other children.

She relates the adventures of Petty Patch and her boy and girl friends. So pleased are her juvenile audiences with these narratives that they send her thousands of letters, telling how much they like Grace's stories, and all about themselves, too.

Grace is successful in her unique methods because she has had many years experience telling stories. She edits a children's magazine, in which she writes her own stories, poems and plays. She has had a book of plays purchased recently by a large publishing house in the East. Many of these plays have actually been produced by local talent in churches and schools.

WOAW has been broadcasting Sorenson stories for more than a year, and her familiar "Good evening boys and girls" brings a thrill to her youthful listeners. Her narrations are especially pleasing to children in the isolated, rural districts, who seldom have the opportunity to enjoy such unique tales presented so pleasantly. Perhaps Miss Sorenson derives her ability to tell a good story from her father who is a historian of national reputation.

"WHO" AT DES MOINES

(Continued from page 5)

Cowper of the music department of Drake university at Des Moines, assisted by Miss Myrtle Williams, a soprano, as well as Helen Birmingham also of Drake university music faculty, is staff accompanist, and W. L. Marsh is director of the eight-piece Bankers Life orchestra. The organ concerts from the Capitol theater are given by L. Carlos Meler.

A recent supply of blackboard charts to 4,500 receiving sets over Iowa has been shipped to banks and grain elevators. These are used in the town as local market bulletins on information finished by the government bulletins through WHO.

Baylor University Alumni Give Home Night Program

WACO, Tex.—The Alumni association of Baylor university recently held its annual Radio celebration on the 80th birthday of the university. The program was broadcast from Station WJAD, and thousands of former students listened in to the concert.

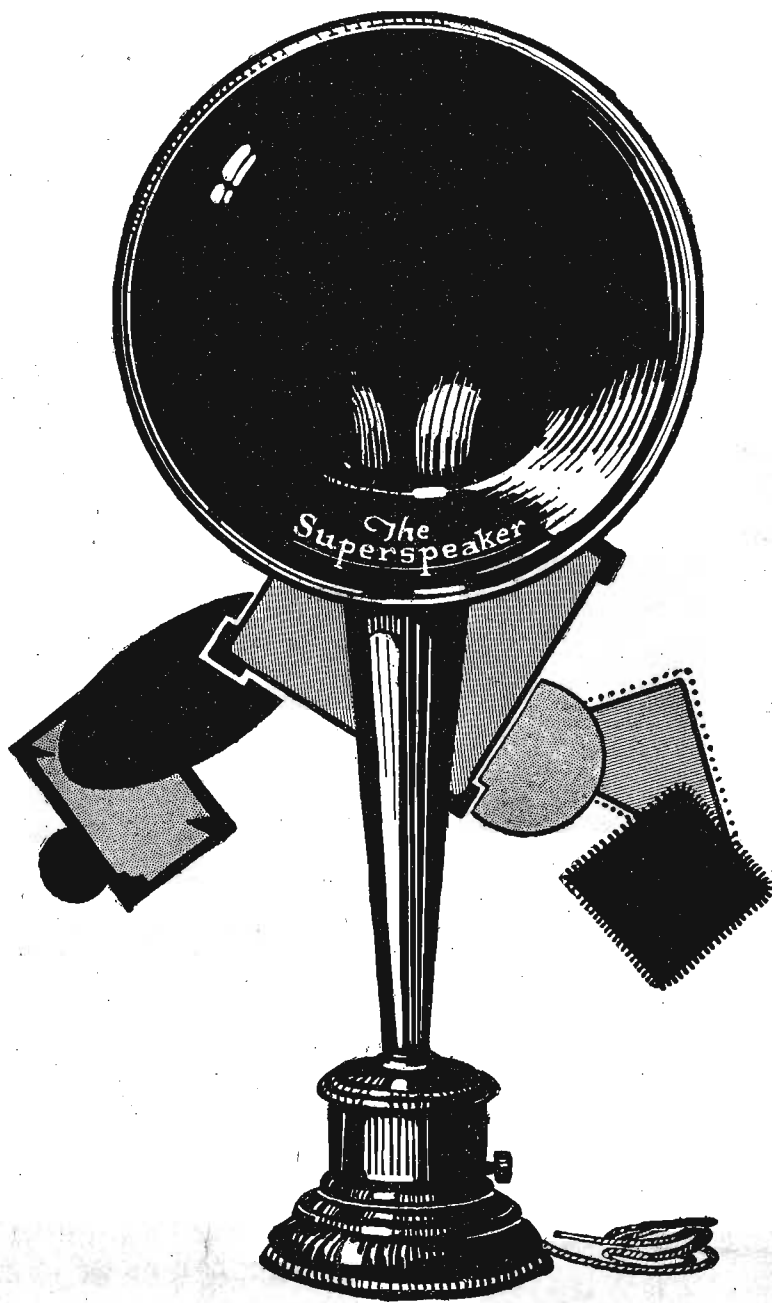
It has been the custom of the Baylor alumni to hold banquets the country over and listen in on the Radio program. This year, however, the association made a home night of the affair.

Station Close—Return License

WASHINGTON.—Announcement has been made by the Radio bureau that whenever Radio stations are dismantled, their licenses must be forwarded to the department of commerce.

WEAF Increases Power

WASHINGTON.—Station WEAJ at New York city has increased its power to 2,000 watts on an experimental basis. This is the first station to use 2,000 watts under the test plan.



Just Try It!

If your present loud speaker does not yield satisfactory volume—or if, on local reception, it blares when your set is in tune—just try The Jewett Superspeaker. The result will amaze and delight you.

Air-gap adjustment gives absolute command of volume—No extra batteries—Throat straight as an organ pipe, eliminates all bugling effect—Built and guaranteed by the million-dollar corporation whose name it bears.

"Compare It, You'll Buy"

The
Superspeaker,
Trademark Registered

Jewett Radio & Phonograph Co.
DETROIT 5670 Twelfth Street MICHIGAN

Tuning in Broadcasters on Their New Waves

Interference Problem Not Hard to Solve

By G. M. Raley

EVER since the third Radio conference when it was decided to reallocate wave bands among the broadcasters so as to create less interference and make room for more stations, the department of commerce Radio section has been hard at work attempting to execute the program mapped out by the conference. But the reallocation was much easier said than done.

Not alone was it difficult to crowd the stations any closer together, but the expected co-operation of broadcasters in some cases was not forthcoming. Now the Radio administration officials have finally begun the active work of changing wave lengths here and there, raising some, lowering others, in a practical attempt at carrying out the program.

As a result, Radiophans far and near are sending in complaints by the thousands. Radio supervisors, broadcasters and this publication have had their share of these. The trouble seems to be from two things:

1. Distant stations, with new waves spaced closer together, are difficult to tune in without interference, one from the other.

2. Old dial settings, once sure to bring

by. A wave trap consists essentially of a coil of wire (inductance) tuned either by switch taps (inductively) or by a variable condenser (capacitively), which is placed in series or parallel with the coil. The device may either be placed in series with the receiver in the aerial lead, or in parallel with the receiver across the aerial and ground posts of the set.

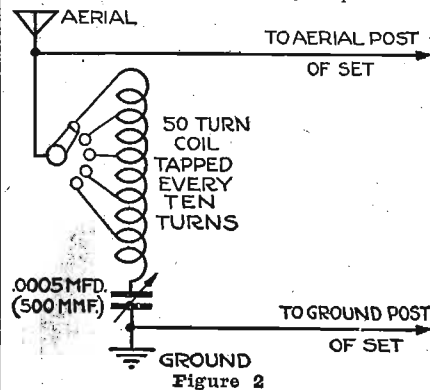
One of the most efficient of these is shown in figure 1. It is connected in parallel with the receiver and is therefore known as the parallel type. The theory is that the wave trap circuit, when tuned to the wave length of the station not desired, will by-pass the signals from this station into the ground.

Efficiency Depends on Parts Used

The parts required for the trap are but two: a good low loss type variable condenser of .0005 mfd. (500 mmfd.) capacity and a 35-turn honeycomb coil, or equivalent low loss coil inductance. The two are connected in series across the aerial and ground binding posts of the receiving set, and should be placed several feet away from the cabinet of the set so as not to be inductively coupled with the receiving tuner.

The efficiency of this arrangement is almost entirely dependent on the grade of apparatus used, so that it is advisable to use the best obtainable condenser and coil.

The coil can be made by the Radiophan who cares to dabble in such things. This is done by winding in a single layer 25 turns of number 24 dcc. wire on a 3-inch diameter or 35 turns of the same size wire on a 2-inch diameter paraffined



cardboard, hard rubber or bakelite tube. To make the trap even more effective, wind fifty turns of the wire on a 2-inch diameter, tapping every 10 turns. See figure 2 for method connecting taps to switch points. When using a trap of this type, always use as much of the coil as

possible in tuning to eliminate an interfering station.

How to Use Trap

To use the trap, after having connected it as shown and placed it at least two feet away from the receiver's cabinet, set the dials of your receiver where the desired station is heard, but is interfered with by the undesired station. Next, adjust the variable condenser of the wave trap until the interference has been reduced to a minimum, at the same time readjusting the receiver so that the desired station comes in as strong as it is possible to make it. A little practice will soon surprise the most skeptical listener in. In logging or recording dial settings so as to come back to a station when desired, it will now be necessary to include the reading of the wave trap dial along with the others.

Other Aids to Selectivity

Low loss variable condensers and inductances, if not used in your receiver, should materially improve the selectivity if substituted for the less efficient variable condensers and inductances.

Super sensitive sets, such as the super-heterodyne or five tube Radio frequency designs, should have their cabinets well shielded so as not to pick up interfering stations through the ability of their inductances to act as effective aerials. Some-

(Continued on page 26)

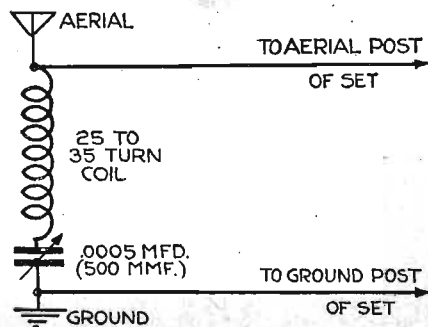


Figure 1

in a certain station, mean nothing when that station's wave length has been changed.

Solution of Problems Not Hard

It is the purpose of this article to give the Radiophan some workable suggestions for the overcoming of these difficulties. Neither are hard to solve, but every listener might as well follow now the instructions outlined, as later, for the department of commerce assures that more than twenty 500-watt stations are awaiting their opportunity of going on the air—with a corresponding renewal of the chaos.

The first problem—separation of stations without interference—depends upon the selectivity of the receiving set used by the Radiophan. Increased selectivity, to overcome the closer spacing of the stations, some of which are now only seven kilocycles apart in their frequencies, can be obtained in a number of ways.

A brief resume of the various methods of increasing the selectivity of a receiver includes the use of short outdoor or indoor aerials, better ground connections, wave traps (or high frequency by-pass circuits), good variable condensers, vernier controls, low loss inductances, shielded sets (when of the super sensitive type), and a great deal of patience.

Patience in tuning a set is a remarkable aid to selectivity that is often overlooked by the beginning Radiophan.

Better Aerials and Grounds

Poor aerials and grounds mean a path of high resistance for the incoming Radio signals, with an increased loss of selectivity. In general it may be said that the lower the resistance of an antenna circuit (aerial and ground), the correspondingly higher will be the selectivity of that circuit.

Short aerials mean low resistance aerials. It is often wise, when selectivity is desired, to use an aerial not over sixty or seventy-five feet long, including the ground lead and lead-in in this length.

The ground connection is very important. This should be clamped or soldered to a cold water pipe which has been scraped or filed clean at the point of connection.

The aerial lead should be insulated well from contact with the house or window still at the point where it is brought into the house. Porcelain tube, or other effective insulators should be used.

For the separation of local or nearby stations, without interference, the writer has used a short indoor aerial with much success. It might be well to have one of these available for use or experiment.

Wave Trap Usually Sure Cure

The wave trap, sometimes called high frequency by-pass or filter, about to be described, is one of the surest methods of separating and eliminating one of two closely tuning stations, be they both distant or one distant and the other near-

McCormack—More Clearly

on the

FRESHMAN MASTERPIECE

WHEREVER you are in this country you can easily tune in John McCormack, Bori, Alda and the host of other Metropolitan Opera artists, now broadcasting every other Thursday evening from WEAf and other stations

The Freshman Masterpiece assures true to life reproduction with real loud speaker volume. Brings out every single note distinctly, with matchless tonal qualities.

The easiest of all sets to operate.



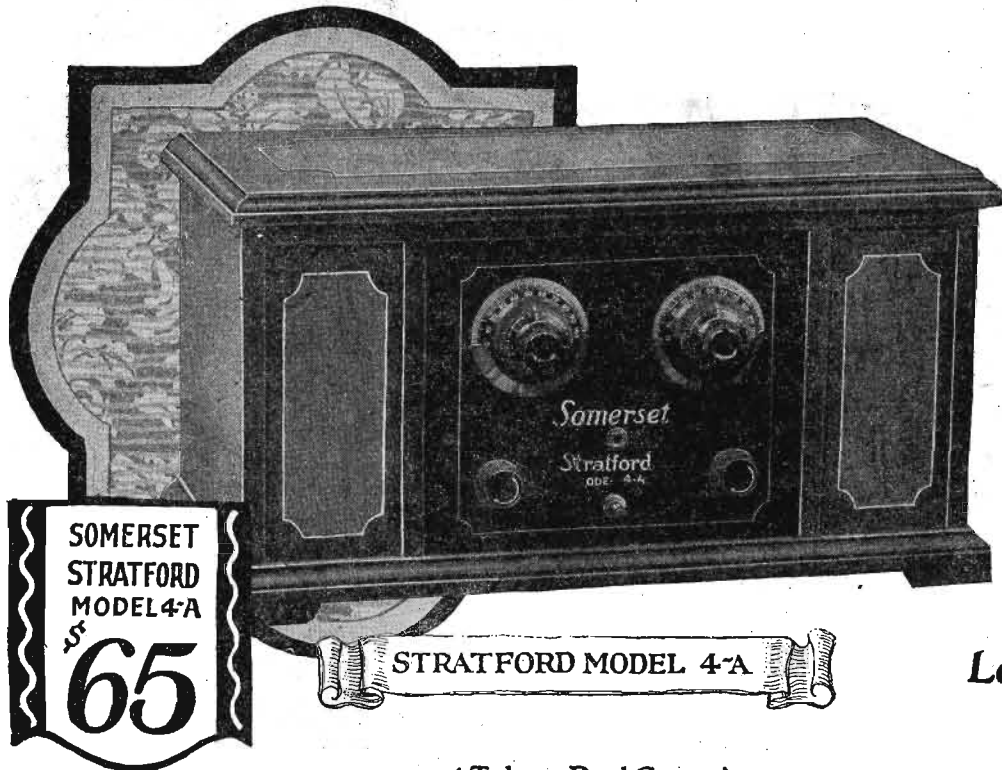
A five tube tuned radio frequency receiver made of the finest low loss materials and in a beautiful genuine solid mahogany cabinet, that is attractive enough for the most pretentious room, and at sixty dollars, economical enough for the most modest. Combining all points essential to the perfect receiver, it is the greatest value ever offered in a radio receiving set.

Chas. Freshman Co. Inc.
Radio Receivers and Parts
FRESHMAN BUILDING
240-248 WEST 40TH ST.—NEW YORK, N.Y.

These artists broadcasting through courtesy of Victor Talking Machine Co.

Somerset

Quality-



SOMERSET
STRATFORD
MODEL 4-A
\$**65**

STRATFORD MODEL 4-A

4 Tubes—Dual Control

A superior four tube, tuned radio frequency receiver—two dial control—operates on storage battery or dry cells. Automatic filament control insures long life of tubes. The finest "low loss" condensers and the famous SOMERSET Calibrated Transformers are features. "B" battery space is provided in the handsome two-tone mahogany finish cabinet. Size 21" x 15" x 11".

List \$65

EVERY once in a while somebody brings forth an idea so big, so valuable, and so obvious, that everybody recognizes its merit immediately and wonders why it wasn't done long before. That is the reception which the public has accorded the Somerset Radio Receiver—the perfect tuned radio frequency line. Almost overnight it has leaped into leadership through its unmistakable superiority in design, quality and value. The Somerset line consists of four models—Stratford Model 4-A, 4 tube set, 2 dials—\$65. Mars Model 5-A, 5 tube set, 3 dials—\$75. Shelbourne, Model 4-B, 4 tube set, 1 dial, synchronized control—\$85. Standish, Model 4-C, 4 tube set, 1 dial, synchronized control, with built-in loud speaker—\$150.

Let the Somerset Line Increase Your Profits!

YOU make profits only on the goods you sell—not on the shelf ornaments. Get aboard the Somerset line—it is going full speed ahead. Somerset Radio Receivers have caught the public fancy because they are just what the public has been wanting. "Give them what they want"—that's the secret to bigger profits.

Prices subject to change without notice

SHELBOURNE MODEL 4-B



SOMERSET
SHELBOURNE
MODEL 4-B
\$**85**

4 Tubes—Single Dial Control

Our perfected tuned radio frequency circuit with single dial synchronized control. Storage battery or dry cell operation, automatic filament control, the finest "low loss" condensers, and the famous SOMERSET Calibrated Transformers. Compartments for large sized storage "A" and dry cell "B" batteries. Mahogany finished cabinet hand-rubbed two-tone effect.

Size 26" x 14" x 12"

List \$85

EVERY STATION IS E-A-S-Y with the single dial synchronized control—featured on our Shelbourne and Standish Models. A simple twist of the big comfortable dial and your favorite station comes in—always at the same point. No need to fuss and adjust—you turn to it as confidently as you turn into your own street going home. The Somerset single dial synchronized control has been perfected after most exhaustive tests, and is made possible only by the most painstaking selection and matching of coils, condensers and transformers. Leading radio engineers have pronounced it a triumph of radio engineering.

Dealers!

Somerset Dealer Service includes not only full cooperation and dealer helps on Somerset Radio Receivers, but also complete service on tubes, phones, batteries, loud speakers etc., at regular dealers' discounts. Fill out and mail the coupon for complete information and details of this service. Don't put it off—send today.

Act Quick!

Somerset Radio Receivers

Radio

at a Price!

SOMERSET cabinets are unique — each a piece of fine furniture to grace milady's drawing room. Substantial construction, with artistic two-toned, hand-rubbed mahogany finish. Somerset technical features are equally remarkable — secured not only by superior wiring and workmanship but by painstaking care and test in selecting parts and materials. Somerset Radio Receivers are easily the greatest value in radio to-day. And Somerset technical features — too many to describe in detail here — are equally notable. In simplicity of operation, reliability, range, selectivity and tone, Somerset Radio Receivers are without peers in their price range — easily the greatest values in radio today!



The Famous Somerset Guarantee—Satisfaction—or Money Back

YOU must be satisfied with this receiver or we do not want you to keep it. If for any reason you feel that it is not exactly as represented or that it is not the quality and value which you have a right to expect, we want you to return it for exchange or for refund, whichever you prefer! We will cheerfully and promptly make good any Somerset product which does not fully measure up to your expectations.

5 Tubes—Three Dial Control
Two stages tuned radio frequency, detector, and two stages audio frequency. Storage battery or dry cell operation, automatic filament control, highest quality "low loss" condensers and the famous SOMERSET Calibrated Transformers. Artistic cabinet hand-rubbed mahogany finish providing space for dry cell "B" batteries. Size 29"x14"x11" **List \$75**

EVERY completed Somerset Radio Receiver must pass the rigid tests of the Somerset Engineering Laboratories before it is certified "O.K. for shipment". It must function perfectly or it cannot leave the Somerset laboratory. And that is why Somerset receivers are so remarkably sensitive and selective, reaching out to get broadcast programs from incredible distances, and reproducing them with precise fidelity and rich mellow tone. It is this infinite care with the "tremendous trifles" that places Somerset Radio Receivers in a class by themselves.

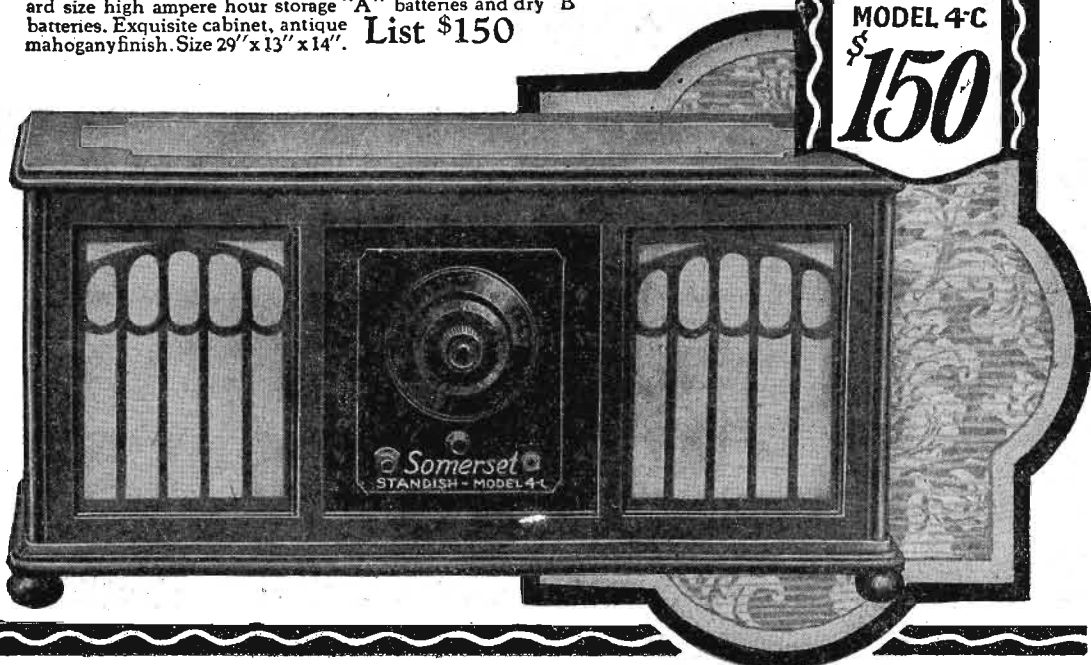
4 Tubes—Single Dial Control with built-in loud speaker

Combining a built-in loud speaker of the highest type and the four tube tuned radio frequency circuit with single dial synchronized control — all the latest and best in radio. Storage battery or dry cell operation, automatic filament control, highest quality "low loss" condensers, and the famous SOMERSET Calibrated Transformers. Ample space is reserved in this cabinet for standard size high ampere hour storage "A" batteries and dry "B" batteries. Exquisite cabinet, antique mahogany finish. Size 29"x13"x14". **List \$150**

Prices subject to change without notice

STANDISH MODEL 4-C

**SOMERSET
STANDISH
MODEL 4-C
\$150**



Fill Out

National Airphone Corp.
16 Hudson St., N. Y. City

Without any obligation to me send full details and information on the Somerset line and remarkable assistance to dealers.

Name

City

State

Mail Today

MFD. by **NATIONAL AIRPHONE CORP.**

16-22 Hudson St.
New York City

AN EVENING AT HOME WITH THE LISTENER IN

(SEE INSTRUCTIONS FOR USE BELOW)

Table with columns for Station and City, Met., Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday. Lists radio stations and their broadcast times.

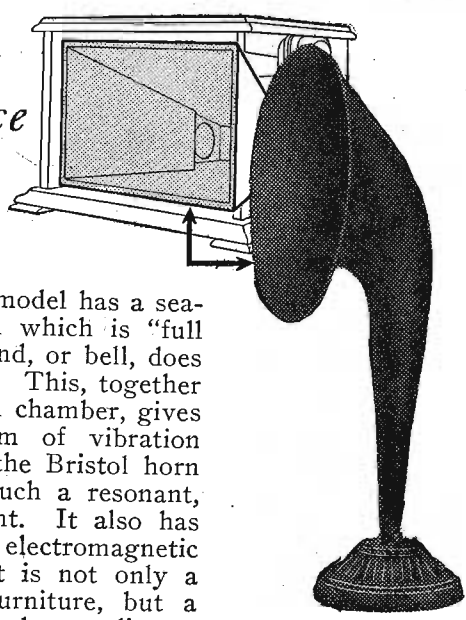
Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. This table includes only the evening Radiocasts, and, on Sunday, the late afternoon program.

STATIONS IN ORDER OF WAVE LENGTHS USED

Table with columns for Meters Call, listing stations in order of wave lengths used.

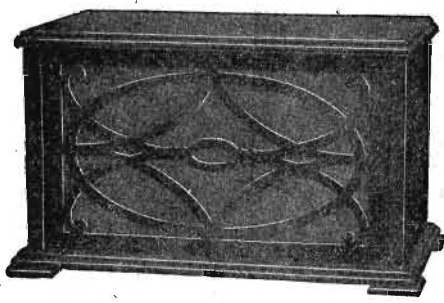
Reliable Radio advertisement for All-American. Includes text: 'MORE AND MORE, the vital parts of a radio set are being bought on the basis of known dependability of the maker, and less and less on mere claims. Probably that is the chief reason why ALL-AMERICANS continue to outsell all others.' Features 'Guaranteed Radio Products' and 'Largest Selling Transformers in the World'. Includes RAULAND MFG. CO. logo and address: 2640 Coyne Street, CHICAGO.

It Has the Full Sweet Resonance of Our Upright Horn



Model S, \$25.00

THE new cabinet model has a seasoned wood horn which is "full floating"—the outer end, or bell, does not touch the cabinet. This, together with a long expansion chamber, gives it that same freedom of vibration which goes to make the Bristol horn type Loud Speaker such a resonant, sweet-toned instrument. It also has the same high-grade electromagnetic sound mechanism. It is not only a handsome piece of furniture, but a speaker worthy of the best radio set that money can buy.



Cabinet Model, \$30.00

There are five Bristol Loud Speakers, priced from \$12.50 to \$30.00. If not at your dealer's, write for Bulletin No. AY-3020.

THE BRISTOL COMPANY Waterbury, Conn.

BRISTOL AUDIOPHONE Loud Speaker

For 36 Years Makers of BRISTOL'S RECORDING INSTRUMENTS. Ask Any Technical Engineer

Broadcast Listener's Reference Library

Part I—The Crystal Set with Various Circuits

By Edward Thomas Jones, A. I. R. E.

THE crystal set will give results, within a radius of twenty-five miles of a powerful broadcasting station which are excelled by no other type of receiver insofar as quality is concerned. A loud speaker cannot be operated directly from the crystal set; however, by adding a two stage amplifier (vacuum tube type) it is possible to operate a loud speaker from nearby powerful transmitters. The most important part of a crystal set is the crystal detector. It is unwise to mount the crystal on the receiving set, it should be mounted on a separate stand so that it will not be jarred out of "ad-

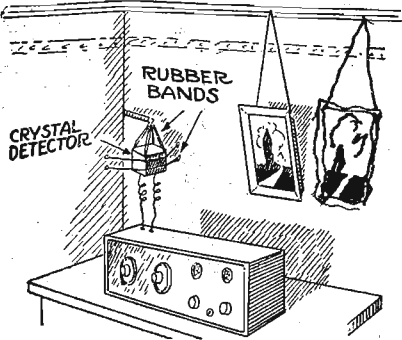


Figure 1

justment" every time it becomes necessary to change the tuner position. This is especially true of the cat-whisker type of detector.

Protection of the Crystal

Too much stress cannot be placed on the proper protection of the crystal detector. You must remember that it is not possible (except under very favorable conditions) to receive from great distances with crystal receivers, and what little energy is picked up and made available to operate the head phones must be taken care of so that reception will be possible. If the detector is not adjusted to its proper state of sensitiveness, the chances are that you will sit and sweat your collar

off without hearing a single sound. Therefore, make the proper installation of the detector where it will be safe—and cannot be jarred out of position every time some-

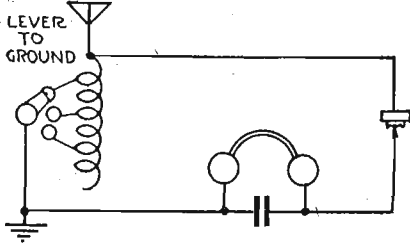


Figure 2

one sneezes or every time a trolley car passes. This is not far-fetched, but simply covers the situation frankly and makes known facts that every crystal set owner should know. It is the answer to those who have not met with much success with crystal detector sets.

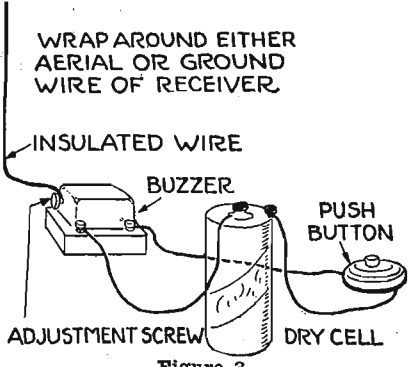


Figure 3

Next in importance is the selecting of a good crystal. Of course you cannot look at a crystal and tell whether it is a good one or not, although some Radiophans will tell you so. You must try out the crystal and listen in before passing judgment.

Crystals do not cost very much and it will pay you to purchase several specimens, and, after conducting your tests, use the one which gives best response in the headphones.

How to Keep Crystal Clean

Keep the surface of the crystal clean, especially if the detector is not of the enclosed type. This can be done by making use of an old toothbrush and some gasoline. Simply brush the surface of the crystal with the brush after it has been dipped in gasoline. Do not use soap.

When a crystal has been in use for some time it becomes a hard matter to find a very sensitive spot. If, after cleaning the crystal as outlined, the crystal's sensitiveness is not increased, then it will be necessary to take a pen-knife and

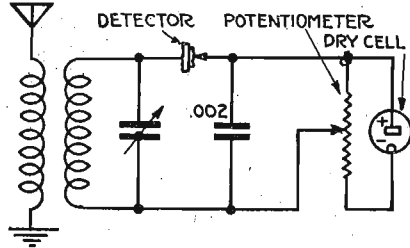


Figure 4

scrape the surface of the crystal. An experimenter at one time suggested that the mineral be ground down by properly applying it to the face of a carborundum stone. To the writer's knowledge, quite a number of experimenters have been successful in restoring crystals in this way.

Always be sure to connect the ground post to the tuner lever or switch. If this is not done, and you bring your hand to rest on the metal parts of the switch while tuning, you ground the signals through your body and decreased signal strength results. This is shown in figure 2.

Since it is not possible to pick up signals without the detector in adjustment, then the only way to operate a crystal receiver is to provide a local sending sta-

tion which will permit the adjusting of the detector.

Purchase from any electrical house a small "watch case" high frequency buzzer,

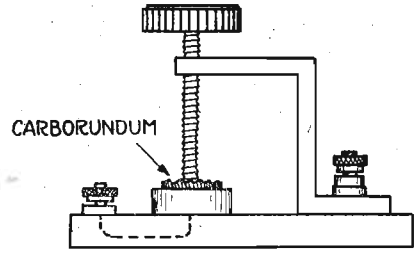


Figure 5

two dry cells, a small push button and sufficient wire to make the connections. Proper connections are shown in figure 3. Note that an extra wire is run from the contact post of the buzzer to either the aerial or ground connection of the receiver. Whenever you press the button the buzzer sends out minute electrical waves. If the detector is adjusted, you

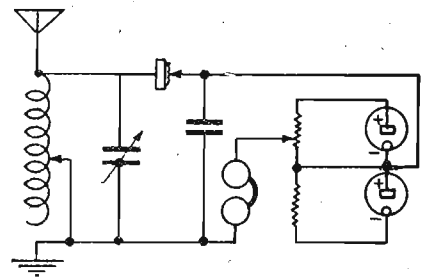
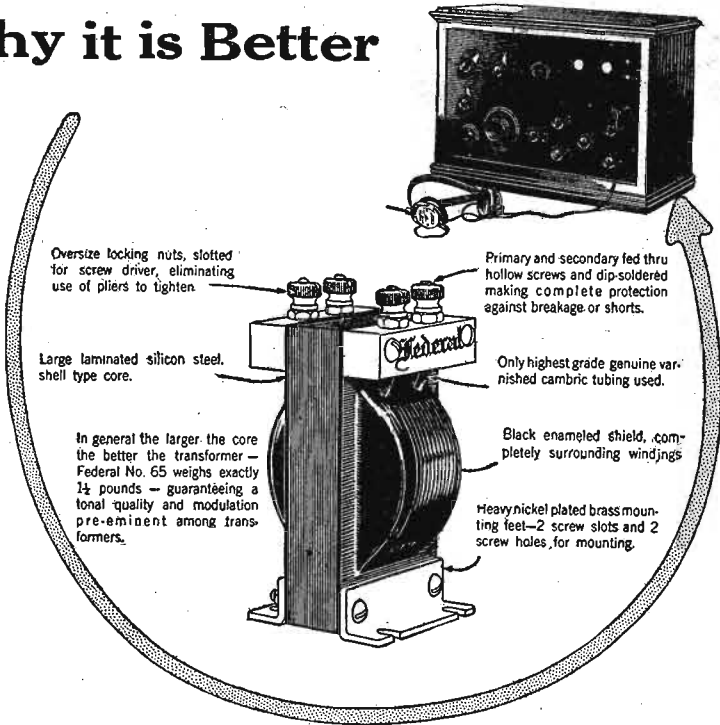


Figure 6

will hear a high pitched buzz in the headphones. By readjusting the detector you may find a "spot" where the "buzz" will come in louder—the crystal is then adjusted and you may then divert your attention to the tuning in of the broadcast

(Continued on page 26)

Why it is Better



"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer! Volume without distortion is the basis for the beauty of Federal Tone.

From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the

same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890.

Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

FEDERAL TELEPHONE AND TELEGRAPH CO.
Buffalo, N. Y.

Boston
New York
Philadelphia
Pittsburgh



Federal
Standard RADIO Products

Chicago
San Francisco
Bridgeburg
Canada



The new Tungar does all the old Tungar did—and more. It will charge both radio A and B batteries, with no change except slipping the wire from one terminal to another. It charges 2, 4 or 6 volt A batteries—24 to 96 volt B batteries—and auto batteries, too.

It is simpler than ever to use. Just two clips and a plug. No need to disconnect your battery from your set, or make any change in the wiring. The Tungar charges overnight while you sleep. And it makes no disturbing noise.

It is more compact than ever. It has a new bulb, unchanged in principle, but more convenient in size and use. G-E research has made a good product better!

Keep your batteries charged with a Tungar—and get the most out of radio.



300,000
Tungars
already
in use!

The new Tungar charges both radio A and B batteries, and auto batteries, too. Two ampere size (East of the Rockies) \$18

The Tungar is also available in five ampere size (East of the Rockies) \$28
80 cycles—110 volts

Tungar
REG. U. S. PAT. OFF.

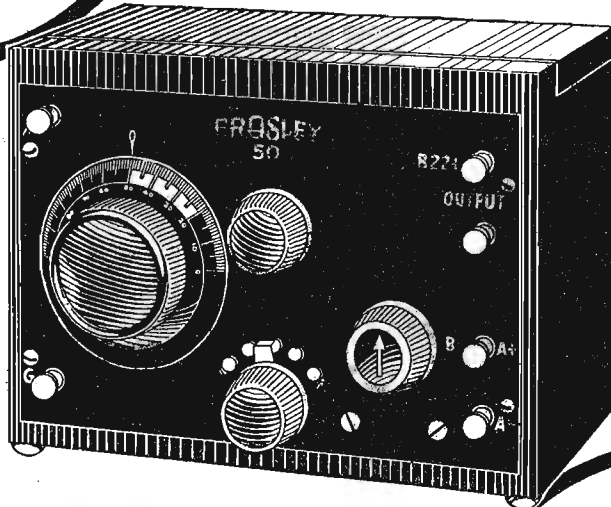
BATTERY CHARGER

Tungar—a registered trademark—is found only on the genuine. Look for it on the name plate.
Merchandise Department
General Electric Company, Bridgeport, Conn.

GENERALELECTRIC

CROSLEY 1 TUBE-50

\$14⁵⁰



*The Little
Giant of Radio
Coast to Coast Reception
with phones frequently
reported.*

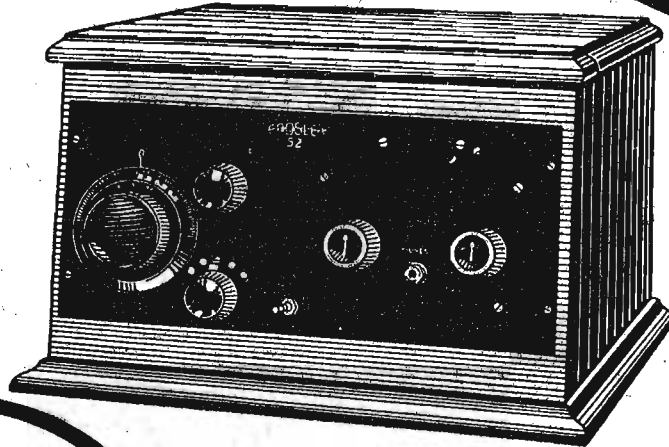
THIS Little Giant of Radio, the Crosley one tube 50, has everywhere astounded people with the distant stations that it brings in, on ear phones of course. All parts of the United States report European stations were heard with it during international test week. It is the radio with which Leonard Weeks of Minot, N. D., kept in constant touch with the MacMillan expedition at the North

Pole. All other makes of receivers failed. For true radio value, it is excelled only by the other larger Crosley Radios. Stations may be easily logged and always located at the same place. For the beginner in radio, the Crosley 50 is ideal. For sale by good dealers everywhere. All Crosley Radios are licensed under Armstrong Regenerative U. S. Patent 1,113,149. Write for Catalog.

THE CROSLEY RADIO CORPORATION
CINCINNATI

THE NEW CROSLEY 52-SPECIAL

\$35



*Similar to
the well-known
Crosley 52 at \$30
in handsome large
cabinet with
Sloping Panel*

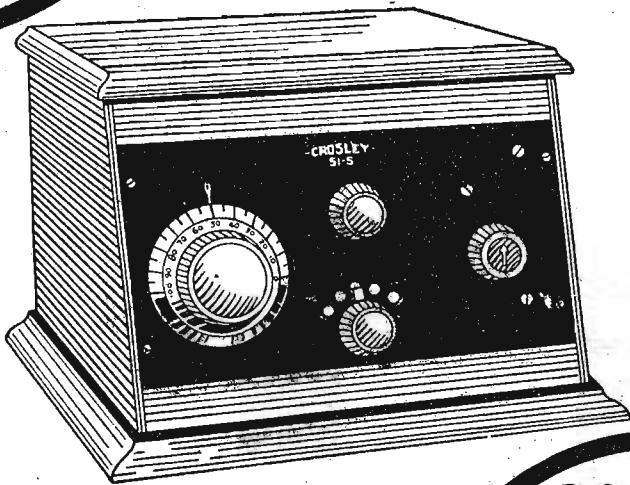
THE tremendous demand for the Crosley three tube 52 has encouraged us to offer this circuit in a new, attractive cabinet with sloping panel, the Crosley 52 Special. This cabinet is large enough to hold all dry cell batteries. It thus becomes self contained, a beautiful piece of furniture which can take its place in the living rooms of the most discriminating. The sloping panel makes operation easier and greatly adds to the appearance of the set. Of course,

the popular Crosley 52 will be continued. It has given uniformly satisfactory loud speaker service in all parts of the country. Continual coast to coast reception and even foreign stations on the loud speaker have been frequently reported. You can purchase a Crosley 52 or 52 Special from most any good dealer. All Crosley Radios are licensed under the Armstrong Regenerative U. S. Patent 1,113,149. Write for catalog.

THE CROSLEY RADIO CORPORATION
CINCINNATI

THE NEW CROSLLEY 51-SPECIAL

\$23⁵⁰



*Of Course
the Famous
Crosley 51 Regular at
\$18⁵⁰
Will be Continued*

HERE is the popular Crosley 51 dressed up in new clothes. It is known as the Crosley 51-Special. This two tube, genuine Armstrong regenerative receiver is exactly the same as the nationally known Crosley 51, except it is installed in a larger cabinet in which there is room for dry cell batteries. Also there is the slanting panel, a feature that adds

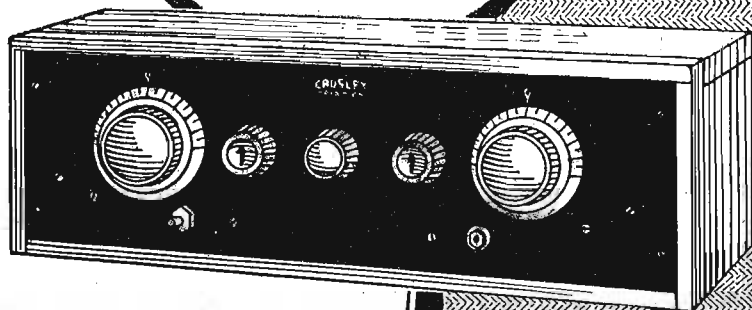
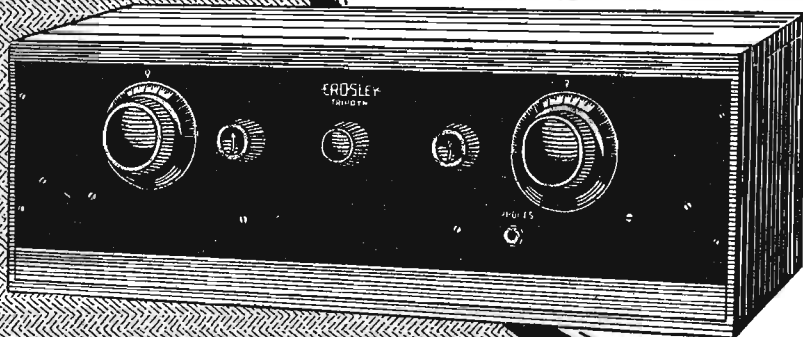
to the appearance of the set and makes operation more comfortable. This radio is as artistic as it is efficient, appealing to the housewife who demands beautiful appearance and elimination of visible batteries. All Crosley radios are manufactured under Armstrong Regenerative U. S. Patent No. 1,113,149. Write for Catalog.

THE CROSLLEY RADIO CORPORATION
CINCINNATI

CROSLEY TRIRDYNS

*With
Sloping Panel*
\$ **55**
New Model

Regular
\$50
Formerly \$65



*Three Tubes
Do the work of
Five or Six
in the
Trirdyn*

THE recognized outstanding achievement in radio is the Crosley Trirdyn. An overburdening amount of evidence proves that it is excelled by none and superior to most receivers costing many times more. It is a three tube radio combining one stage of tuned radio frequency, regenerative detector and reflex amplification. This combination enables three tubes to do the work of five or six. Brings in every large station in the country on the loud speaker. Is very selective, easy to tune and economical to operate.

The straight front Trirdyn Regular, formerly \$65; now \$50. The Trirdyn Special in large cabinet to house dry cell batteries formerly \$75; now \$60.

To these have been added the new Trirdyn Regular with sloping panel at \$55 and the new Trirdyn Special in beautiful cabinet with sloping panel \$65. All Crosley Radios are licensed under Armstrong Regenerative U. S. Patent 1,113,149. Demand a Crosley Trirdyn at any Good Dealer.

THE CROSLEY RADIO CORPORATION
CINCINNATI

Radio Digest

PROGRAMS
Illustrated

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What Is it All About?

Do Radio Waves Have Weight and Substance?

TWO YEARS ago we all laughed at Einstein; now he is generally accepted as a leader of scientific thought. Just as he proves the theory that light has weight by measuring the deflection of star light, so we may prove that Radio waves have substance or weight by measuring the variation of energy when they travel east or west. Apparently, the increased momentum or tangential force of the earth revolving toward the east strengthens and improves those signals going west.

The greatest of scientists seem lost in the conflict of ideas; Herz, Fleming, Lodge and Edison have made suggestions, but their theories have all now been thrown down and everyone is at sea.

We might just as well use the hypothesis that Radio messages or impulses are transmitted between points as an express train delivers packages to their destination. How is it done? The wave hypothesis has fallen down. The carrier is proven to have mass. If it is affected by gravity and has weight then it must also have shape and form. That form is something of which so far our senses cannot conceive. It is like the vague fourth dimension of mathematics. Only those of concentrated development of mathematical knowledge can get the drift of the idea.

Just as we are trying to bring mental telepathy to an understanding so we must do likewise with Radio. There has never been in the world's history a more opportune time for a scientist to become crowned as now, with the solution of the phenomena of Radio.

The heaviside theory has proven faulty. The day absorption of short waves is greater than the night and now, contrary to all theory and practice of twenty-five years' development, we discover that signals from Bordeaux are stronger on eighteen thousand meters than on twenty-three thousand. After these years of long waves we are turning to the short waves and reflection and refraction principles. The problems of static is still unsolved and the peculiarities of so-called fading of signals cannot be satisfactorily explained. The aurora borealis and other magnetic and electrical demonstrations improve Radio reception but disrupt the cables. From this you might say Radio laws should not be at all like laws of electricity and magnetism. Just as an electric motor may drive a water wheel or other dissimilar device, so our present day Radio transmitters and receivers built on electrical principles, are controlling the Radio phenomena.

Let us get some fresh minds on the subject—the old ones have gone stale and admit defeat of all their theories.

Cures Nerves

New Found Remedy Abroad for Nervousness

IF THE English recognize in Radio an aid in the treatment of nervous cases and insomnia what would they think of conditions in America where jazz is mostly the product of programs. Foreign doctors declare that Radio programs are important to nerve patients, not only in their direct effects but as antidotes for the unpleasant everyday street noises. English Radio must be different from ours. Static, jazz, crossed waves and local interference that have come to be almost the regular thing are enough to send some folks to the asylum with hopeless nerves. If not insomnia—isn't it Radio that keeps American folks awake nights?

Foreign Licenses

System of Taxing the Use of Sets

THE postmaster general, who has control of Radio in England, finds that he has 2,000,000 slackers who have sets but pay no revenue. While an intended drive may bring in half of the slackers the large amount that will escape payment makes the system a bad proposition. It is expected that the money brought in on delinquents will aid the broadcasting company to accomplish greater things.

The British trouble would be ours if we would adopt their plan for the payment of broadcasting.

RADIO INDI-GEST

Jim's Letter to Frank

Dear Indi:—I gave my brother Jim a regenerative set with a loud speaker. Like all farmers, he didn't take to it at first, but he gradually got the fever. He had a few months of good reception and then trouble came. Here is his letter to me.

Dear Frank:—"This is Sunday morning and I have just got in, with 2 rabbits for dinner, and the snow out of my shoes, and a fresh chew of tobacco, and a good fire with plenty of wood, and nothing to do, so I thought I might have time to write and tell you about the Radio.

"The first thing I done for her was to buy twenty-eight dollars worth of medicine. The first dose was a new 'A' battery but she got no better. Then I got her 2 new tubes, and no better yet. Then I got her 3 new 'B' batteries and gave hem to her and she ate them all three up in three days.

"Then I hung the old ones back on her and doctored her for a few days until she got them 3 batteries digested and she got so she could whisper some. I kept on doctoring and tried all the remedies I could think of and now she is beginning to talk pretty plain. "The lights are all good and bright and her digestive organs seems lots better but she is pretty hoarse yet. I think I will operate on her again tomorrow. She will talk good and strong for a while and then she commences getting weak until she fades away and then comes back again as strong as before. I think that is caused by pains from eating the batteries, and she has got another trouble that I haven't found yet.

"Well Frank I guess you can beat me hearing music from China and Japan but I can hear the alligators on the coast of Florida a croaking, and the bears in the rockies growling, and the monkees in Africa squealing, all with one tunein and it is loud enuff so, I can tell just what it is. Of course there is several other kind of animals that I can't just tell what they are but they sure have got loud voices."

"JIM."

"Since Radio Came In"

By E. Claire

Oh where's the dear old huskin bee
We had in days of yore,
And the darkies used to playin'
And a singin' 'round the door?
We used to hear them laughing,
Now we only see them grin;
Where once was mirth, it's hushed and still,
"Since Radio came in."

Where's the hay-rides and the
Sunday picnics for the school,
And where's the dear old crank
That used to teach the Golden Rule,
And where's the taffy pullin'
And the yarn we used to spin?
All seem to be forgotten now
"Since Radio came in."

The young folks used to go to church
On every Sunday night;
They used to give old folks the lurch,
To walk in pale moonlight;
But now they sit at home and spoon,
We used to think that sin;
And they get their sermon with their meals,
"Since Radio came in."

The baseball and the good old games
We used to pay to see,
And a great many other things,
They've gone for charity;
And those that used to have in store,
Their light wines, beer and gin,
Now have to drink the "ether waves"
"Since Radio came in."

Pacific Oats Station—AGO

Dear Indi:—My set is made of two vacuum tubes. They work great, amplifying the vacuum something wonderful. Most nights I can't hear nothing else. I got a unsuspected shock las' night, however, me readin' the programs as usual (which is mostly how I hear the concerts). All on a suddint my set perked up with a horse growl sayin', "Pacific Oats Station AGO—Henry Hothead's Orchestra," and the tubes got in their work again, makin' a perfect vacuum. I don't see this Pacific Oats stations in your program at all which will you please tell me why. Yours simply,

A. PUNK SETT.

Harry M. Snodgrass

Dear Harry, how we miss you
Since you have gone away;
And so do many millions
Who loved to hear you play.
But the memory of your music
Will always with us dwell;
Where ere you go, what ere you do
We shall always wish you well.

And many a wintry evening,
When the earth was wrapped in snow,
We heard J. M. Witten calling
Upon the Radio.

And every Monday evening
We could hear his favorite text,
"Home, Home Sweet Home" on the Baldwin
By Harry, will be next.

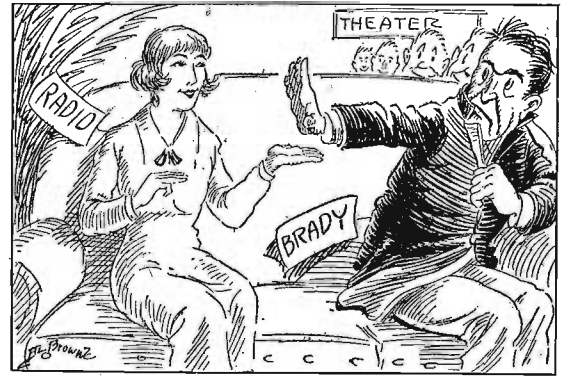
E. T. BRYANT.

Walla Walla Expedition Rebels!

At the last minute, when the expedition was about to leave, mutiny broke out in the fo'c'sle. The cook claims that he was approached by a stranger and offered \$25 per week to stay away from the expedition. When the sailors heard of this, they rebelled, and demanded pie twice a week. According to the latest information brought ashore in the long boat, Capt. Oneoar was busily trying to recruit a new crew. We will leave next week, sure!

INDI HISSELF.

Someone's Sittin' Pretty



Condensed

By DIELECTRIC

WHB provided a feature not so long ago that introduced an innovation in terpsichorean art—that is, it must have attracted the attention of jazz fans. When the Old Time Dance orchestra came on the air at the the Sweeney school the unorthodox were impressed with its title. Personally, the most pleasing element was the absence of "silent periods."

There are not so many organ recitals coming through the ether as at one time, whether this be the wish of listeners in, or not, I should like to be able to say, but can't. An excellent organ recital was given by WNAC which merited applause cards. Did you send one?

In listening to the United States Navy band orchestra it seemed to me there had been improvement since early in the fall. As I listened to the concert, and particularly to Miss Hood's singing of "Because," the impression prevailed that WCAP was putting out pleasing programs. They are fortunate to Radiocast this and the Marine band concerts.

WNYC was less fortunate than some other stations in its Radiocasting of the running of that marvel, Nurmi. Nevertheless, you could almost vision his peculiar style of covering the track and the yells of thousands of spectators as he flashed ahead of his nearest competitor for track honors. The transmission was inclined to be foggy.

Among the hotel orchestras providing music for their dining patrons, and we diners who are not patrons, mention should be made of the William Penn aggregation, whose playing is heard through WCAE.

One of the last piano selections heard from WOS during the stay of Harry Snodgrass in Jefferson City was his own conception of the way "Three o'Clock in the Morning" should be played. It was quite original, if the subject lacked peculiar distinction. Harry will be missed from the programs of this station, along with Announcer Witten.

There are few sports so speedy in action and exciting to witness as basketball. No doubt this one game taxes the ability of a Radio observer as does no other, yet there can be only praise for the description given us of the Pittsburgh-Boston game. The cheers of the onlookers add to such events, not detract from them.

Most of us don't find the diversion in listening to the ceremonies attendant upon a wedding as when the Radio first carried such a feature. WLW had everything to make this occasion as nearly actual to the listening observer as could be wished for, yet it didn't stir us from our lethargy. Maybe we are getting unromantic.

It is too bad that such special concerts as those arranged by the Brunswick Phonograph company should not have the facilities of the best Radiocast stations. It is better to tune them in from some stations other than WJZ. So far these concerts have presented uniformly pleasing artists. May they continue for some time to come.

WOC is as well-known a station to old timers as any on the air. There never was any severe criticism for the station at any time and the future is unlikely to develop any with their improved outfit. I had heard the Chaminade club concerts from this station before, but never to such advantage as on the opening night of the new regime.

How to Make the Two Tube Knox Reflex

Part I—Analysis of Circuit and Winding of Spider Webs

By W. H. H. Knox

THE writer has always been a staunch supporter of the crystal as a detector and, as the reflex circuit presents the best opportunities for utilizing this form of detector, it was naturally selected some two years ago when searching for a hook-up with which to experiment. The reflex has been faithfully adhered to during this time and, in developing the circuit to be submitted, a great deal of pleasure has been derived; also a greater amount of knowledge regarding Radio and high frequency current than it was thought possible to absorb mentally in connection with any branch of science.

Analyzing the Circuit

The analysis of this circuit is about as follows (see figure 2). Signals enter the circuit through the coil L1, which is an untuned primary in the antenna circuit. Because of inductive coupling, signals are passed into coil L2, which is tuned by condenser C1 and which, with this condenser, will cover the broadcasting range. At first glance it might be presumed that coil L5 introduced straight tickler regeneration, but this is not the case as coil L5 is connected to produce reverse feedback as in the superdyne. L5 is connected to the plate circuit of the first tube through a small condenser of .000045 or .00005 mfd. capacity and through the resistance R3, which is 24 ohms. Such a resistance is on the market in the form of a wire wound fiber strip intended to be used with a 6-ohm rheostat for control of dry cell tubes with 30 ohms. Signals pass from the plate of tube T1 through coil L6 tuned by the condenser C6 and through the primary of audio frequency transformer AT2 into coil L3, which is the primary of a Radio frequency transformer. L6 and C6 constitute the tuned impedance of the plate circuit and bring the plate circuit into exact resonance with the grid circuit composed of L2 and C1. The howl which would ordinarily result is prevented by the reverse feedback of coil L5 and condenser C5. The spider web L4 is inductively coupled to L3 and is tuned by variable condenser C4 with which it covers the broadcasting range. Signals then pass into the crystal detector D and the primary of audio frequency transformer AT1. They are now at audio frequencies and are passed into the grid circuit of tube T2 through the electro-magnetic coupling between the primary and secondary of audio

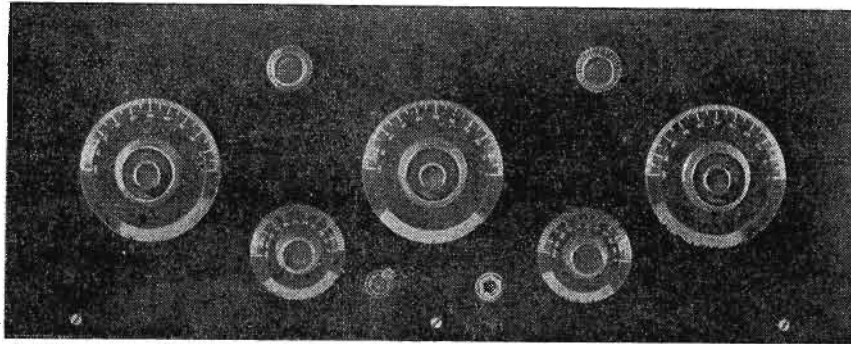


Figure 1

transformer AT1. At audio frequencies they are amplified by tube T1, passed through coil L6 and into the primary of AT2. This being an audio transformer the audio frequency is passed into its secondary and onto the grid of tube T2, which is a second stage of audio frequency amplification. The output jack is

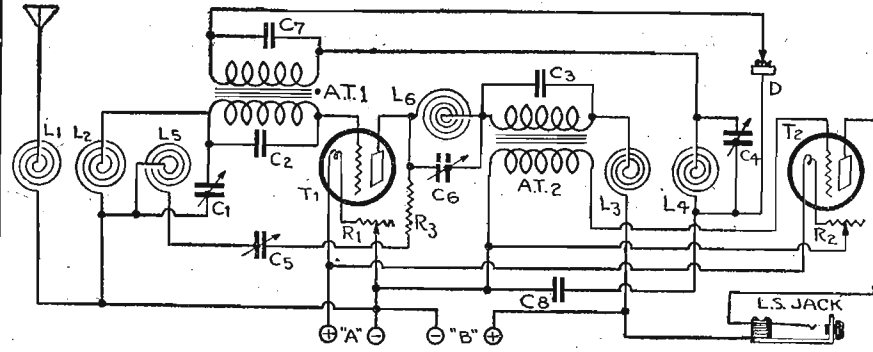


Figure 2

connected in this plate circuit. We thus have a successful application of the superdyne principle to a reflex receiver with consequent gain in both selectivity and range, but retaining the economy of tubes and tone quality of the reflex.

Difficulties Overcome

Something over a year ago it was decided to try introducing regeneration into the reflex circuit and, starting with the

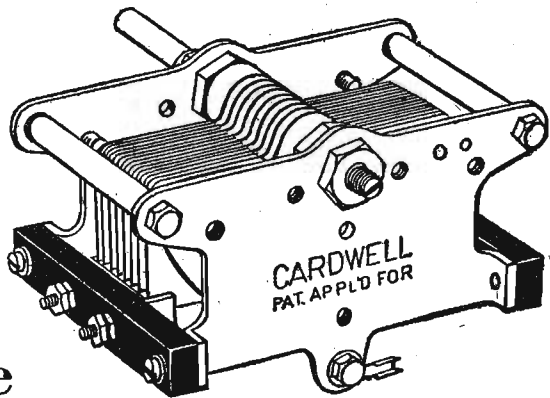
tubes, it was found that regeneration is constantly in advance of amplification up

to the oscillating point. Therefore, if regeneration could be retarded, thereby preventing an oscillating condition of the tube until the peak of amplification was reached, enormous amplification would most certainly result.

The writer decided, first of all, to attack the problem of inductive resonance. This really means that the inductance of the plate circuit is equal to the inductance of the grid circuit, a condition that will surely result in violent oscillation. The logical way of preventing this was, of course, to make this inductance as unequal as was practical and coils of different ratios were tried until it was finally decided that this was not the cause of the instability of the set.

Attention was next directed to the problem of magnetic coupling and, much to the writer's disgust, it was suddenly noticed that while coils L1 and L2 (figure 2) and L3 and L4 were about 5 inches apart, they were placed parallel to each other. The writer has never been able to figure out how they got that way, but the fact remains that they were in this position, and after turning them both to about a 57-degree angle a decided improvement was noticed. Every three element tube is subject to a malady of capacity coupling, or the interaction of the grid and plate circuits. There are several remedies for this, all effective to a certain degree, such as the Hazeltine method of neutralization, conductive reverse feedback, and inductive reverse feedback. The first two were tried but there were certain features about their action that seemed unsatisfactory, so the inductive reverse feedback was tried and it was found that the tubes were under perfect control at all times. At this stage of the work it was felt that the experiments had gotten along pretty well, so the next step was to tackle regeneration once more.

There was no whistle when tuning, but, (Continued on page 26)



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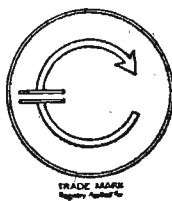
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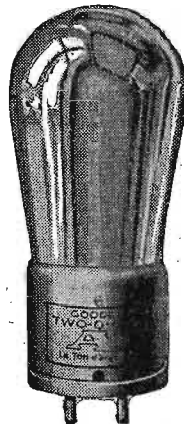
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2 TUBE KNOX REFLEX

(Continued from page 25)

while the writer now had a howl-less set, it was far from an efficient one. The local stations came in loud on the A tubes and the tone was excellent, but the DX reception was far from satisfactory and

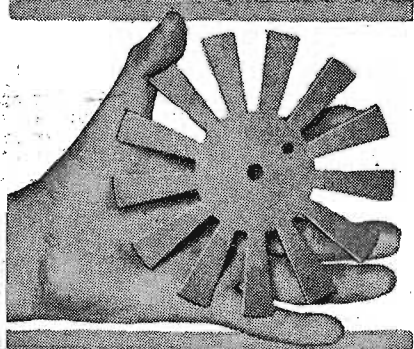


Figure 3

It was felt that there was some way of improving this. About this time an article came out which stated that some of the most popular reflex circuits were prevented from oscillating by using a small number of turns in the primaries of the Radio frequency transformers, but that in doing so the impedance of the plate circuit was reduced to such an extent that the plate voltage variations were very small, which reduced the efficiency of the set. This seemed perfectly reasonable and although it was known that by raising the impedance the tendency toward self oscillation would be increased, it was felt that regeneration was now under strict control.

The writer decided to try a 50-turn honeycomb coil in the plate circuit of the first tube; this raised the impedance all right, but it also started the howling and whistling again. However, we were on the right track, so it was decided to vary the action of this coil by shunting a variable condenser across it, and discovered that the regeneration was at last under perfect control with tuned impedance.

The set still retained its excellent tone quality, but was now also an excellent distance set. Los Angeles is one of the most difficult cities in which to receive DX stations as there are many strong locals, and other conditions which seem to prevent getting out of town, yet the receiver now went through the locals and put stations 500 to 800 miles away on the loud speaker with good volume.

Constructing Spiderwebs

As can be seen from figure 2, there are six spiderweb coils used in this receiver and, as these are the only parts which must be made at home, we will take up their construction first. There are two methods of winding and using these coils. The easier method is that shown in figures 3 and 4 in which a thin fiber form is used with a solid center about 2 1/4 inches in diameter, while the outside diameter is 5 inches. The wire is wound on this form in the manner shown and to the required number of turns, and when the coil is finished the form is left inside the coil and used for mounting. The second method which was used by the writer is

that of first making a wooden hub 2 1/4 inches in diameter and 1 inch thick, after which 15 holes are drilled in the circumference of this hub at equal distances apart. These holes are to be 1/4 inch in diameter and 1/4 inch dowel rods 2 1/4 inches long are fitted into the holes. These should be a snug enough fit that they will stay in while the winding is in progress, but not so tight that they cannot be readily removed when the winding is finished. When the required number of turns have

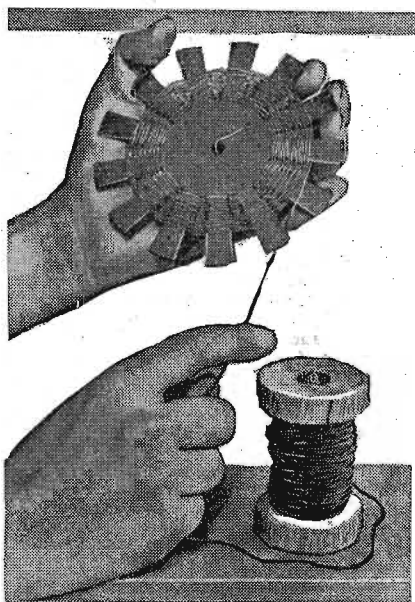


Figure 4

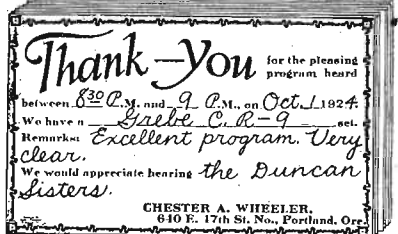
been put on this wooden form they may be either coated with cement or held firmly in place with heavy waxed thread interlaced in the windings.

The third possible method is to wind the coils as shown in figures 3 and 4 and then go around the center disc with a fine hack saw, cutting off all of the spokes except one which is used for mounting. The turns are, of course, secured with thread or Radio cement before cutting out the fiber.

Coil L2 may be wound first of all with 41 turns, on either of the forms above described. When winding coils L1 and L5 string should be wound on first to a depth of about 1/4 inch after which 17 turns of wire are put on one form which makes coil L1, and 17 turns are put on another form to make L5. Coils L3 and L4 are wound each on their own form without string, L3 to contain 27 turns and L4 to contain 51 turns. Coil 6 is wound on another form and contains 33 1/2 turns.

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3 Variable condensers, .0005 mfd. vernier	\$16.50
1 Variable condenser, .000045 mfd. midget	1.50
1 Crystal detector, panel mount	1.75
2 Sockets	2.00
2 Rheostats, 20-30 ohm	2.00
6 Spider web forms, 5"	3.00
1 1/2 lb. spool No. 28 scc. wire	1.40
1 1/4 lb. spool No. 30 scc. wire	.35
2 Audio frequency transformers	8.50
1 7" x 18" panel	3.15
1 7" x 17" base-panel	2.95
1 Filament switch	1.00
1 Open circuit jack	.80
6 Binding posts	.60
1 Fixed mica cond., .001 mfd.	.40
1 Fixed mica cond., .006 mfd.	.75
1 Fixed mica cond., .0005 mfd.	.35
1 Fixed mica cond., .0001 mfd.	.35
1 Cabinet 7" x 18" x 7"	9.00
1 Resistance unit, 24 ohm	.75
Miscellaneous bus bar screws, etc.	2.00
Total	\$59.60

All coils, with the exception of L5, may be wound with number 24, 26 or 28 single cotton covered wire, or double silk if preferred, but coil L5 should be wound with wire not larger than number 30 and either number 30, 32 or 34 may be used. There should now be six spider web coils each on its own form and ready for mounting.

(Next week Mr. Knox gives the panel drilling layout and baseboard layout with detailed instructions on connecting the coils.—Editor's Note.)

Boosting Weak Signals

Weak signals from distant stations received on a set using a loop antenna as the intercepting medium can be greatly intensified and strengthened by grounding the negative side of the A or filament battery. The increase will be particularly noticeable on sets employing only two stages of Radio frequency amplification because the infinitesimal amount of energy picked up by the loop cannot be sufficiently amplified.

Distant stations that can barely be detected can often be raised to good audibility by grounding the receiver through the negative side of the A battery. While having the aforementioned advantage it also has the drawback of raising the static and noise level along with the weak signals and in many cases of broadening the tuning.

REFERENCE LIBRARY

(Continued from page 19)

station. Occasionally, "test" to see if the detector is properly adjusted (provided you are not listening to a station).

Battery Supply for Crystal Sets

Battery supply for crystal detectors was used as far back as 1903—four years before I heard or saw a Radio station in operation. Battery supply will aid silicon detectors and several other types, but it is primarily intended for carborundum crystals. It is strange indeed that so few carborundum detectors are being used. It will hold its adjustment for days and is fairly sensitive. It is the kind of crystal detector that "saves your religion." Note the sturdy construction suggested in figure 5.

A battery is connected in the circuit as shown in figure 4. A "dead" dry cell and a potentiometer (400 to 600 ohms) are the only additional parts required. The battery must be connected in the circuit as regards polarity in such a way that it aids reception. To the broadcast listener it is suggested: try the battery first in one position in the circuit and then reverse the connections. Then place it in the circuit in the position in which best results were obtained. The writer has never been successful in adding battery supply to galena crystals. Another carborundum hook-up is shown in figure 6.

(Next week Mr. Jones goes into the factors which limit Radio reception and enable some fans to get both coasts while a neighbor has difficulty getting out 500 miles.—Editor's Note.)

TUNING BROADCASTERS

(Continued from page 9)

times it is found good to shunt (place in parallel) heavy capacity (0.5 to 2 mfd.) fixed condensers across the A and B battery leads to the receiver, especially where these leads are over one foot in length. This prevents energy, so picked up, from going on through the receiver.

After all is said and done, the increasing number of stations, many of which are of the super power type, has placed the Radio section of the department of commerce where it is literally "up against it." It remains therefore for the manufacturers and Radiophans to improve their sets to meet the demands placed upon them.

Radio-Madrid Spanish Radio company at present operating the big broadcasting stations in that country, has recently undergone a complete organization.

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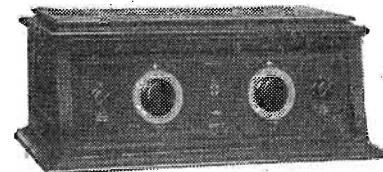
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Construction of the Six Tube Hetduogen

Some Questions and Their Answers

By C. E. Brush

THERE are several points in connection with hetduogen receiver on which the readers of Radio Digest have requested a little more information. Since some of these points and the answers will prove of interest to those who are building the hetduogen, they are being printed and will straighten out many difficulties.

Q.—I am about to construct your hetduogen and want a filter, antenna coupler and oscillator constructed along low loss lines and also wish to use litz wire in these units. If you warrant the use of the above construction please give the details in Radio Digest.

H. E. S., Pittsburgh, Pa.

A.—We have your letter of January 5, and wish to advise that there would be no advantage in constructing the inductance units for hetduogen on low loss principals. Regeneration is introduced into the grid circuits of both detectors so that the effective resistance of both circuits is nearly reduced to zero.

The use of litz wire has been stated by leading authorities to be of no advantage below 2,000 meters and, in addition, if one of the little strands in a piece of litz becomes broken or is not connected by solder the result is far worse than if solid wire were used.

Q.—In reference to the hetduogen set that you are publishing, if you are going to heterodyne to about 600 meters will you not get a large number of ship stations through the programs? Would it be possible to use a loop on this set?

D. L., Windsor, Canada.

A.—We have your letter of January 5, and would advise that while we do not know the reason, we found that ship stations and other transmissions around 600 meters are not picked up on the hetduogen. The writer is going to try out this set on a loop, but has not as yet had an opportunity to do this.

Tubing Used

Q.—Concerning construction of the 6-tube hetduogen on page 15 of the January 3 issue—oscillator windings—advise if the tube should be 2 3/4 inches inside or outside diameter?

R. L. B., Dalton, Ga.

A.—The hard rubber or bakelite tube for the oscillator coupler of the hetduogen should have an outside diameter of 2 3/4 inches; the antenna coupler tube should have an outside diameter of 3 1/4 inches. These are both standard sizes and the wall has a thickness of 1/16 inch.

Q.—I have plenty of number 26 dcc. wire and wish to know if I can use it instead of the dsc. How will the volume and tone of the hetduogen compare with the superdyne, that is, tube for tube and ordinarily should I expect coast to coast reception from this city by using the hetduogen? Would I gain anything by winding coils basket weave fashion, and if so, should the same diameter and number of turns be used?

T. L. M., Rome, Ga.

A.—Number 26 dcc. wire will be suitable for winding the coils, providing the proper space is left between the anchoring holes to accommodate it. We would hardly say that you will get reliable or daily coast to coast reception, as we are not familiar with receiving conditions in Georgia, but if any other receiver will do this in your locality the hetduogen will. We doubt whether any gain would be noticed from the use of basket weave coils, as the resistance of the circuits is lowered to

the minimum possible by the use of regeneration.

Radiation

Q.—I wrote your Q and A department some time ago and wish to thank you for the information received. I am now very much interested in hetduogen which is being described in your issues, and wish to ask the following questions. Is the center dial a volume control or is it used to tune in stations? Does the set radiate and bother other receiving sets? Does it whistle when tuning in to a station?

T. T. M., What Cheer, Iowa.

A.—The center dial on the hetduogen acts as a volume control since it is a control of regeneration in the first tube. This receiver will radiate if improperly handled, as will any other set, since this regeneration control can be brought up too far. If this control is advanced too far, tuning can be done on the whistle of the carrier wave. Correctly operated, however, tuning is done with this control considerably below the oscillation point and this control is then advanced for increased volume.

Hetduogen Best Yet

Radio Digest: I am listening to KFI, with WCAP going full blast, no interference. Had KFI, KGO, and KOA last Monday night—loud speaker on hetduogen with five tubes, one transformer and one stage resistance coupled. Am well pleased, but will you please tell me what transformers Mr. Brush uses? Only put up a test set but am starting to rebuild now. I would also like to know what he used that second variable leak for?

Won't you please give me the information I ask by return mail. I will buy the Radio Digest just the same as I have a copy reserved each week. The programs alone are well worth the price. I am a locomotive engineer, and have built nearly everything I have found in Radio for last two years, during my spare time. Hetduogen gives promise of being the best yet, or at least the equal of a seven tube super-het.

E. R. Riker, 535 North Irving avenue, Scranton, Pa.

Q.—Please answer the following questions in regard to the hetduogen. Does tube W use a separate rheostat, and if so, what size rheostat do I need for tubes V, U, and X? If tube W does not use a separate rheostat what size rheostat do I need for tubes V, U, W, and X? I want to use jacks between tubes X, Y, and Z; do I need separate rheostats if I use jacks between these tubes? I have three unshielded audio transformers, and wish to know if they will work all right in this set?

A.—We have your letter of January 2. In hetduogen as built by the writer, tubes U and W are on one rheostat, while tubes V, X, Y, and Z are on another. It would be advisable to have a separate rheostat on tubes X, Y, and Z if you are going to put jacks between them. As built by the writer, there is a jack in the plate circuit of tube Y, and the jack in the plate circuit of tube Z is of the filament control type. Unshielded transformers might work in this set, but if you are going to use them we would advise the installation of but two stages of audio amplification. The use of three stages requires carefully shielded and unusually well designed transformers.

Resistance Coupling

Q.—The hetduogen as described in the December 27 issue sounds very good, and

I am impatiently waiting for next week's Digest. I am anxious to know if I can use resistance coupled amplification, as I have three stages of this type; or must this be the transformer style of coupling?

J. J. S., Boise, Idaho.

A.—We wish to advise that resistance coupled amplification can be used in the hetduogen and will probably give equal, if not better, results than the transformer coupled amplification shown. The three stages of resistance coupling will not give quite the volume that three stages of audio will, but there will be no tendency to howl and the output will be remarkably free from distortion. A hetduogen made with such coupling of the amplification should prove very satisfactory.

Q.—In checking over the hetduogen sub-panel layout and the wiring diagram as shown in figures 10 and 11, and then looking at the panel from the front as shown in figure 1, I find two rheostats, two jacks and one filament switch. The wiring diagram as shown in figure 2 has only one rheostat, one jack and no filament switch. Please advise whether this is an error or how there is this discrepancy.

W. A. F., Greensboro, N. C.

A.—The hetduogen hook-up shown in our December 27 issue, figure 2 was not the actual hook-up used. It was intended only for use with the explanation of the circuit given in that article, and all parts such as extra rheostats and C battery, were eliminated so that the essential features might be found as easily as possible. The actual hook-up and directions for wiring are contained in the January 17 issue, in figures 10 and 11, and will be found to agree with the front view as shown in figure 1.

Q.—I am not yet a subscriber for your magazine but I buy it regularly at the newsstand and have become very interested in the construction of hetduogen by C. E. Brush. Will you please give me an estimate of the cost of this set when complete, understanding that I buy all materials at regular list price? Will the set when completed be as efficient as the standard make five tube sets on the market?

H. D., Kankakee, Ill.

A.—We wish to advise that the cost of

the complete set of parts for the hetduogen at list prices is about \$75. Our opinion is this receiver will be just as efficient as any five tube set, and far more selective than most of them. The complete list of parts is in the issue of January 17.

Amplifier Tubes Used

Q.—Although the construction of hetduogen has been very carefully described in your magazine you have not as yet mentioned what tubes are to be used. I presume that the hard tubes are to be used in all sockets, but will appreciate your letting me know definitely on this.

K. L. B., Oklahoma City, Okla.

A.—As used by the writer, the amplifier tubes such as UV-201A or C-301A are used as detectors, oscillator and audio frequency amplifiers. 199 tubes may be used in place of the storage battery tubes, providing of course, that four volts is used at the A battery binding posts, but the volume will naturally not be quite as great as that to be expected from the larger tubes. The writer has not tried the WD tubes, but can see no reason why they would not work in this set.

Grounding Rotor Plates

Connect the movable plates of a condenser to the ground or filament side of the circuit and the effect of body capacity can generally be eliminated. The difference in the connections is more noticeable when weak signals are received. In the case of the antenna series condenser the rotary plates should be connected to the wire leading to the ground, and the stationary plates to the antenna.

Graining a Panel

To give a special grained finish to a Radio panel, place the panel securely on a table and stroke it lengthwise with fine sandpaper or steel wool. When all traces of the natural polish have been removed, brush the panel with a dry cloth, and finish by wiping with a clean cloth dipped in machine oil.

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CORNEWY ELECTRIC LABORATORIES
309 Fifth Avenue NEW YORK CITY

Friday, February 13

(Continued from page 13)

WGAE, Pittsburgh, Pa. (Eastern, 462), 6:30 p. m., dinner concert, William Penn hotel; 7:30, Uncle Kaysbee; 8:30, Viola Bulsker-Leonard, dramatic soprano; 9, concert, Astor Coffee dance orchestra.

WCAU, Philadelphia, Pa. (Eastern, 278), 6:30 p. m., Meyer Davis' Hotel Pennsylvania trio; 8, talk, Clara Zillesen; 8:10, recital; 9:15, dance music, Southland seven; 10:10, Southland seven dance orchestra.

WCCO, Minneapolis-St. Paul, Minn. (Central, 417), 10:45 a. m., home service, Betty Crocker; 2 p. m., woman's hour, Blind People's program, Edith Marsh, leader; 4, magazine hour; 5:30, children's hour, Court of Gold Medal; 6, sports talk; 6:30, dinner concert, Troendle trio; 7:30, lecture, Taxpayers' association; 7:45, lecture; 8, St. Paul-Minneapolis Real Estate board program; 9, "The F. & R. Family."

WCX, Detroit, Mich. (Eastern, 516), 4:15 p. m., musical program; 6, dinner concert, Book-Cadillac hotel; 7, musical program; 10-12, dance music, Finzel's Arcadia orchestra.

WDAF, Kansas City, Mo. (Central, 365.6), 3:30-4:30 p. m., Star's Radio trio; 6-7, piano tuning-in number on the Duo-Art; address, speaker, Kansas City Children's bureau; Tell-Me-a-lady; Trio; piano ensemble; 8-10, popular; 11:45-1 a. m., "Merry Old Chief" and the Plantation players.

WDAF, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., daily almanac; 12:02 p. m., Stanley theater organ recital; Arcadia cafe concert orchestra; 2, Arcadia cafe concert orchestra; 7:30, Dream Daddy's bedtime stories; 8, book review; Arnold Arboretum; 8:15, fifteen minutes of humor; Sam Winfield; 9:30, Stanley theater concert; 10-12, Arcadia cafe dance orchestra; Morning Glory club.

WEAF, New York, N. Y. (Eastern, 492), 4:10-4:25 p. m., French lesson, Columbia university; 4:40-5, children's stories; 6-7, dinner music, Waldorf-Astoria hotel; 7:30-7:45, children's stories; 8, Tinney comedy; 7:45-8:15, children's stories; 8:15-8:30, Happiness boys; 8:30-9, Hohner Harmony four; 9-10, B. F. Fischer's Astor Coffee orchestra; 11-12, Meyer Davis Lido Venice orchestra.

WEBH, Chicago, Ill. (Central, 370), 7 p. m., Oriole orchestra; Dan Russo, violinist; Ted Florito, celeste; musical bits, Riviera theater; 9, Rita McFawn, soprano; Oriole orchestra; Frederik Agard, tenor; 11, Three Musketeers, Oriole orchestra; songs, Nick Lucas.

WEBJ, New York, N. Y. (Eastern, 273), 7-7:45 p. m., Original Indiana five from the Cinderella ballroom; 7:45-8:15, Edith Law accompanied by Alice Law; 8:15-8:30, Victor Wilbur and Joe Maley; 8:15-9, Johnny Basilone and his Harlem Tea Garden orchestra.

WEI, Boston, Mass. (Eastern, 303), 2 p. m., Happy Hawkins and his Grand Garden's orchestra; 6:30, "Fire Precaution," Charles A. Donohoe; 7:15, James A. Watts, tenor; 7:30, A. E. Richardson interviewed by Otto Grow; 8, program, courtesy of the Neapolitan Ice Cream company; 8:30, U. S. Army band concert.

WEMC, Berrien Springs, Mich. (Central, 286), 9-9:20 p. m., old hymns, Radio Lighthouse choir; 9:20-9:30, Ruth Lee, soprano; 9:30-9:40, Ernest Hurd, tenor; 9:40-10, Bible chat, Orville Lunn.

WFAA, Dallas Texas (Central, 472.9), 12:30-1 p. m., address, Dr. Robert Stewart Hyer; 4:30-5, woman's hour; 6:30-7:30, vesper recital, Jack Gardner's Honey boys' orchestra; 8:30-9:30, Marcell Jones, tenor; Jenkins, reader; William E. McRaven, pianist.

WFI, Philadelphia, Pa. (Eastern, 395), 1 p. m., Meyer Davis Bellevue Stratford concert orchestra; 3, Caroline Hoffman, pianist; 6:30, Meyer Davis Bellevue Stratford concert orchestra; 7, Sunny Jim, the kiddies' pal.

WGN, Chicago, Ill. (Central, 370), 1:40 p. m., luncheon concert, Drake concert ensemble, Blackstone string quintet; 2:30, artists series, Lyon & Healy; 3, rocking chair time; 5:30, Skeezix time for the children; 6, organ recital, Lyon & Healy; 6:30-7, dinner concert, Drake concert ensemble, Blackstone string quintet; 8-9, Gunn School of music; 10-11, Don Bestor Drake dance orchestra; Phil Fleming, Vernon Ricks, jazz artists.

WGR, Buffalo, N. Y. (Eastern, 319), 10:45-11 a. m., Gold Medal home service talk, Betty Crocker; 12:30-1 p. m., Hotel Statler concert ensemble; 2:20-4:30, Radio Dealers' musical program, featuring Gladys Atwood; 6:30-7:30, dinner music, Vincent Lopez Hotel Statler dance orchestra, Harold Gleser, director; 8:15-8:55, recital by Agnes Luther, Tullis, contralto, and Mildred Daugherty Emery, pianist; 9-10, Astor House coffee program jointly with WFAF; 10-11, Larkin string orchestra, John Lund, director; 11:30, supper-dance music, Vincent Lopez Hotel Statler dance orchestra, Harold Gleser, director.

WGY, Schenectady, N. Y. (Eastern, 360), 2 p. m., health talk, Dr. C. Woodall; 6:30, Sunday school lesson; 7, program, Strand theater orchestra; 7:30, health talk; 7:45, "What Psychology Tests Do Not Show," Dr. Leonard C. Jones; 8, musical program; 9:15, Union League club dinner, speakers, Elihu Root, Harlan Fiske Stone, Charles Evans Hughes; 10:30, Greig night; "Medley of Grieg Melodies," WGY orchestra; "Album Leaf," "Scherzo," Ollie G. Yetter, pianist; "Nocturne," "Gavotte," American trio; "In a Boat," Matilda Bigelow Russ, soprano; "Menuett," orchestra; "I Love Thee," Matilda Bigelow Russ, soprano; "Four Norwegian Dance," orchestra.

WHAS, Louisville, Ky. (Central, 400), 4-5 p. m., Mrs. Charles Kansinger, soprano; 7:30-9, Jake Seligman and his Kentucky Nightingales; T. H. Graf, pianist.

WHO, Des Moines, Iowa (Central, 526), 2:15 p. m., "Why I Believe in Scouting," Rev. Mathieson; 7:30-9, Williamson Brothers; artists from Boone.

WIP, Philadelphia, Pa. (Eastern, 509.9), 1 p. m., Glimbel tea room orchestra; 3, Elwood M. Wagner, baritone; Matilde E. Eves, soprano; Harry A. Gildstein, violinist; 4, "White Australian Policy," Dr. Jas. P. Lichtenberger, University of Penna.; 6:05, songs, Joe Burke and Mark Fisher; 6:15, Harvey Marburger and his Vaudeville orchestra; 7, Uncle Wip's bedtime stories.

WJZ, New York, N. Y. (Eastern, 455), 12:15-1 p. m., Brick Church noon hour of music; 4-5, Charlotte Petrucci, soprano; Pasquale Rubino, tenor; 8:40-9, Helen Davis, banjoist.

WLS, Chicago, Ill. (Central, 345), 12-1 p. m., 4 Aces of Harmony; "Book Farmer" series, G. C. Biggar; "A Practical Poetry," George W. Kelley; 3:45-4:45, homemakers' hour; "Active Citizenship," Mrs. Walter Evans; "Preparation for the Baby," Ellen Rose Dickey; 6:30, Ralph Emerson, organist; 6:50, Senate theater studio; 7, lullaby time, Ford and Glenn; 7:15, Mark Oster Opera club; 8-9, Nubs Allan, contralto; Kenneth Clark, Hawaiian guitarist; Ford and Glenn; "John Turpin" series, E. C. Thiem; "Co-operative Marketing in Minnesota," George W. Kelley; "How the Bureau of Agricultural Economics Serves You," Earl B. Mallison; 9, Ben Ritzenthaler; 9:10, WLS theater presents "Mansions," one act drama; 9:30, Art Kahn's Senate Theater Synopators; 9:40, Ben Ritzenthaler; 10, Senate Theater Symphony orchestra; 10:10, Marquette Mandolin club; Rudolph Bryan's Marquette Banjo quartet; 10:30, Isher Jones and his College Inn orchestra; 10:40, Ford and Glenn time.

WLW, Cincinnati, Ohio (Central, 423), 8 a. m., physical exercises, Y. M. C. A., Wm. Stradman, instructor; 12:15 p. m., program, Delta Omicron sorority; 4, lesson in French, Madame Teulupidis, pupils of Leo Stoffregen in recital.

WMC, Memphis, Tenn. (Central, 503.9), 12 m., O. K. Houck Piano company; 8:30 p. m., Britling orchestra; 11, frolic, Lowenstein.

WNI, Newark, N. J. (Eastern, 233), 10:30-11 p. m., Frank Daily and his orchestra; 11-11:30, Wolfe Gilbert and company; 11:30-12, Original Dixieland band; 12-12:30 a. m., Frank Daily and his Meadowbrook orchestra.

WNYC, New York, N. Y. (Eastern, 528.8), 7:35 p. m., resume of meeting of board of estimate; 8:30, famous minstrels, United Societies of Holy Rosary church; 10, concert.

WOAW, Omaha, Neb. (Central, 526), 4 p. m., matinee program; 6, story hour, Doris Claire Secord; 6:20, music; 6:30, G. R.'s Radio orchestra, Angelo Lupo, director; 9, program, Original Music masters, Herb Fairman, Joe Havlicek, leaders; 10:30, orchestra, Brandels store restaurants.

WOC, Davenport, Iowa (Central, 463.6), 5:45 p. m., chimes; 7, songs, Val McLaughlin; 7:20, "Legislation and the Farmer," Judge P. D. Letts; 8, program, Rohlf trio.

WOR, Newark, N. J. (Eastern, 405), 2:45 p. m., Chester Sutta, violinist; 3, Allen R. Cullimore, lecturer; 3:30, Chester Sutta; 6:15, Bluebird orchestra; 6:30, man in the moon; 7-7:15, Bluebird orchestra.

WOS, Jefferson City, Mo. (Central, 409.9), 8-10 p. m., talent from Mexico district, J. J. Humphrey, director; address, Honorable William Job.

WQJ, Chicago, Ill. (Central, 448), 11-12 m., Sunday dinner menu, Ted Wilmus; 3-4 p. m., "Touring Europe with Mrs. Sanger," Mrs. Harry T. Sanger; "Style Talk," Dudley C. Palmer; 7-8, dinner concert, Ralph Williams and his Rainbo Garden orchestra; Leroy Trauger, baritone; Blanche E. Robb, pianist; Shepard Levine, tenor; 10-2 a. m., Ralph Williams and his Rainbo skylarks; Elsie Orr, soprano; Ann Burrows, accompanist; Rogers boys, Larry and Billy; Brock sisters, Julia and Ruth; West brothers; Nubs Allen, contralto; Lauretta Giles, soprano; Monogram trio; Nate Caldwell, pianist.

WRC, Washington, D. C. (Eastern, 469), 4 p. m., fashion developments of the moment, Eleanor Gunn; 4:10, Eleanor Glenn, pianist; 4:20, "Beauty and Personality," Elsie Pierce; 4:30, tea music, Meyer Davis' New Willard hotel trio; 6, children's hour, Peggy Albion.

WREO, Lansing, Mich. (Central, 288.5), 1-3 a. m., orchestra, special Pacific coast program.

TABLE FOR MAKING USE TIME TRANSITIONS

Eastern Standard Time	1	2	3	4	5	6	7	8	9	10	11	12
Central Standard Time	12	1	2	3	4	5	6	7	8	9	10	11
Mountain Standard Time	11	12	1	2	3	4	5	6	7	8	9	10
Pacific Standard Time	10	11	12	1	2	3	4	5	6	7	8	9

HOW TO USE. If a station is giving a program at 8 o'clock Mountain time and you wish to find what this is equivalent to in Central time, find 8 o'clock in the third of Mountain time row. Then immediately above it in the same vertical column will be found the figure 9 in the Central time row. This indicates that the program would be heard at 9 o'clock Central time.

WSB, Atlanta, Ga. (Central, 429), 12 m., entertainment; 5-6 p. m., bedtime story, Bonnie Barnhardt; garden talk, William B. Decker; 8-9, program, college; 10:45, Bernard and Robinson.

WTAM, Cleveland, Ohio (Eastern, 364.3), 6 p. m., Guy Lombardo's Royal Canadians orchestra.

WTAY, Oak Park, Ill. (Central, 250), 6:15-8 p. m., Black Cat orchestra; Al Melgard, organist.

WWJ, Detroit, Mich. (Eastern, 352.7), 8 a. m., setting up exercises; 9:30, tonight's dinner; 12:05 p. m., Jules Klein's Hotel Statler orchestra; 3, Detroit News orchestra; 6, dinner concert; 8:30, Detroit News orchestra; Anne Campbell, poet; Harry E. Parker, tenor.

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ELECTRICAL EQUIPMENT

How to Construct A. F. Transformers

Homemade Amplifier for Your Receiving Set

The first step in the construction is the two end plates. These are made up of either hardwood, hard rubber or any of the numerous insulating materials on the

WORKSHOP KINKS EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT
Radio Digest,
510 North Dearborn St., Chicago

market. If hardwood is used these should be cut 2 inches square and 1/2 inch thick. The center core hole should be drilled 7/16 inch in diameter and the two small holes are made with a number 30 drill.

It will be noted that the small holes are located differently in the two end blocks. The one side is for the primary and the other for the secondary wires. The edges of these holes should be well rounded to avoid chafing of the fine wire.

The end pieces are mounted on a bundle of core wires. The space between the end plates is 3 inches. Care should be taken to see that these core wires are kept perfectly straight and parallel. It is suggested that the wires be slightly moistened with oil to avoid rust.

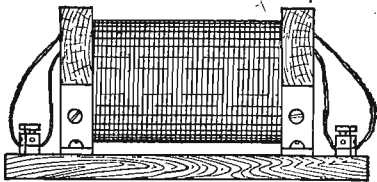
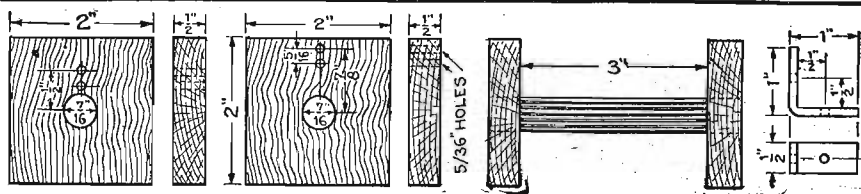
After the end pieces are properly spaced the core should be wrapped twice around with two layers of waxed paper. This should exactly fill the space between the end blocks in order to avoid short circuiting the wires on the core.

For convenience it would be advisable to let the core wires project from one end plate 1 inch. This will permit mounting in a lathe chuck, thus facilitating the coil winding. The supply spool from which the wire is unwound should rotate with a slight friction in order to avoid any tendency of spinning and thus accumulating an unnecessary length of loose wire. Care should be taken not to attempt winding too rapidly. Start slowly and gradually increase the speed as the work proceeds.

The primary winding should be wound in smooth consecutive layers until the diameter is 13/16 inch. In calipering this diameter the sharp ends of the calipers should not scratch or damage the insulation on the wire. Avoid all kinks in the wire. In fact a kink should be treated as a break and the two ends should be twisted together, soldered and then wrapped with a thin piece of silk.

The wire must be wound on evenly from end to end. This method of winding avoids any comparatively large differences of potential between layers. After the primary winding has been completed it should be tested with a milliammeter or galvanometer and a 6-volt battery. The ends of the primary winding should project

END BLOCKS ON CORE OF WIRES



through the two holes nearest to the core holes. It may be advisable to solder a heavier gauge wire to the ends of the coil in order to avoid a break.

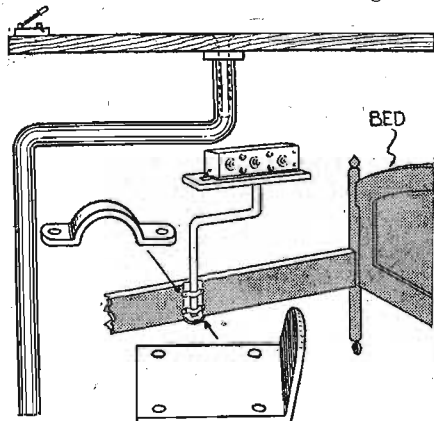
When the primary winding is complete two or three layers of paraffin paper should be wrapped around the primary winding to provide an insulation between the coils. The secondary coil is wound in the same manner to a diameter of 1 3/4 inches. The beginning and end should be reinforced with a heavier gauge wire and then led out through the end piece in the holes farthest out.

When the secondary winding is complete cover it with a layer or two of paraffin paper and then wind tightly with tape.

The complete coil is mounted on a wooden or fiber base plate and fastened in place by means of four angles as shown. The ends of the primary and secondary are secured to binding posts and marked in the usual manner.—J. Foubert, Cornwall, Ont.

For the Real Shut-in

All Radio tables to be used near or over the bed are constantly jarred along with the sick persons nerves by stumbling feet and careless bumps. The following is a



plan for a Radio set table that may be instantly removed without lifting or disturbance of any kind.

The top is of wood, long and wide enough to hold the set and any switches needed. The metal parts are all easily obtained from a plumber's supply store.

For the table illustrated a piece of three-ply bass wood was used.

Material List

- 1 Top 28 inches long, 15 inches wide and 3/8 inch thick.
- 1 1/2-inch iron pipe 42 inches long.
- 1 1/2-inch flat headed bolt 8 inches long.
- 1 piece of pipe that is large enough to just fit over the pipe used for the arm, 8 inches long.
- 2 iron straps of the proper size for the arm.

The arm may be made of one piece of pipe bent into shape or it may be made of short lengths put together with elbows. The holder which carries the arm is fastened to a wooden bed inside the side board with iron straps. If to be used

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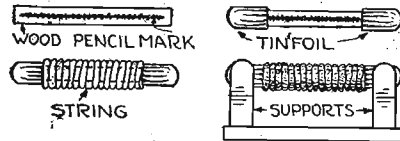
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Wood and Foil Make Cartridge Grid Leak

The grid leak shown is nothing but a stick of wood marked with a pencil, with tinfoil caps placed on the ends and bound with a piece of twine. In order to make this leak of a permanent value it is only necessary to paint the whole thing except



the very tips with a waterproof substance. This is the first homemade leak I have seen that can be mounted in the regular grid leak forms or supports.—J. Forman Smith, Sylacauga, Ala.

on an iron bed, fasten with bolted collar straps.

When properly constructed the top will turn and also the arm at the side of the bed. The set can be instantly swung out of the way.

The top should be stained and waxed and the iron parts enameled black.

In making the table adjust the measurements to individual needs and requirements.—Morey Studios, Ottumwa, Iowa.

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Type 499A—3-4 Volts, .06 Ampere with Standard Base Amplifier and Detector
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Questions and Answers

Hetduogen Filter Construction
(10706) HES, Pittsburgh, Pa.
I am building the hetduogen as described in Radio Digest Mr. Brush stated that ten different filters were constructed before the present one was adopted. I suppose it cost quite a lot of money and time to have perfected so wonderful a circuit. I do not wish to condemn the filter, but would it be possible to use three spider web coils wound on a 2-inch diameter core with 17 prongs? That is, one for the primary and two for the secondary with the special regeneration condenser mounted along side of the secondary?

A.—We have your letter of January 8 containing suggestions for the changing of the filter in the hetduogen. If you have ever wound spider web coils you must realize that to put 350 turns on a spider web form would require a spider web about 7 inches in diameter. Incidentally it would take more than 350 turns to get the same value of inductance on a spider web coil that one gets from winding 350 turns as wound in the filter shown. Of course the spider web could be kept of smaller diameter by using smaller wire, but the D. C. resistance would be so increased that any possible advantage gained from the low loss method of winding would be more than offset.

We really feel that in this case a spider web filter is out of the question, but we feel that the honeycomb coils of 400 turns might be used one for the primary and two for the secondary.

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Hetduogen
(11317) CBW, Kansas City, Mo.
In the December 27 issue the article on the hetduogen has started. If the succeeding articles necessary to build this are to extend over several issues at what cost may I obtain sufficient data to enable me to build at once. In your reply will you kindly advise me at once if the unusual amount of regeneration makes this set noisy. You know regeneration has been abandoned in a number of cases on account of noise.

A.—We have your letter of the 26th relative to hetduogen receiver. It is not regeneration itself which makes a set noisy. Regeneration reduces the resistance of the tuning circuit and so increases the sensitivity of the set and the result is that the static over a very great range is brought in which increases the noise in the head phones. The same result is to be noted when operating a super-heterodyne.

Adding Radio Frequency

(11316) FHH, Brecky, Sask., Can.
Some time ago I asked about adding Radio frequency to my receiving set. I might say that my receiving set is a Westinghouse Radiola IIIA.

A.—The best answer we can give to your question is to write to Mr. S. W. Goulden of the Radio Corporation of America, 233 Broadway, New York city. He will be glad to advise you on any additions to be made to Radiola receiver.

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Limited Range
(10688) EEE, Mead, Neb.
I cannot reach high wave lengths with my three circuit regenerative receiver. My aerial is four wires each 22 feet long and 40 feet high. The trouble lies in the length of my aerial, because the same set on my former aerial reception was best on high wave lengths. I cannot change my aerial because of local interference and obstacles so it cannot be lengthened. Is there any way of equipping my set so high wave lengths may be reached? Which is the most simplest way?

Also, I am using two metal pipes as masts for the aerial, must they be grounded?

A.—The additional wires in your antenna system should be eliminated for they reduce the efficiency of the set. The overall length of antenna system is inclusive of lead-in and ground lead of the single wire. This should be properly insulated from its supports, which are not necessarily grounded.

We are suggesting that you connect a 35 or 50-turn honeycomb coil in the grid lead of your secondary circuit to permit of reception on high wave lengths.

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Interference from Neighbors
(11314) MOR, Kalamazoo, Mich.
By accident I discovered that the vibrations from a battery charger make a constant hum in the receiver. After several experiments I found that the vibrations from the battery charger in the neighborhood can spoil the night's entertainment for the whole neighborhood.
Having seen nothing in your paper about this, I thought it wise to call your attention to it. The only remedy I see for it at present is to educate the neighbors not to recharge their batteries during Radio broadcasting hours.

A.—In order to overcome the trouble which you report as resulting from the operation of a battery charger in your neighborhood during broadcasting hours, we suggest that you persuade the person or persons operating the charger to erect a wire screen around it and ground the screen, also connect two good quality .5 mfd. fixed condensers across the A. C. line in series and ground the center point. This will do away with much or all of the annoying hum which you have experienced.

Men to build radio sets in spare time. Leon Lambert, 501-H Kaufman Bldg., Wichita, Kansas.

It's your money and you can spend it for tubes or batteries if you want to; but I can show you how to bring distant stations in on a simple crystal set. Same plans increase range of tube sets also. Copyrighted plans \$1.00. Complete parts for long distant crystal sets \$5.00. Leon Lambert, 501 Kaufman Bldg., Wichita, Kansas.

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