

October 15, 1925
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RADIO PROGRESS

Reg. U. S. Pat. Off.

*'Always Abreast
of the Times'*

SHOW NUMBER

Why the Straight Line Condenser?

By HORACE V. S. TAYLOR

Reflexing a Loop Set

Nine Noises in Radio

From Hospital to Stage

A and B Broadcasting Stations

Radio in the Biggest Cathedral

YOU WILL UNDERSTAND THIS
MAGAZINE---AND WILL LIKE IT

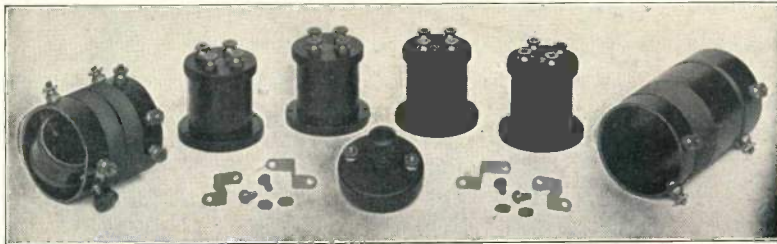
A New England Publication

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A SURE FIRE

SUPER-HETERODYNE KIT

**A
Superadio
Product**



**A
Superadio
Product**

**SUPERADIO KIT, \$17.⁵⁰
SUPERHETERODYNE K**

MATCHED TRANSFORMERS—TUNED INPUT

EASY TO BUILD

EASY TO OPERATE

UNSURPASSED DISTANCE VOLUME AND SELECTIVITY

WONDERFUL TONE

Kit Consists of:

- 1 Antenna Coupler**
- 1 Oscillator Coupler**
- 1 Special Variable Condenser**

- 1 Tuned Input Transformer**
- 3 Matched Intermediate Transformers**
- Hardware for Mounting Couplers**

**Booklet, With Diagrams and Full Layouts
and Information**

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Cambridge, Mass.

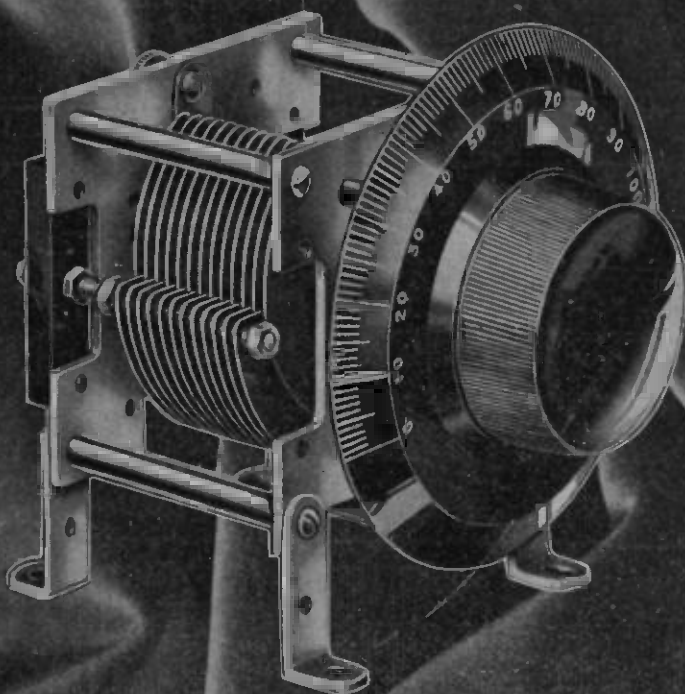
Sales Representatives:

Martin, Hartley and Foss Co.

99 Bedford Street, Boston, Mass.

NATIONAL

**VELVET CONDENSERS
VERNIER AND DIALS**



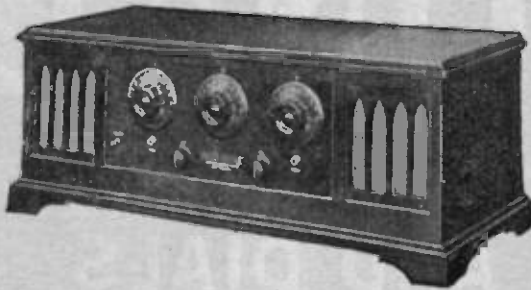
Made by the NATIONAL COMPANY, INC.
Exclusive Manufacturers of
**The NATIONAL
Browning-Drake TRANSFORMER**

Write for Bulletin 106 R. E.
NATIONAL COMPANY, INC., 110 Brookline St., Cambridge, Mass.



RICO-DYNE DE LUXE SET

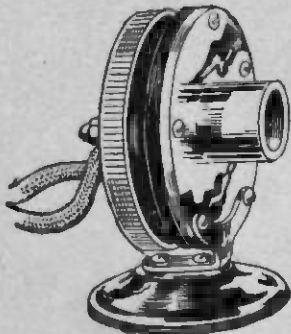
(HAVING NEW STRAIGHT-LINE RADIO FREQUENCY CONDENSER)



Type B
De Luxe

\$75

Beautiful in appearance and still more beautiful in performance. Mahogany cabinet of classic design. Uses 5 UV201 A tubes with storage battery or UV199 tubes with dry cell batteries. There is room for the dry cell batteries in the cabinet. The De Luxe model contains a loud speaker with the famous MELOTONE Unit, which gives remarkably clear and loud reproduction. Sensitive, selective, non-oscillating. A tuned radio frequency set of the highest order at a remarkably low price.



ADJUSTABLE

MAKE FULL USE OF YOUR PHONOGRAPH MELOTONE — "None Better"

Adjustable phonograph unit
makes your phonograph
a perfect loud-speaker

\$7.50

The Melotone Has All the Qualities of the \$10 to \$12 Units



THE NATION'S FAVORITE HEADSET

RICOPHONES — The Headset of Real Value

There is more quality, real honest-to-goodness quality packed into RICOPHONES than you'll find in any headset at twice its price! Compare and see.

\$2.75

Manufacturers of the famous "RICO" straight line condensers, at \$1.75 each. The "Tropadyne" circuit is supplied free with every tuned "Tropaformer" that we manufacture for all long wave transmission. "Tropaformers" \$6.75 each. Dealers—write or wire for wonderful proposition.

RADIO INDUSTRIES CORPORATION,
131 DUANE ST., NEW YORK CITY.

Gentlemen: I am enclosing \$..... for the items checked below. Kindly ship at once.

..... RICO-DYNE DE LUXE SET, \$75.

..... MELOTONE UNIT, \$7.50.

..... RICOPHONES, \$2.75.

My Dealer is

NAME

ADDRESS

CITY

RICO

for all
Long Wave
Circuits

RICO Products on this Page Will Improve Your Radio 100% TROPAFORMERS



The sensitivity, selectivity and volume obtained in all types of long-wave circuits depends entirely upon the intermediate frequency transformer. TROPAFORMERS have been specifically designed to meet the new scientific requirements of long-wave circuits. The TROPAFORMER combines transformer and condenser. The condenser is shunted across the secondary winding of the transformer, and by its use the transformer may be tuned to any definite wave length between 3,000 and 9,500 meters. Only in TROPAFORMERS will long-wave circuit users find these advantages, and these advantages are patented for TROPAFORMERS exclusively!

\$6.75

Free Hook-up of the Famous Tropadyne Circuit with Each Tropafomer Ordered.

DID YOU EVER BUILD A SET THAT GOT "COAST TO COAST"?

You Can with the RICO-DYNE 5-Tube Auto-Balanced
Cellu-Weld Tuned Radio Frequency Kit

\$38.75

Complete Knockdown Set as illustrated with full instructions how to build this marvelous set within a few hours.

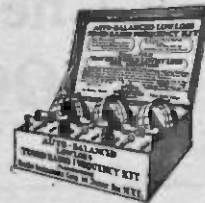
Greatest Radio Value in History—This is What You Get:

1—Pair Ricofones. 1—Genuine Bakelite Front Panel, completely drilled and engraved. 1—Genuine laminated Bakelite Sub-Panel—with sockets already mounted. All mounting holes properly drilled. 3—Auto Balanced Tuned Radio Frequency Units—perfectly matched and balanced. 3—Beautiful 4-inch Dials. 1—Variable Grid Leak and .00025 M.F. Condenser. 1—4 to 1 Audio Transformer. 1—2 to 1 Audio Transformer. 1—.002 Fixed Mica Condenser. 1—.006 Fixed Mica Condenser. 2—Single Circuit Jacks. 1—Filament Control Switch. 1—30-ohm Rheostat. 1—10-ohm Rheostat.

FOR THOSE WHO WANT TO BUY ONLY THE RICO-DYNE KIT

HERE IS JUST WHAT THEY WANT:

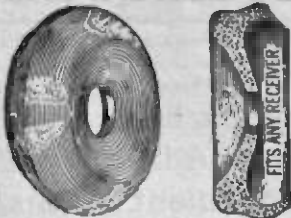
It seems unusual that with the tremendous volume, selectivity and distance-range of the Rico Auto Balanced set, it should be so simple to construct. Yet, nevertheless, this is true. We have letters from fans who tell us that they constructed their Rico set within a few hours. The plans which accompany the Rico Kit are so simple that we believe this is so. Any beginner need only to read English in order to construct the Rico set. This Kit contains 3 Auto Balanced Tuned Radio Frequency Condensers, Inductance Units, factory matched, book of instructions and drilling template. You can't go wrong!



\$16.50

RICO-DYNE HAS SET
NEW RECORDS IN RADIO!

for
bliss!



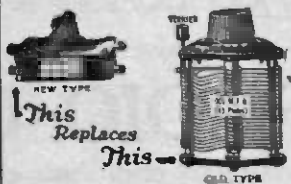
SPONGE RUBBER

RICO FONEKUSHIONS

You'll know what real ear-phone comfort is when you use RICO FONEKUSHIONS. They are made of soft, pure sponge rubber, and fit any make of headphone. They are like soft, downy pillows for your distance-seeking ears.....

50c

for
better
tuning



This
Replaces

This

RICO STRAIGHT LINE CONDENSERS

In the old days, folks used horses. Now they can get as much power out of one auto as from 40 horses. It was all right, too, a few years ago, for folks to use the old-time condensers, but now, since Rico brought forth the RICO STRAIGHT LINE CONDENSER, which occupies two-thirds less space than the ordinary mesh plate type, everyone modernizes his set with the RICO STRAIGHT LINE CONDENSER.

No. 411—.00025 mfd.\$1.75
No. 423—.0005 mfd. 1.75
No. 450—.001 mfd. 1.75

Inclusive with Dials. Without Dials, \$1.50.

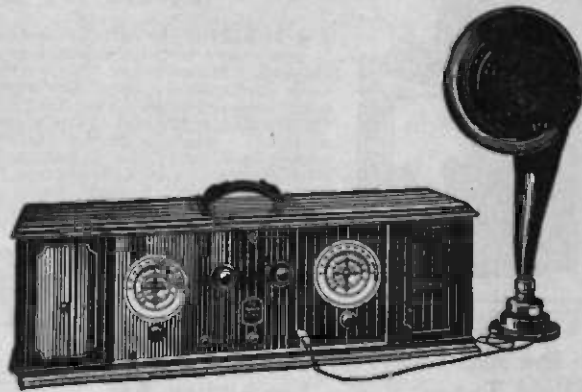
Each of these
Rico products
means added
pleasure and
value to your
Radio Set.

If Your Dealer Cannot Supply You—Use This Coupon. No Money Down!

RADIO INDUSTRIES CORPORATION
131 Duane Street, New York City

Please send me C. O. D. the following:Tropafomers, \$6.75Straight Line
Condensers, \$1.75Ricofones, \$2.95Oscillating Coil, \$3Fonekushions, 50c
.....Melotone Attachment, \$7.50.

NameAddress.....



Which is Better—

**A Cheap Set for Cash---or
A GOOD Set ON TERMS ?**

The Good Set is Cheapest in the End

Bay State specializes on the better grade sets, like Radiola, DeForest, Adler Royal, Magnavox, and sells on **Convenient Terms.**

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Extracts from a Few of the Many

LOVE LETTERS

FROM THE READERS OF "RADIO PROGRESS"

And Not One of Them Solicited

"The style of your magazine and its motto are so good."

F. J. PORTER,
U. S. Patent Office, Washington.

"Your Mr. Taylor is the only writer whose work has been so clearly worded that I could get the idea with little effort. 'More power to him.'"

B. W. PERCIVAL, Lynn, Mass.

"We like RADIO PROGRESS, but don't see enough of it!"

H. S. FRAINE,
of Doubleday, Page & Co., N. Y.

"Your magazine gives so much on the fundamentals of radio that I have decided to subscribe for it. Most people depend on this magazine to keep them instructed on the subject about which the publication deals. Very few buy books. I appreciate it very much and hope it will grow large."

DR. J. S. CANTRELL,
Proprietor Snowwhite Eggfarm, Carthage, Mo.

"I like RADIO PROGRESS because its articles are clear and concise, especially those of H. V. S. Taylor."

A. A. CONSTEIN,
Ph. G., D. D. S., Upper Sandusky, Ohio.

"RADIO PROGRESS is the most interesting radio magazine I have yet seen, and strikes a happy medium between being too technical and ignoring technical explanation altogether. May 'you live long and prosper.'"

(Dr.) M. S. DELAND,
State Hospital, Topeka, Kan.

"Your magazine has a very pleasing presentation of its subjects without too much technicality, and understandable."

A. J. WERTZEL,
Vice. Pres. United States National Bank, Superior, Wis.

"Enclosed find 50c. for copies Nos. 9, 10 and 11 of RADIO PROGRESS to COMPLETE MY FILE, as I missed them while on my vacation."

FRANK HANUS, Cleveland, Ohio.

"I like your magazine very much and hope you will keep up the good work in publishing such clean cut articles."

E. T. LEWIS,
Baltimore, Md.

"Interest in your progressive little magazine as well as the desire to obtain the special hook-up number of Jan. 15th has prompted me to enclose," etc.

CORLISS GALLOGLY,
Alden, Minn.

"I like your magazine very much."

JOHN GILLMAN, Long Island City, N. Y.

"While your magazine may not have the bulk of some of your contemporaries the subject matter is excellent, being clearly written and accurate."

E. J. WAGNER, Chicago.

You Radio Manufacturers

Who want to advertise where you can make the largest sales for the smallest expense will never do it until you advertise in RADIO PROGRESS

There are more than 20,000 other readers like those above who are awaiting your announcements.

RADIO PROGRESS

8 TEMPLE STREET

PROVIDENCE, R. I.

RADIO PROGRESS

HORACE V. S. TAYLOR, EDITOR

Volume 2

Number 15

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OCTOBER 15, 1925

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New York Representative

SHELDON C. KNIFFIN.....503 Fifth Avenue, New York—Phone Murray Hill 3149

Western Representative

W. T. DIEHL.....30 North Dearborn Street, Chicago—Phone Central 5410

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The publishers of this magazine disclaim all responsibility for opinions or statements of contributors which may at any time become subject of controversy.

A Lot of Entertainment for 15c

Everybody talks about "Modulation" these days. That is one of the pet phrases in describing the super-power waves, for instance. What does it really mean and how is it measured? A good article on this subject is written by Sadenwater in our next (November 1) issue, **"What Do You Mean by Modulation?"**

Most of us think of the Red Cross in terms of the late war. However, they are carrying on right now and they have pressed radio into service. You will want to know about the campaign they will conduct later on this fall. An interesting article by Griesemer, **"Radio on the Job as Nurse,"** will give you the details.

Arnold's **"Latest Styles in Switchboards"** has a lot of interesting information about a new kind of board which is used in supporting the instruments in radio sending stations. Your electric light company, too, is probably considering this development, as it is being used by all sorts of electrical companies.

The big cry at this time is for selectivity, which will pick up distance even when your local broadcasters are on the air. If your present set does not tune out the nearby stations the way it ought to, you will find this construction write-up a great advantage to you. See **"A Sharp Super-Selector Circuit,"** by Marx.

The tuner is what brings in the station you want to hear and keeps out all others. Many of these units have too much wire in them. How many turns should be used for best results? This subject is discussed at length with diagrams by Taylor in **"How Much Wire on Your Tuner?"**

It is not always the biggest stations that are heard farthest. There is one broadcaster with only moderate power located in the eastern part of the United States which has been heard for nearly half way around the globe. Some fascinating facts about the equipment and personnel of this little giant is described in **"A Small Station with a Big Voice,"** by Vance.

The aerial is the dragnet which pulls in everything you want to hear. How many antennas are not all that they should be, and so waste the goodness of an expensive set? How to erect an antenna that will be a credit to your set is told by Standiford in **"Putting Up a First-Class Aerial."**

Parker is one of the patent lawyers who is not dull and dry. He has described a recent case of a tube which for patent reasons was suppressed by the government. See **"Rolls Royce Tubes Can't be Bought"** in our next issue.

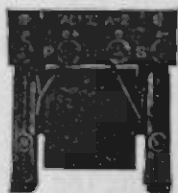
The Two Outstanding Parts In Radio !

Give Low Losses and Amplification Without Distortion to Any Set

QUALITY and distance are what a radio set must give. To insure Quality, amplification without distortion is essential. And to insure Distance, low losses are essential. That is radio in a nutshell.

People in whose sets Acme Transformers are used, are sure of hearing concerts "loud and clear" so a whole roomful of people can enjoy them.

The Acme A-2 Audio Amplifying Transformer is the part that gives quality. It is the result of 5 years of research and experimenting. It gives amplification without distortion to any set. Whether you have a neutrodyne, super-heterodyne, regenerative or reflex, the addition of the Acme A-2 will make it better.



Acme A-2 Audio Frequency Amplifying Transformer

To get the thrill of hearing distant stations loud and clear, your set must have low losses, for it is low losses that give sharp tuning to cut through the locals, and it is low losses that allow the little energy in your antenna to come to the amplifier undiminished. That's what the Acme condenser will do for any set. And it will do it for years, because the ends can't warp, the bearings can't stick and the dust can't get in and drive up the losses several hundred per cent.

The Acme Reflex (trade mark) owes its success and its continued popularity to these two outstanding parts in the radio industry, for low losses and amplification go hand in hand.

Use these two parts in the set you build. Insist on them in the set you buy.

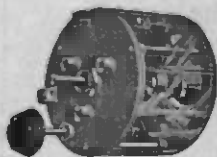
Send 10 cents for 40-page book, "Amplification without Distortion"

WE HAVE prepared a 40-page book called "Amplification without Distortion." It contains 19 valuable wiring diagrams. In clear non-technical language it discusses such subjects as Radio Essentials and Set-building; How to make a loop; Audio frequency amplifying apparatus and circuits; Instructions for constructing and operating Reflex amplifiers; How to operate Reflex receivers; Antenna tuning circuits for Reflex sets; "D" Coil added to Acme four tube reflex; "D" coil tuned R. F. and Reflex diagrams; and several more besides. It will help you build a set or make your present set better. Send us 10 cents with coupon below and we will mail you a copy at once.

ACME APPARATUS COMPANY

Transformer and Radio Engineers and Manufacturers
DEPT. (AS), CAMBRIDGE, MASS.

SEND THIS COUPON



Acme Low-Loss Condenser

ACME APPARATUS COMPANY,
Dept. (AS), Cambridge, Mass.

Gentlemen:—

I am enclosing 10 cents (U. S. stamps or coin) for a copy of your book "Amplification without Distortion."

Name

Street

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

ACME ~ for amplification

RADIO PROGRESS

"ALWAYS ABREAST OF THE TIMES"

Vol. 2, No. 15

OCTOBER 15, 1925

15c PER COPY, \$3.00 PER YEAR

Brooklyn Second Annual Radio Exposition OCTOBER 17 to 24, 1925

Twenty-third Regiment Armory

Atlantic and Bedford Ave., Brooklyn, N. Y.

THE presentation of Brooklyn's Second Annual Radio Exposition this year gives evidence of the willingness on the part of local manufacturers, distributors and dealers to take an interest in the project and to further better relationship in the Radio industry.

The Management, under the guidance of Mr. Stephen T. Rogers, Managing Director, has endeavored to bring the manufacturer, distributor and dealer together so that they might meet under one roof, and thus give the radio buying public of Brooklyn an opportunity to see, hear and decide what radio receiving set or radio apparatus it should purchase to the best possible advantage.

The success of this Exposition, and any future ones which may be held in Brooklyn, is just as vital to the exhibitor as it is to the management, and so it is the sincere wish of everyone connected with this venture that the visitors who intend to buy radio this year give preference to those concerns who are here, ready and willing to serve prospective purchasers.

Consistent with the policy of the management to give Brooklyn, Queens and Long Island an opportunity to share in the educational and financial value of this Exposition, they have planned and brought to realization some very unique features, among which are:—

1.—A contest conducted by the Brooklyn Daily Eagle which will give, during the course of this Exposition, \$500 in gold, and radio sets valued at over \$3,000, contributed by some of the Exhibitors of the Exposition. These prizes will be given to the winners in the puzzle contest, which began on September 26 and continues daily.

2.—An amateur set building contest, conducted by the Brooklyn Daily Times, which has brought to this Exposition hundreds of home made sets and thus gives the young people of Brooklyn an opportunity to show how capable they are in building radio receivers. Prizes have been offered and will be awarded during the week of October 17 at the Exposition. This contest created intense interest and awoke a desire in many boys and girls to build their own sets.

3.—The erection of an up-to-the-minute broadcasting booth on the floor of the Exposition, so that anyone may see how broadcasting is conducted in the studio and may meet the leading announcers and radio stars.

4.—The exhibition of a model radio factory, so that the prospective purchaser may see how a set is assembled and the many fine points connected with the building of such an instrument.

5.—The offering to the visitors of prizes valued at many thousands of dollars. Among some of these prizes are radio sets manufactured by the Thermiodyne Corp., Marwol Manufacturing Company of New York, the Kismet Company, the Columbia Mantel Company, the DeForest Radio Corporation, Eagle Neutrodyne Receiver, loud speakers, batteries, phones, etc. Individual prizes are to be offered by some of the Exhibitors. The total of these prizes will probably reach about \$5,000.

6.—The building of a special loud speaker, hanging in the center of the Armory. This speaker took four weeks to construct and is a sample of what fine work can be done in radio. It was built for the Exposition by the Herzog Radio Corporation of 722 Atlantic Avenue, Brooklyn, N. Y.

..Program..

SATURDAY, OCTOBER 17

- 2:30 p. m.—Exposition formally opened by Borough President Joseph A. Guider.
 3:30 to 4:30 p. m.—Special program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 7:00 to 8:00 p. m.—Reception by local distributors to their dealers.
 8:30 to 9:30 p. m.—Special program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 9:30 to 10:30 p. m.—Entertainment by the Oracle Entertainers.

MONDAY, OCTOBER 19

- 2:30 to 3:30 p. m.—Dealers' hour.
 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 8:00 to 8:30 p. m.—Reception to prominent announcers, radio and stage stars.
 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 Dinner at the Hotel Commodore for Thermiodyne dealers by the Pyramid Motor
 Equipment Corporation representing the Thermiodyne Corporation of New
 York.

TUESDAY, OCTOBER 20

- 2:30 to 3:30 p. m.—Dealers' hour.
 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 4:30 to 7:00 p. m.—Demonstration by radio set manufacturers in the demonstrating room.
 8:00 to 8:30 p. m.—Reception to invited guests at the booth of John W. Weber, Jr.
 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 Entertainment by the Oracle Entertainers.
 9:30 to 10:30 p. m.—Announcement by the management of prize winners.

WEDNESDAY, OCTOBER 21

- 2:30 to 3:30 p. m.—Dealers' hour.
 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 4:30 to 7:00 p. m.—Demonstration by radio set manufacturers in the demonstrating room.
 8:00 to 8:30 p. m.—Special reception to well known celebrities, radio, stage and screen stars. Cour-
 tesy of Keane and Scott.
 Entertainment by the Oracle Entertainers.
 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
 9:30 to 10:30 p. m.—Announcement by the Management of the prize winners.

Program--Continued

THURSDAY, OCTOBER 22

- 2:30 to 3:30 p. m.—Dealers' hour.
- 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 4:30 to 7:00 p. m.—Demonstration by radio set manufacturers in the demonstrating room.
- 8:00 to 8:30 p. m.—Reception by the management to public officials.
- 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 9:30 to 10:30 p. m.—Announcement by the Management of prize winners.

FRIDAY, OCTOBER 23

- 2:30 to 3:30 p. m.—Dealers' hour.
- 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 4:30 to 7:00 p. m.—Demonstration by radio set manufacturers in the demonstrating room.
- 8:00 to 8:30 p. m.—Entertainment by the Oracle Entertainers.
- 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 9:30 to 10:30 p. m.—Announcement of winners of the Brooklyn Daily Eagle contest. Announcement by the management of the prize winners.

SATURDAY, OCTOBER 24

- 2:30 to 3:30 p. m.—Dealers' hour.
- 3:30 to 4:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 4:30 to 5:30 p. m.—Demonstration by radio set manufacturers in the demonstrating room.
- 8:00 to 8:30 p. m.—Reception to contestants in the Brooklyn Daily Times contest at the Times Booth.
- 8:30 to 9:30 p. m.—Program by Station WAHG, Grebe & Co., Richmond Hill, N. Y.
- 9:30 to 10:30 p. m.—Announcement of winners in the Brooklyn Times contest, final announcement by the management of prize winners.

DIRECTORY OF EXHIBITS

List of Exhibitors, Second Annual Radio Exposition, Brooklyn, N. Y., October 17 to October 24, 1925:

A		B	
Name	Booth	Name	Booth
Adapto Cabinet Company	19	Batteryless Radio Corp.	60
American Bosch Magneto	17	Battery Sales and Equipment Co.	168-169
American Mechanical Laboratories	212	G. Boissenault Co., Inc.	50
Amplion Corp. of America	18	Borough Hall Radio Company	161
F. A. D. Andrea, Inc.	101	Brooklyn Citizen	143
Atwater Kent Mfg. Co.	110	Brooklyn Daily Eagle	131
		Brooklyn Daily Times	173-177, Inc.
		Brooklyn Standard Union	167

C	
Name	Booth
E. P. Campbell	192-7, Inc.
Cardwell Manufacturing Company	130
Claratone Manufacturing Corp.	40
Columbia Mantel Company	132
Corwin Radiophone Sales Co.	136-137

D	
Name	Booth
De Forest Radio Corporation	124
Dictograph Products Corp.	123

E	
Name	Booth
Epom Corporation	214
Experimenter Pub. Co.	118-119

F	
Name	Booth
Chas. Freshman Co.	170
Funk & Shore	128

G	
Name	Booth
Carod Manufacturing Corporation	140
A. H. Grebe & Co.	30
David Grimes Corporation	39

H	
Name	Booth
Hayes Products Corporation	127
Herzog Radio Corporation	121

J	
Name	Booth
A. Jenkisson	138

K	
Name	Booth
Kelly & Phillips	104
Roger C. Kennedy	217
Kodel Mfg. Corp.	19
A. Kueger	147-8

L	
Name	Booth
Liberty Electric Corp.	123

M	
Name	Booth
Magneto Repair Company	205
Marko Storage Battery Company	90-100
Marwol Manufacturing Corp.	91-94, Inc.
Masterench Corp.	102
McPhilben Radio Corp.	123-124

N	
Name	Booth
A. I. Namm & Son	171
Nassau Radio Mfg. Corp.	20
New York Journal	45-57
New York Times	113-114

P	
Name	Booth
Philco Storage Battery Company	111
Pooley Cabinet Company	110
Premier Radio Corp.	129
Priess Radio Corp.	101
Pyramid Motor Equipment Corp.	208-9

R	
Name	Booth
Radio Progress	162
Radio Sun Publishing Co.	221-22
Rossiter & Company	67-77

S	
Name	Booth
Sattler Tool Company	206
G. J. Seedman Automotive & Radio, Inc. ...	30-40
Sherman Manufacturing Company	218
M. B. Sleeper	207
Speednut Sales and Service Co.	215
M. Spingarn	223
Splittorf Electric Co. of N. Y.	130
Star Equipment Company	116-117

T	
Name	Booth
Thermiodyne Radio Corp.	208-11, Inc.
Tollner Electric Company	106-7-8-9
Tower Mfg. Co.	103
Twentieth Century Radio Corp.	130-140

U	
Name	Booth
United Radio Service	163

V	
Name	Booth
Valley Electric Company	133-34
Victory Electric Supply Co.	101-111
Volton Battery Company	126

W	
Name	Booth
John W. Weber, Jr.,	17-20, Inc.
E. A. Wildermuth	110-120

Y	
Name	Booth
Y. M. C. A.	86-87-96-97

"A" and "B" Broadcasting Stations

High Standard Set by Government on Their Operation

By VANCE

WHEN someone slaps you on the back and asks you how you are, you may reply, "O, I am feeling A." By this you mean that you are in the very best condition. But a broadcasting station classed as "A" is not in the first rank.

The government, through the Department of Commerce, has divided all the senders into two groups, "A" and "B." It is quite interesting to see what the requirements are for each and what ad-

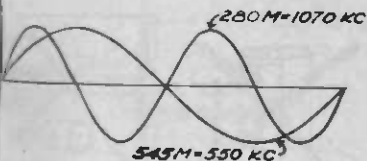


Fig. 1. This is the Range of "B" Stations. The Relative Size of Power is Shown.

...vantage to the operator there may be in changing from one to the other.

No License Needed to Build

As a matter of fact, the present radio law does not require a license or permit if you want to erect a radio station. However, when your apparatus is all assembled and the aerial is up, you can not make use of it until you get a license from the department.

To be exact, section 1 of the Act to regulate radio communication, dated 1912, requires a license for radio stations used for the transmission of signals whose effect extends beyond the State in which they are made, or where interference would be caused with the receipt of messages or signals sent from outside the state.

As a matter of fact, that last clause refers to any sending station even one which can transmit for only a block. You see someone within that radius might be listening to a program from

far away and in that case would be disturbed by the interference.

Permission for Reports

At present what is called limited commercial licenses are issued for broadcasting stations for sending out U. S. Government reports, such as market and crop estimates and weather forecasts, sermons, news, entertainment, lectures, and such matter. If you desire to broadcast the Government reports, permission to do so must be obtained from the Chief of the Bureau of Agricultural Economics and Chief of the Weather Bureau, Department of Agriculture, and when the Department of Commerce is informed by these bureaus that this authority has been granted, such authority will be incorporated in the license.

The rules require that broadcasting stations are to be operated by a person holding a commercial second-class license or higher. This operator must listen in all the while the transmitting station is sending, in order to receive any notice of interference being caused by the operation of the transmitting station.

Supervisor of Radio, of the particular District in which the station is located. This application is sent in after the equipment is all erected and ready for operation. Then the supervisor sends an inspector to look over the plant and if everything is according to rule, the Department may issue permission to broadcast on a certain assigned wave frequency.

However, it is not at all sure that any more stations in a given locality will be able to get their wave. Indeed, the Bureau has recently been sending out a letter to those thinking of putting up new stations which contains a paragraph as follows:

Every Wave is Taken

"Should you contemplate the erection of a broadcasting station, the Department considers it advisable that you be informed as to the wave situation. At the present time all of the broadcasting waves are assigned and in use and should you erect a station no assurance can be given you that a wave assignment will be available for use by your station."

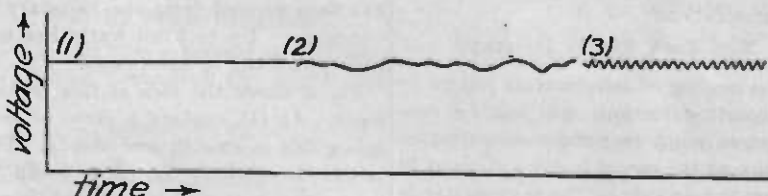


Fig. 2. The Large Station Must Have Power Like (1); Irregularities Like (2) and Commutator Ripple (3) Are Barred

Preventing Jam for SOS

Another thing, if an SOS call from a ship in distress is put on the air, the instant it is heard the broadcasting station must shut off its power so that it will not jam the distress call and prevent its being heard by other ships who might go to the rescue.

In order to get permission to send, it is necessary to apply for a license to the

When a license is issued it runs for only a year after which it must be renewed. This provision is a wise one and allows the Government to keep a restraining hand on the activities of the senders. If they have been on the ragged edge of breaking the law, it may be hard for the Department to convict them and take a license away, but when the year is up it is a simple matter to

refuse to renew the license unless the offending station shows evidence that it will reform.

They Cannot Charge for Broadcasting

Stations which do broadcasting are not in the same division as those which send out code messages. In the first place, broadcasting stations are not open to public service and are licensed only for a specific service as defined in the license. Senders of this class must not transmit to, or accept public messages from, other stations. No rates or payments are authorized.

Licenses of this class are required for all transmitting radio stations used for broadcasting news, music, lectures, church services, Government reports, and such matters, and do not permit the

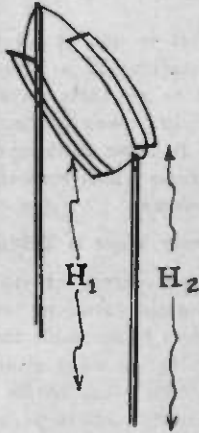


Fig. 3. Aerials Must be Guyed so They Will Not Swing Like This

transmission of private or commercial communications.

May Read Special Telegrams

The reading of telegrams or letters by broadcasting stations will not be construed as point to point communication so long as the signer is not addressed in person and so long as the text matter is of general interest.

It's too bad in a way that this exception is made. Probably you have been annoyed from time to time with the lengthy reading of telegrams from Tom, Dick, and Harry, all saying about the same thing—"Concert coming in fine. Modulation perfect." However, the good sense of the studio directors has largely ruled out this annoyance. No testing or experimenting is authorized in broadcasting stations between the hours of 10 a. m. and midnight, local standard

time. Furthermore, if a sender interferes with the reception of time signals or weather information by marine service, it must remain silent while such signals are being transmitted.

Small Power, Fast Wave

There are two different kinds of broadcasters as we have noted. The smaller, or weaker is called the Class "A" and the larger "B." Class "A" licenses will be issued to stations equipped to use power not exceeding 500 watts in the antenna, and will be assigned a wave between 1,460 kc. (205.4 meters) and 1,080 kc. (277.8 meters.)

Where more than one station of this class are licensed to use the same wave frequency in the same city or locality a division of time will be required if necessary.

A license will not be issued for a station in class "B" unless it complies in every respect with the following specifications:

Range of Class "B" Waves

Wave Frequency—The waves between 1,450 and 550 kilocycles (280.2 and 545.1 meters) may be assigned for the use of stations of this class, which must be free from harmonics. Whenever necessary, the use of a coupled circuit transmitter will be required. The relative speeds of these two limits appears in Fig. 1.

Power—The power supply must be dependable and non-fluctuating. The minimum required will be 500 watts in the antenna and the maximum must not exceed, 1,000 watts, unless special authority has been secured from the Secretary of Commerce. Up to 5,000 watts has now been permitted in some cases.

Fig. 2 shows the idea of this requirement. At (1) appears a curve of voltage which is smooth and steady. This is what is required. At (2) is shown the fluctuating wave which may be caused by harmonics or may be due to the chattering of a poor contact. At (3) is a slight ripple which is occasioned by the commutator of the generator supplying the voltage as it passes underneath the brushes. In this way it is insured that no distortion of the tone will result at the sending end.

Must Follow Audio Waves

Modulation—The system must be so arranged as to cause the generated radio frequency current to vary accurately

according to the sound impressed upon the microphone system.

Spare Parts—Sufficient tubes and other material must be readily available to insure continuity and reliability of the announced schedule of service.

Antenna—The antenna must be so constructed as to prevent swinging. Such action would probably cause a change in wave frequency (Fig. 3.)

Signaling System—Some adequate and dependable system must be provided for communication between the operating room and the studio. Otherwise there might be trouble in control.

Studio—The radio equipment in the studio must be limited to that essential for use in the room. The room must be so arranged so as to avoid sound reverberation and to exclude external and unnecessary noises.

Programs—The programs must be carefully supervised and maintained to

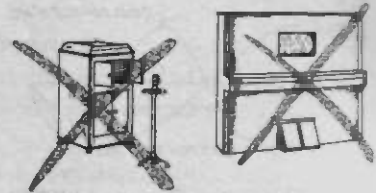


Fig. 4. Mechanical Reproduction is Forbidden at Class "B" Stations

insure satisfactory service to the public.

No "Canned" Music Allowed

Music—The use of mechanically operated instruments is prohibited. Only the class "A" stations may use phonograph and player piano (Fig. 4.)

Division of Time—Where two or more stations in Class "B" are licensed to use the same wave length, a division of time will be required if necessary.

Licenses issued for the use of waves between 1,450 and 550 kc. specifically provide that any failure to maintain the standards prescribed for such stations may result in the forfeiture of the Class "B" privilege and relicensing of the station to use a wave in the class "A" band.

The possession of a "B" license is so valuable in these days that there is no danger that stations will forfeit their rights if they can possibly avoid it. There are any number of broadcasters now waiting to jump into the "B" waves as soon as there is a vacancy.

Nine Noises in Radio

How to Filter Them Out and Get Through Only Music

By Service Department, Freed-Eiseman Radio Corp.

YOU have probably heard that old conundrum, "What makes more noise than a pig under a sty?" The answer used to be, "Two pigs." Now-a-days the best reply is "a poor radio set." Radio reception has not yet reached that fool-proof stage where it is only necessary to turn a switch to secure continuous satisfactory production. Per-

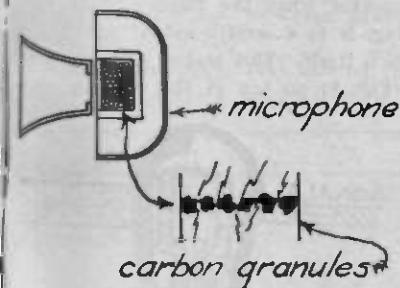


Fig. 1. If the Pieces of Coal Are Packed in Badly a Squealing is Heard

haps it never will. A little thought must be used when tuning in.

Horn Belches Blast of Noise

How many times have you looked forward to some broadcast program of particular interest, only to be greeted by a flood of jumbled harshness belching from the horn of the loud speaker. It interferes with the program, it grates upon the nerves of the listener, and tries the patience of those people who desire quality reception unaccompanied by this objectionable noise.

By understanding the reasons for the various noises, you may obviate disappointments and get a quality of tonal value that will be a continual delight. Let us consider the sources of these sounds.

First, we have the studio noises, which may be defined as those which originate at the broadcasting station. Noisy microphones cause a steady hiss which often blurs the voice of the artist.

It Squeezes the Coal

The trouble is usually caused by a poor condition of the tiny carbon granules inside this unit. When working properly the current through the particles is constant until a sound strikes the diaphragm. Then the vibration of this metal disk alternately squeeze and release the little lumps of coal and in this way vary the resistance and so the current through the microphone. If the carbon particles become too closely packed, or on the other hand, they get too loose (Fig. 1), a noisy condition will result, which of course, is broadcast and picked up in your receiver.

Another trouble, which is becoming more common is the disturbance which accompanies outside pick-ups. Time was when all the numbers were performed right in the studio of the broadcasting station. Of course, this required the artists to be present in person. It also prevented sending out programs like big conventions and the broadcasting of games and athletic events. The modern station, however, uses a great deal of outside material.

Pick Up Power Pulsations

To do this it is necessary to have telephone wires connecting the studio with

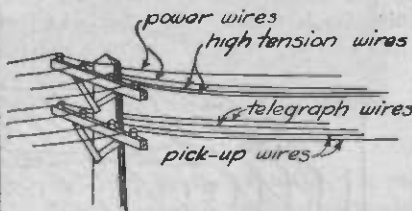


Fig. 2. Out-of-Town Programs Must Fight for Right of Way

the place where the event is occurring. The telephone companies have been very accommodating in this respect and are willing to furnish lines which have been found extra good and free from noise for such a purpose. However, even at

that the wires carrying the pick-up must run sometimes miles at a time in parallel with power wires, high voltage feeders, and telegraph circuits. By transposing the line, that is by interchanging the position of the lines on the cross arms this outside disturbance is much reduced, but it still is apt to be present to some extent.

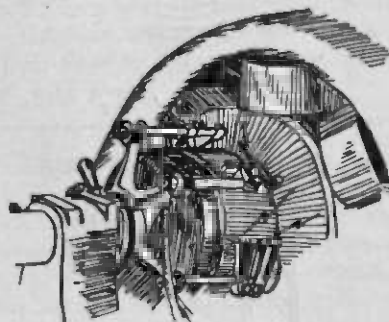


Fig. 3. Commutator Noises Are Often Heard in Plate Voltage of Sending Tubes

Another source of sound is shown in Fig. 3. When a station throws the switch connecting its oscillator to the sending aerial, you are apt to know of the fact if you are listening in, tuned to that particular wave. Of course, the carrier itself has such a high speed of vibration that it is way above the audibility of any human ear. However, a sort of irregular hum is heard. This is oftentimes caused by the commutator ripple which is generated in the plate supply of the sending tubes.

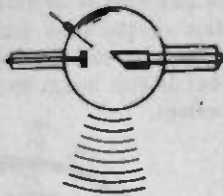
Catch Hum in a Filter

This is illustrated in Fig. 3. The remedy for such a condition of course, lies with the broadcaster. Many stations have put in a storage battery supply which completely gets rid of the commutator effect. Such a set of storage "B" batteries runs up into thousands of dollars and to avoid this very heavy expense, as well as for some other rea-

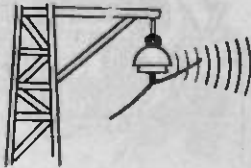
sons, many stations stick to their generators but use a filter system of coils and condensers to cut down or remove the objectionable hum.

The noise from the carrier wave is easily identified by the fact that in signing off after the announcer says "Good-night," you still hear this roughness or grating noise. A second or two later it suddenly disappears. This occurs when the operator pulls the switch which takes the oscillator off the aerial.

Noise contributed by the "ether" (which fills all space) may be defined as those sounds which are caused by elec-



x ray



leaky insulator



violet ray

Fig. 4. Here Are Three Causes of Powerful Disturbances

trical disturbances between the broadcasting station and the receiver itself. In this group are found the disturbing influences of high tension power lines, violet and X-ray machines, leaky transformers, electrically operated elevators, sparking motors and generators, trolley and elevated railway systems and telephone and telegraph wires, Fig. 4. Electrical impulses from these undesirable sources usually occur at short wavelengths and are picked up by sensitive receivers.

Static also comes in this "ether" class and is more or less prevalent throughout the summer months. Many satisfactory programs are suddenly broken up by a series of unfamiliar clicks, and in many cases are interrupted entirely for short periods. Such bad cases of static are often the product of a thunderstorm (Fig. 5) somewhere within the receiving range of your radio set. However, even on days when there is no electrical storm within a radius of 1,000 miles you may be bothered by static disturbances, especially in summer time.

Poor "B" Battery Noisy

In another class are the noises which are caused by the receiver itself or by the equipment which is used in connection with it. Poor "B" batteries become noisy and are usually the cause of a high pitched squeal when the receiver is operating on the second audio stage. These batteries should be discarded when they become noisy. Such sounds are caused by a defective contact somewhere in the connections between cells, Fig. 6. The Bureau of Standards reports that old age or use alone will not make a battery noisy, but that dry cells often develop poor contacts, when they get old.

Noises are sometimes caused by the vacuum tubes themselves. While correct in appearance, it sometimes happens that their internal elements are not rigidly supported, and any disturbance in the vicinity of the receiver may cause these elements to vibrate. This defect in construction produces a bell-like sound which may build up in volume and drown out the program. This may be overcome by shifting the tubes about in the sockets until a satisfactory combination is found. One tube looks just like another, (Fig. 7) but such shifting

around will soon convince you that they are not exactly alike in their internal parts.

A somewhat similar sound is sometimes caused by placing the loud speaker on top of the receiver or by pointing the horn in the direction of the radio set.



Fig. 6. Poor Battery Contacts May Be Hidden Under the Wax Top

This may be remedied by a slight change in the position of the horn. The whole speaker when the diaphragm is vibrating, is to a certain extent set into motion itself. This makes it dance around (Fig. 8) on top of the receiver and is

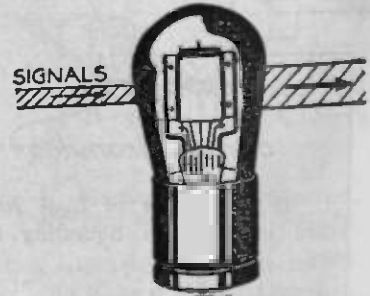


Fig. 7. Signals Should Go Through As Shown

this way it sets the latter into similar vibration. If the tubes inside are not carefully supported on springs, they will take up the oscillations and the shaking of the grids inside the tubes may give out a further electrical wave which is

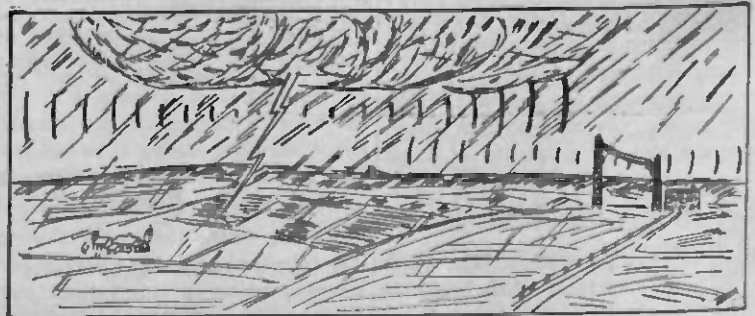


Fig. 5. Bad Static Usually Comes From a Thunder Storm Somewhere in Range

converted into sound at the same frequency of vibration. This again goes

light one) or even pointing it in such a way that the panel on the set picks up the air vibrations, will cause the same sort of howl. The remedy, of course, is either to spring-support the tubes or else relocate the horn.

ing the prongs of the tubes or by bending up the spring contacts of the tube sockets.

While some of these causes of noise, which have just been mentioned can be overcome only by the sending station, and some are the fault of nature itself, still care on the part of the listener will often reduce the interference. If you will bear these points in mind, you will quite likely be able to improve your own installation.

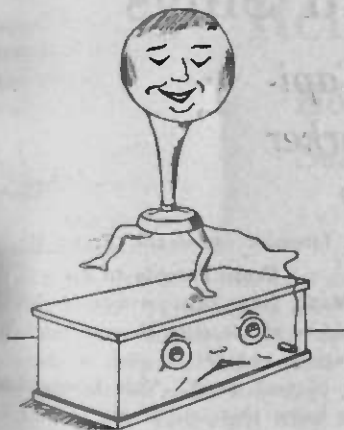


Fig. 8. This is How it Seems to the Set With Speaker on Top

around the circle and so keeps adding up until the set howls.

It sometimes occurs that resting the speaker on the same table (if it is a

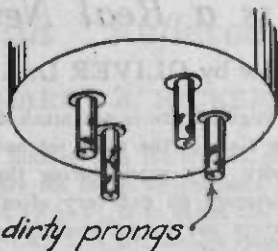


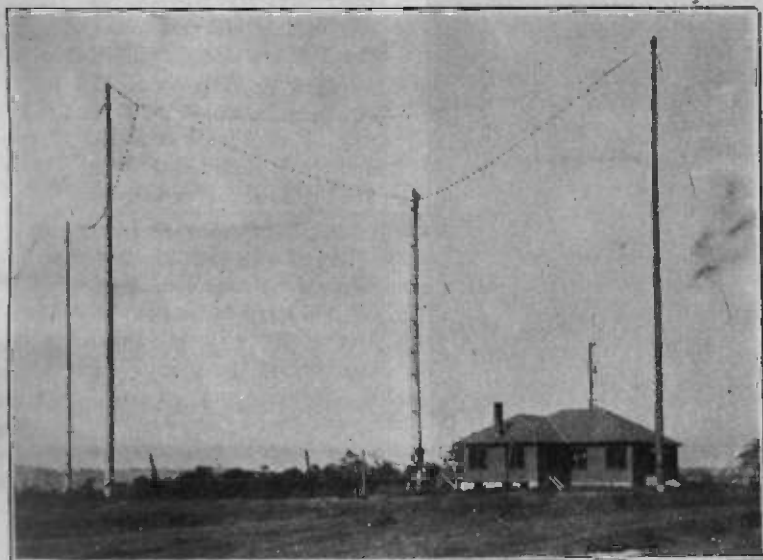
Fig. 9. If the Solder on Tips is Corroded, Clean it

Dirty Prongs Make Noises

Noises are also caused by dirty prongs of vacuum tubes or by sockets which do not make perfect contact, Fig. 9, These noises may be overcome by sandpaper-

Tuned by Dead Hand

S. R. Kimball, a rancher in San Bernardino Valley, Cal., recently placed in order with an undertaker in Los Angeles for a \$1,200 steel coffin equipped with a radio receiving set. Kimball explained that he is convinced that the soul lingers near the body until the day of judgment, and that he will be able to "hear what is going on in the world" after he dies.



"THE PIONEER BROADCASTING STATION"

You have all heard KDKA, East Pittsburg, any number of times. Do you know how this station looks? Here is a photograph showing the building located at the foot of the four masts, which support the aerial.

They are wooden poles and are guyed each by a single wire. If you look closely you will notice that the guy wires are broken up by four insulators each. The aerial itself is of the bird cage type, with several wires arranged in parallel around ring separators.

Behind the roof of the building appears the vertical rod which serves for the aerial in the high frequency (short) wave broadcasting, which has been heard very great distances. This plant is located at East Pittsburg, but the studio is in Pittsburg, twelve miles away.

CHINA—CHILE—CALIFORNIA—CONNECTICUT

A roundabout path that furnishes some new records in the way of distance work for amateur radio communication was pursued by a message from Chefoo, China, to Hartford, Conn. It made its way via Chile and California. The message started at radio station NUQG on board the U. S. S. Pillsbury at Chefoo, and conveyed the congratulations of the radio men on that ship to the headquarters of the American Radio Relay League at Hartford for the work of the League in the development of fast wave communication.

The first lap covered by the message came as a startling demonstration of the efficiency of fast oscillations. Senor Edmundo Guevara of Vilcum, in the southern part of Chile—almost 12,000 miles around the earth from Chefoo—took the message from the operator on the Pillsbury. To prove that direction had little to do with the result, Guevara then cast about in the ether for an American radio amateur to pass the message along.

Station 6JP, owned and operated by O. Roediger of San Francisco, was the first to answer the call of Chile, 1EG, and Senor Guevara passed on the message to Roediger, who in turn sent it to headquarters in Connecticut.

When the Sultan of Sulu Sings

Frank Moulan of the Popular Capitol Gang is a Real New Yorker

An Interview by OLIVER D. ARNOLD

QUESTION—What is the rarest thing to be found on the New York stage? *Answer*—A real New Yorker. And yet our story deals with one of these rare birds.

If you have listened in to WEA, New York, or any of its eleven satellites on a

Sunday night, there is not much danger that the dials of the radio set have become worn very much during the evening—listeners do not very often tune this station out to get something else. So undoubtedly you have heard the bright and catchy songs of one of

the foremost comedians, Frank Moulan.

Chose Parents to Fit

Many fans have wondered how he could be at the same time so bright and vivacious and yet do such serious singing of real merit. This is easy when you know that one of his parents was French, the other Scotch. Thus we see at a very early date that young Frank displayed great foresight in his choice of parents.

When he first began to cast longing glances at the long trousers in the clothing windows he became a choir boy in Trinity Church, N. Y. "I liked to sing," says Mr. Moulan, "and there was lots of fun with the other choir boys, but I had a rotten voice. However, I managed to hang on to this job until my voice changed." Judging by the way he sings now it seems likely that *modesty* in regard to his voice has somewhat clouded his veracity.

Made a Savage Beginning

His success with his first venture decided the young man definitely to follow the stage for a career. We see him first at 22 with his hat in his hand knocking at the private door of Henry W. Savage, who operated the Castle Square Opera Company. After hearing a few songs and getting the personality of the singer it did not take Mr. Savage very long to offer a contract to the young comedian.

"Don't say that a comedian can't stick with one company more than a year or two," remarked Mr. Moulan. "I know that many an actor shifts every little while because the company fires him out. And many another has the artistic temperament developed to such an extent that he quits a production just on a whim. But I stayed with the Castle Square Company for five years in succession. That's a pretty good record for these days. We played not

Continued on Next Page



Fig. 1. This Man Caused a Fight in Court Between Two Big Producers

Reflexing a Loop Set

How to Build a Non-squealing Set With Reflexed Radio

By HARRY A. NICKERSON

HAVE you ever tried your hand at a reflex set? It is not so easy to build, since the amplifier tubes carry the music a couple of times—once at radio and then at audio frequency. If the set does not work right when finished this makes it harder to locate the trouble.

The reflex receiver, which will now be described, uses at least three tubes and is one of the few real loop sets which are worth while.

Main Trouble with Reflex

One of the chief troubles of this style of hook-up is the howl which is often-times heard continuously. However, a method of curing the howl was discovered a year or so ago.

This sound (due to coupling between transformers, etc.) in many reflex sets may be heard when the cat whisker is

out of contact with the crystal, provided steps are not taken to eliminate it. This method (Fig. 1) is to shunt the secondary of both first and second stage audio transformers with a .00025 Mf. fixed

across the secondary of the first audio transformer.

Set Should be Dead

In a well built radio, with potentiometer arm at "full" positive (right hand

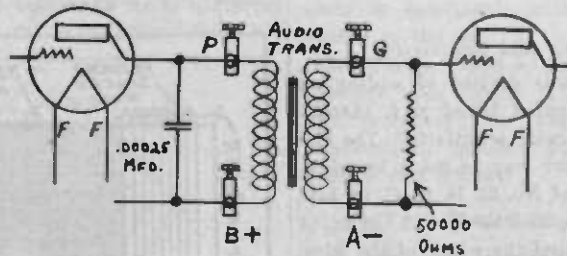


Fig. 1. The Essential Change Here is the .00025 Condenser and the 50,000 Ohm Resistance

mica condenser, connecting in each case the outermost winding of the secondary to the grid of its tube. Then a fixed grid leak of 50,000 ohms is also shunted

side), no howling should be heard, even with the crystal out of adjustment. A leak of 100,000 ohms (or even more), provided it cures the tendency to howl,

WHEN THE SULTAN SINGS

Continued from Previous Page

only in New York, hut also Chicago and as far West as St. Louis."

Struck Twice in Same Place

A clever comedian is needed to bring out the best points in a catchy musical show. "The Arcadians" was this kind of a play. One man that we know of who had a two-day business trip to New York happened to pick this musical comedy to entertain him the first night. Mr. Moulan was so effective and the show so delightful that the other night was spent in the same theatre.

Another great success was the "Sultan of Sulu." Playing a title role Mr. Moulan looked so much like Napoleon that he was asked to take the leading part in the play by that name, by no less an authority than Florenz Zeigfeld. However, Henry W. Savage, realizing that Mr. Moulan was not twins and that such an engagement would mean that he must leave his old company,

naturally objected. It did not seem appropriate that the "Sultan of Sulu" should take Napoleon's place

What the Judge Said

The matter finally came up in the courts of New York City. The presiding judge after much deep thought handed down the edict that the "Sultan of Sulu" belonged to the Savage Tribe and not to the Napoleon Courts.

Other important plays in which our Star has appeared with glory to himself and great pleasure to his audience are "Humpty Dumpty" (a Drury Lane Spectacle), "Grand Mogul" and "Queen of the Movies," three productions of Klaw and Erlanger. Charles Frohman's "The Siren" gave him another opportunity to spread himself.

St. Louis is a lucky city. Among other things to its credit is the fact that they have a municipal opera and furthermore that the management of it has been able for four years to close with

Mr. Moulan to play leading comedy roles. The St. Louis theatregoers have been loud in their applause of his singing.

This Was Inevitable

A year and a half ago Roxy of the Capitol Theatre first met this talented artist and the inevitable immediately happened—he joined the Capitol Gang. Since then he has made millions of fans happy with his catchy songs.

"Almost every one has a secret grievance," we said to Mr. Moulan. "What may yours be?" "Yes," he sadly replied, "I have a secret sorrow which is gnawing at my heart. I have always been cast as a comedian, but I want awfully to play drama. However, no producers will let me."

From what we have seen and heard, we are very glad that his ambition has not yet been gratified, as every one will agree that his specialties, as broadcast every Sunday evening, could hardly be improved.

would give slightly greater volume than the 50,000 ohm leak. When the loop connections are removed, the set should be dead except possibly for a little 60-cycle hum and a slight rushing noise.

The set which was developed in the laboratory, and which formed the basis of this article, used Acme transformers. However, most of the ideas advanced and the hook-ups would be just as suitable for use with instruments of other manufacturers.

Using the "R2" radio frequency transformer in the Acme four-tube set, as in most iron core untuned r. f. transformer sets, there is a lack of selectivity where powerful local broadcast stations are operating.

How to Add Selectivity

A method was devised of adding an additional stage of tuned r. f. thereby giving all desirable selectivity. The air-core transformer may be made by winding 55 turns of No. 22 D. C. C. or Litz wire on a three-inch tube, with ten turns at one end spaced the width of the wire, wound directly over the secondary, with two layers of wrapping paper between. The "toroformer," a toroidal wound coil, specially developed for use in this position in the Acme, gives excellent results without the necessity for taps in the primary. By using the "home made" transformer, control of selectivity as well as of tendency to oscillate is to be had by varying the number of turns of the primary in use, and the gain in selectivity over the four-tube set is truly remarkable.

With the four or five-tube reflex, a three-foot loop usually gives sufficient volume to operate a loudspeaker even on distant stations. For increased volume a large loop may be used, or an outdoor antenna with the usual variocoupler for tuning purposes. With the outdoor antenna, the pick up is so great that the set digs pretty well down into the "noise level" and unless coupling is kept loose, selectivity may suffer. While this hook-up is inherently very quiet, if you feed it noise, its high amplifying properties will produce the noise, amplified. A short antenna of 15 or 25 feet used in conjunction with a small loop will also increase volume.

A Sharp Zero Position

The loop inductance, with a good .0005 variable condenser shunting the loop,

should be about .16 millihenry in order properly to cover the broadcast band. The minimum position of the loop, which is the direction in which it points when the signals from any given station fade out practically or quite to zero, is always sharply defined. A shift of a few degrees either way will make the station come in much louder.

The maximum loop direction, however, is not very well defined. You can point the coil anywhere over an arc of 15 or 20 degrees without noticing much change in the loudness. This is a very desirable feature since to suppress some particularly loud local you must point it directly at the unwanted sender, and it certainly is an advantage that the sta-

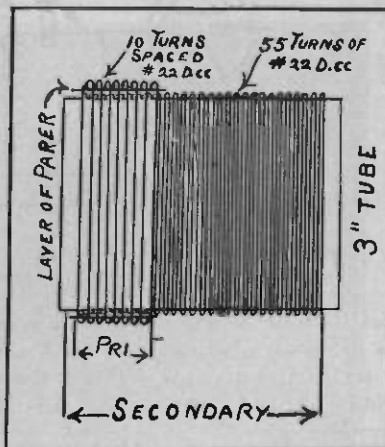


Fig. 2. The R. F. Transformer Can Be Wound at Home. The Primary Turns Are Spaced.

tion you are desirous of picking up need not be just at right angles in order to be heard with practically maximum volume.

South, West and North

Thus, with loop fixed in approximately an east and west direction, without antenna or ground, the writer in Boston, on the same evening, has heard stations in Miami, Oakland (Calif.) and Toronto, while local stations could be excluded easily.

The bigger the loop, the greater the pick-up and also the apparent loss in selectivity. For selectivity with a three-foot loop with four-tube reflex, the following hook-up is suggested (Fig. 3).

Here the loop is divided into two equal parts by a tap at the center. It is this latter that runs to the grid of the first radio frequency tube. The tuning condenser is in parallel with the

entire loop through the two outside leads. One of these (either will do) runs to the arm of the potentiometer which is bridged across the filament. This latter is used to adjust the grid bias to the proper value.

Making it Much Louder

A great increase of signal strength is generally noted when one side of the loop is grounded or connected to a short antenna. This connection should not be made to the lead from the loop which connects to the grid of the first r. f. tube, but tried to either side of the "A" battery.

It will be noted that the first or left hand tube in the standard Acme three or four-tube hook-up is not reflexed. It is comparatively easy to substitute for R2, the aerial coupling coil, a tuned r. f. transformer. From 50 to 65 turns of honeycomb, or a similar coil, is suggested as the secondary of this transformer, over which is wound say 15 turns, tapped at say 2, 5, 9 and 15, permitting use of 2 to 15 turns in the primary. The inner turn of the honeycomb would then be connected to the grid.

Doughnut Coil is Good

The use of a coil having a small field is desirable here so that one of the special Toroidal wound or doughnut coils made by several manufacturers gives good results in this position. Of course the secondary of this coil is tuned by a .0005 Mf. variable condenser (another control). It will be found that with three controls, oscillation springs up rather unpleasantly, but just the right combination of tuned r. f. transformer will give better selectivity with good volume. In using this tuned r. f. transformer, it is suggested that tuning be started using a few turns in the primary and then this number increased until further turns produce oscillation.

Note that the potentiometer in this type of reflex controls the grid bias of the first r. f. or left hand tube only. When stations are coming in well, this potentiometer control is not especially critical. A grunting sound or a violent squawk seems to be an inseparable accompaniment of many sets of this type, when the set goes into oscillation. It will be found that the voltage of "B" and "C" batteries, and especially the resistance of the crystal used as a detector, makes a great difference in the

quality and intensity of this oscillation noise. Most any sensitive crystal will work in this hook-up. A good crystal is of the semi-adjustable type, and permits a very light contact of the cat-whisker on the galena, and at the same time maintains this contact fixed. A $\frac{1}{2}$ or 1 microfarad (mfd.) fixed condenser across the "B" batteries often clarifies reception somewhat.

Checking Up the Tubes

The set is rather particular about tubes. The double duty placed upon them seems to require that the storage battery type be used, such as UV 201-A or C 301-A. Of course the new "X" base tubes are just as good. It is well to test tubes when first purchased and frequently thereafter during use. If you find that you must turn the rheostat all the way "on," it generally indicates one or more defective tubes.

Bad hand capacity effects when, in tuning, your hand is changed in its position, generally indicates one of three possibilities—(1) one or more poor tubes; (2) a break in the winding of the potentiometer, or (3) a reversal of the leads to the crystal detector. A low "B" battery requires jockeying with the filament rheostat. The difference in volume with 90 volts as compared to 67 is very marked. Many fans turn the rheostat to full "on" and pay for their folly in tubes quickly exhausted. A test with a good voltmeter across the filament binding posts on the sockets of the tubes is the best way to determine whether, for example, a UV 201-A is receiving its rated five volts of filament voltage. When three such tubes are being used, the rheostat is turned about three-fourths the way on, and with four tubes, five-sixths or slightly less distance. This will give the approximate five volts required.

Plugging in the Phones

As an experiment, the phones may be connected in shunt across the primary of either of the first two or left hand audio transformers, thereby "listening-in" on the output of three stages of r. f. with crystal, or after the first stage of audio.

The use of "B" batteries which test high (at least 40 volts) is necessary for good volume and clear reception. The insertion of a "C" battery for "B" voltages over 67 is highly desirable for the sake of economy of "B" battery and

clearer reception. The "C" battery will help to make the set work (give it the ability to oscillate) when the "B" battery is low. The set must be operated close to the point of oscillation in order to get distance.

One Transformer Does Work

The characteristic curves of the R2, R3 and R4 transformers as given out by Acme Company indicate that R2 has the main burden of amplifying the lower wave lengths, assisted by R4. If therefore no oscillation of the set is possible on the faster waves, trouble may exist in a partially defective R2 or R4 transformer.

The best tubes you own should be placed in the three left hand sockets. A poor tube will work indifferently well

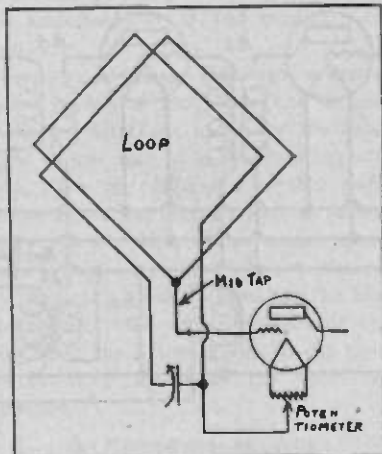


Fig. 3. The Voltage Given by the Potentiometer Through the Loop Becomes the Grid Bias

as a straight audio amplifier in the right hand socket, though volume may suffer. The first or left hand tube by all means should be a good oscillator. It is also evident that this tube should be especially sensitive, since unless a signal affects that tube, there is nothing to be amplified by the succeeding tubes.

Before the builder having trouble calls in the Doctor, here are some tests which may be made to determine whether some particular part of accessory is defective:

Readings on the Tubes

1. Test tubes. A tube tester which indicates the variation in plate current for a change in grid bias from minus one to zero should be used. For UV-201 A tube, a variation of at least .8 milliampere (m. a.) should be registered. Some tubes will vary .12 m. a.

or perhaps more. The greater variation does not necessarily indicate a better reflex radio frequency tube; it may merely indicate that the grid and plate inside the tube have moved more closely together than normal through a jar, etc. Usually, however, the higher test means a better straight audio amplifier.

2. Test all batteries. Remember 90 volts at least are needed to make the distant stations "roar in," rather than 67 volts of "B."

3. Insert a fresh "C" battery, if the old one is exhausted, or if no "C" battery is included in the set.

4. Try a different crystal. Crystals seem to deteriorate with age and exposure to the air.

5. Test R. F. and A. F. transformers: (a) For open circuit in either primary and secondary; (b) For short circuit (connection) between windings of secondary and primary.

Your Tongue for a Meter

A volt-meter in series with a few volts of battery and the primary or secondary of the r. f. transformers should indicate the full voltage of the battery less a slight drop due to the resistance of the coils under test. Phones in series with the windings of the a. f. transformers and a battery should be used for testing them. If no phones or meter are available, the tongue may be used as a tester, placing it in circuit with the winding under test and battery in series. A few volts of battery will cause a very perceptible "taste" when the tongue is used to close the circuit. Care should be taken not to use too high voltage in the battery or the tongue may get an unpleasant shock.

7. Examine jacks to see that contacts are being made where wanted.

8. Try all connections to see that none are loose or shaking, or that soldering flux or resin joints are causing trouble. A frequent cause of clicking and grinding noises in the set may be laid to looseness in the usual machine-screws fastening socket springs to socket. When the loop or other antenna device is removed from the set, irregular scratching and grating noises are sure indications of either loose joints or connections or defective "A", "B" or "C" batteries. Pushing and pulling the various parts and connections will gen-

erally reveal the location of the trouble, if it is due to loose connections.

Avoid Cheap, Poor Condensers

9. Test fixed and variable condensers for short and open circuits. Too much voltage should not be used in making tests, since a "dead short" may result in injury to phones or meters used in testing. Condensers will also give a more or less loud "click" when first placed in series with phones for testing purposes. The larger capacity condensers when placed across a "B" battery may show a large spark at the moment of first contact, but subsequent contact should not show the spark. Of course, mica dielectric fixed condensers should

be used. The cheap paper condensers which sell for about fifteen cents are often times all right, but they are not very reliable. A leaky condenser will cause noise and might even break down and damage the tubes.

10. Bend up socket springs, if necessary, in order that they may make a sure contact with prongs of tube, and clean off the tips of these prongs.

Corroded Contacts Are Noisy

The solder which you already see at the ends of these pins is used in making the connection to the four lead-in wires of the tubes. When this gets oxidized it is apt to form a poor contact. The remedy is to brighten up the metal with a knife or sand-paper.

11. Test potentiometer for continuity of its winding. If necessary, remove its central shaft, taking care not to lose any washers at the rear. Clean the shaft and arm. After long wear, the friction spring which makes contact, may need tightening.

Time to Go to a Doctor

12. As a last resort, if these more or less crude testing methods fail, consult the nearest radio repair man who has an intelligent knowledge of this style hook-up.

Fig. 4. shows the hook-up for the five-tube set. A Sodian bulb, S13, is shown although an ordinary detector may be substituted. Three stages of radio frequency are followed by the de-

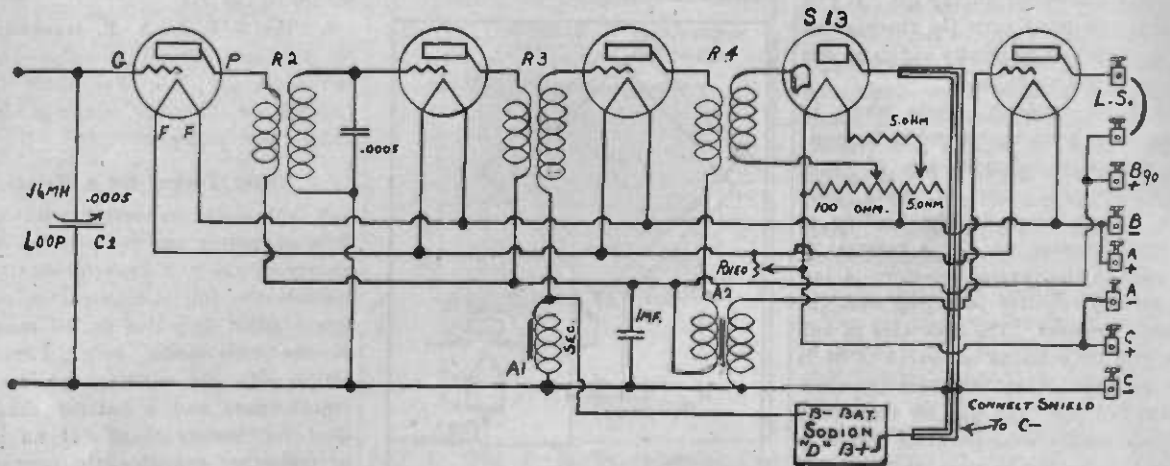


Fig. 4. Here is the Complete Hook-up. A Sodian Tube, S13, is Used as a Detector, Although a 201-A Will Work Well. Notice Primary of First A. F. Set is Left Open

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detector. Two steps of audio reflexed feed the last tube which is a third step of audio amplification.

The left hand audio frequency transformer, A1, has the primary left unconnected, but the secondary is used as an audio choke to prevent the low frequency wave from the detector from being short circuited to the C minus lead without being impressed on the grid of the first tube.

Keeping Up with Inventors

Ten examiners are now constantly employed in the United States Patent Office in considering and acting upon applications for further patents on improvements in the radio field.

Radio in the Biggest Cathedral

Broadcasting for Hundreds of Feet Instead of Miles

By HARRY J. MARX

ONE thousand, two thousand, perhaps three thousand miles. That is the sort of record we are accustomed to think of as being new and worth while. But here is a big undertaking where the broadcasting distances were measured in feet.

This use of radio apparatus for addressing a large gathering is not entirely new, as it has carried the voice of a speaker to a vast throng many times in America. In fact it has worked so well that it has for the first time invaded a large cathedral—in fact the largest in the world. St. Peter's at Rome is the scene of this new application.

One Voice to Thousands

A public address system was installed in this immense edifice for the recent canonization of Sister Teresa. The many thousands of people in the audience and the huge size of the Basilica made it necessary to use some method of amplification of the Pope's voice in order to enable everyone present to hear the ceremonies in full detail.

When such occasions have happened in the past the crowd has begun to gather long before the event as everyone has known that unless he got a front seat there wasn't a chance of his hearing what was going on. Imagine what a rush there must have been to get the places within ear shot of the speaker.

The universal use of public address systems throughout the world at big functions no doubt helped to bring about the decision to influence the Pope to adopt similar methods. Signor Mancucci, the Chief Engineer of the Vatican, and Mr. Paddle, an engineer, co-operated in the installation of a Graham public address equipment with Amplion loud speakers in not only St. Peter's, but also the Vatican. The satisfaction which was given by the installation is expressed in the following telegram, sent by the Chief Engineer of the Vatican to

the Italian representatives of the manufacturers:

Gave a Repeat Order

"I beg to express my congratulations on the splendid results obtained with the fine apparatus supplied by you on the occasion of the solemn function in Saint Peter's. His Holiness will be pleased if you could arrange to repeat the amplification for the coming ceremonies."

Such an address system uses a microphone, a set of amplifiers and a loud speaker. All these units are the same style as are used in a broadcasting station. The big difference is that radio frequency is not needed and all vibrations are at the slow or audio speed. That is why an oscillator is not required at the sending end to give out the high speed pulsations nor is a detector employed at the listening end to cut these waves down again to the voice frequencies.

A Microphone on Arm

The details of such a system must be carefully worked out. The position where the units are located is quite important. A special support for the microphone was fastened to the right arm of the pontifical throne. This made it possible to deliver the Proclamation right from the chair, which is customary in such a service. The evidence of the wisdom of this installation was observed by the spontaneous outburst of loud applause throughout the Cathedral at the conclusion of the reading.

At each of the four corners of the magnificent canopy over the tomb of St. Peter (Fig. 1) were placed two large Amplion loud speaker horns. Other units were distributed in different parts of the Basilica in order to distribute the sound to all parts of the huge edifice.

Puzzle—Find the Horns

If you will look closely at Fig. 1, you will see in the upper right hand corner

two of the horns right on top of the pillar. They are so well concealed that it was necessary for our artist to retouch the photograph at this point with white ink to show the outline of the flare. If you had been looking up at it from below, it is doubtful whether you would have noticed the speaker amid the rich detail of the ornaments.

The power of the amplification was increased as desired for the purpose. Since the human voice fluctuates to a considerable degree in the delivery of an address, it requires a large amount of skill in the monitoring of the control boards in order to deliver an output from the loud speakers that is uniform and natural in tonal quality.



Fig. 2. This Style of Horn Was Used, But Straight Instead of Curved

Hiding the Operator

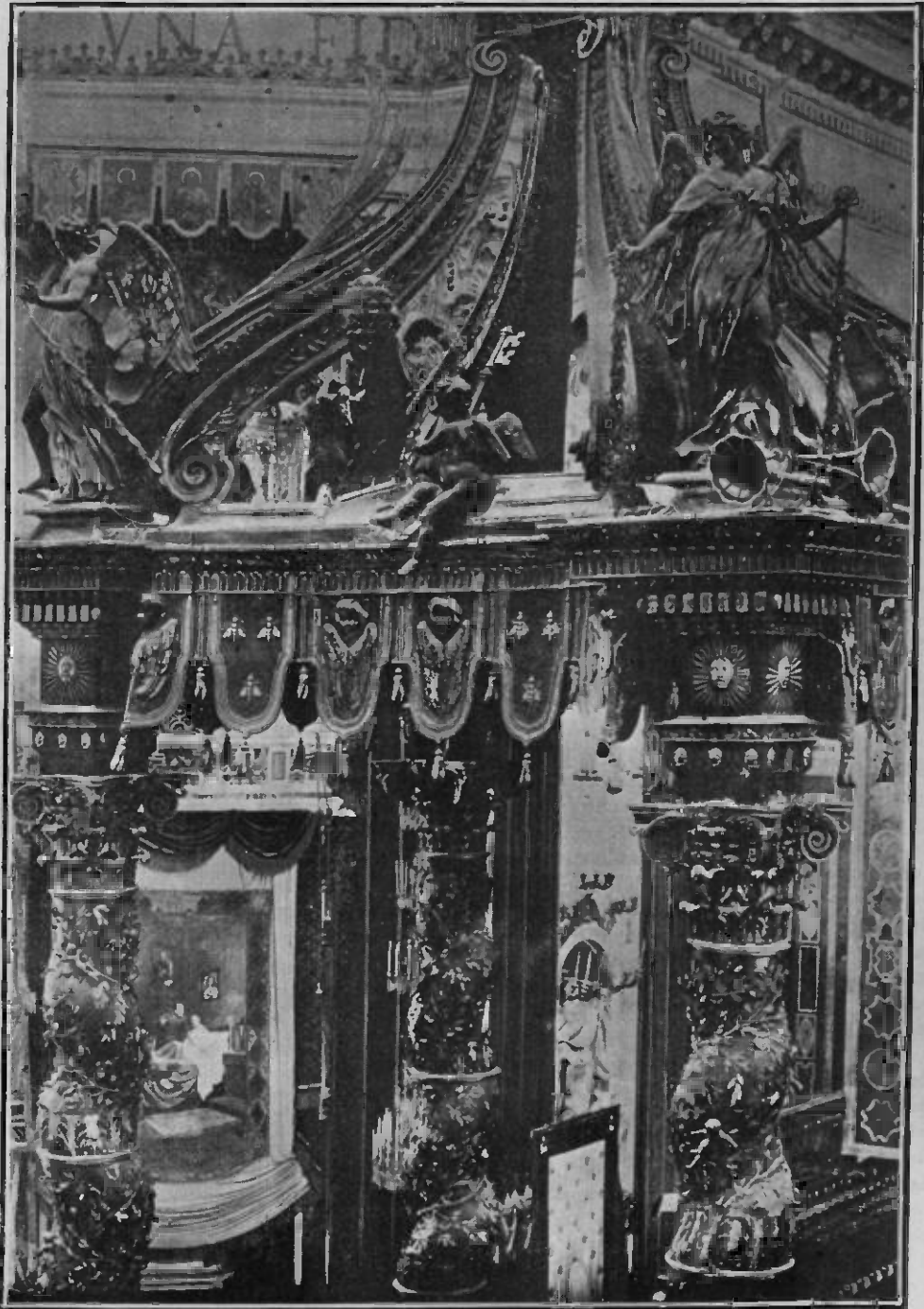
The loud speakers were decorated to harmonize with the elaborate ornamentation throughout the Cathedral. Only those who have been abroad and visited a few of the magnificent cathedrals of the Old Country can appreciate the at-

tention required in this. Each of the horns was especially ornamented to fit the particular niche in which it was located. All wiring had to be concealed and secured without disfiguring any of the decorations. The location of the con-

trol apparatus and its operator was invisible to the audience, but such that the director could see and hear everything that was happening.

Unaffected by the innovation of radio, the ceremony was superb and impres-

sive. When we consider an audience of 70,000 human beings crowded into a huge Cathedral, which in itself was gorgeously attired and illuminated as by a fireworks display, we begin to realize the importance of the occasion.



C by Amplion Co.

Fig. 1. Look in Upper Right Corner and You Will Find Two of the Loud Speakers Which Broadcast the Ceremony

Straight Instead of Curved

The type of horn which was used is rather special in regard to its shape. You will see from Fig. 1 that there is no curve in it as in the ordinary speaker. The usual model of the Amplion is shown in Fig. 2. This has the same

sible, the straight form was adopted.

The splendid appearance of the edifice is faintly indicated in the photograph, Fig. 3. Notice the four columns of the Tomb of St. Peter in the center of the floor. It is one of these same columns which appears in Fig. 1. Owing to the

in making up the assembly.

No Flash Light Needed

Aside from the radio, the lighting of the immense edifice was in itself a marvel. Only a faint idea of the wonder of it is attained from the pictures. The brightness was so intense that the photographs were made without the use of flashlight powders, or any other artificial help.

Some account of the occasion may interest you. Organ music has an unusually penetrating and inspiring effect. It provided an introduction to the solemn functions of the old religious ceremonies. Following the organ renditions, the voice of His Holiness the Pope, aided by modern efficiency, was heard delivering the immortal words of benediction.

As mentioned above, we may remind you that in the past such ceremonies were only spectacles to the eye, since the addresses were audible only to the restricted circles of those nearest. These in most cases were the dignitaries of the church. And then we wonder perhaps why many more were not swayed by the solemnity of such an occasion.

Not Told Before Hand

It is interesting to note that no public announcement was made of the installation, in fact the whole was more in the light of an experiment. However, it proved so successful that it seems probable that a permanent installation will be made to take care of notable events in the future.

To obtain photographs of such ceremonies is unusually difficult, but in connection with this installation the permission of official pictures was included. The illustrations shown have been made from pictures taken by the official Italian photographer.

An extract from the publication *La Tribuna* of Rome on the next day may be of interest:

"Yesterday was really a historical day. The sanctification in St. Peter's will be remembered as a very special event by reason of the fact that the voices of the clergy have been heard strong, clear, and marvelously close through the whole of the Basilica and as far as the vestibule.

The Big Crowd is Thrilled

"The immense crowd of the faithful, and specially those furthest away, experienced a wonderful sensation."



C by Amplion Co.

Fig. 3. Here is the Biggest Nave in the World. In the Center Are the Columns of Fig. 1. The Horns Can Hardly be Seen.

telephone in the end and the same gradual increase in diameter and flare. Owing to the large amount of space available in the location and the desire to conceal the speaker as much as pos-

skillful handling of the apparatus, it is doubtful whether you will be able to pick out the loud speakers in this last illustration. Of course, that is just the idea which the electricians had in mind

From Hospital to Stage

*As a Nurse Pauline Miller
Was a Wonderful Singer*

By GOLDA M. GOLDMAN



Fig. 1. Here's the Girl Who Made the Doctors Forget Their Patients

IS a pretty girl ever handicapped by her good looks? It seems that sometimes her appearance will interfere with her career.

A very few years ago, Bellevue Hospital possessed one of the prettiest nurses in training in the country. But the patients and the doctors were sel-

dom heard to comment upon her nursing ability, or for that matter upon her proficiency as a stenographer, for she filled a double role at that time.

Sung to the Patients

It seems that when she happened around the doctors seemed to forget what it was that they were about to

prescribe, and even those men whose temperature charts were way down, experienced a sudden touch of fever after she had smoothed their pillows. Attention rested upon the fact that Pauline Miller might frequently be heard singing to the patients. It was therefore decided that she should go on the stage.

With this encouragement, the beautiful nurse deserted her profession and organized a female group known as "The Lyric Quartet." The four women soon had so much work to do at clubs, parties, and musicals, that they could hardly keep up with it. Mr. L. Werba, who put on "Adrienne," heard them and engaged the quartet for a twenty-six weeks' run on Broadway.

A Charming Music Box Singer

In this engagement Miss Miller had a tiny solo part. But small as it was, its notes carried to the "Music Box," and she was engaged to understudy the prima donna in that organization. Here she played at the leading role fifty-four times, going from there to "Madame Pompadour." Her engagement at the Strand, at first temporary, soon became a permanent feature. Singing at first with Everett Clark in rural settings, she did a group of very charming lyrics including, "My Dear, Will You Remember?" and "Look for the Silver Lining."

It is difficult to say whether Miss Miller's costumes are becoming to her, or whether she is becoming to them, for she is certainly as delightful to the eye as she is to the ear.

Italy Will Welcome Her

You want to listen-in pretty regularly on Monday nights, however, when the Strand Theatre broadcasts, for she may leave you soon. She plans next spring to go to Vienna to study, and from there she will journey on to Italy. When she goes, one of the most beautiful voices which the radio fans have enjoyed this year will be lost from the air.

Buying Your Radio by Installments

By MR. LOUIS FRANKEL, Secretary of Mohawk Electric Company

ONE of the biggest problems that the business world has to contend with at the present time is that of selling you and me articles costing \$100.00 or over on a satisfactory plan.

It is a well-known fact that by far the biggest part of all goods in this

on the time-payment plan, at least 90 per cent of autos being sold this way. Household appliances, too, such as washing machines, vacuum cleaners, and even electric irons, are to-day being sold on the installment plan.

Electric Light and Gas Companies, who are the largest outlets for this class of goods, have all adopted this scheme with great success. They let you buy a flat iron or a percolator, and then pay their installments with your monthly bills. The result follows that there has been a big increase in the sales of such appliances, even though the price of some of them is as low as \$5.00.

But the big problem, of course, lies in selling articles which cost over \$100. The principal trouble with the present method of selling radios has been to decide how much a customer must pay when he takes the set. This has varied so much that there is hardly any set rule for merchants to follow. Experienced bankers say that the customer should pay at least one-third down, and clean up the balance within eight to ten months.

A Store Like a Bank

Now it would appear to me that the experience of these finance corporations ought to be a good guide. Such figures are probably more closely correct than either a smaller or larger down payment, with more or less installments. The washing machine people have tried this plan and found it to be very successful. The piano stores, on the other hand, have sold their musical instruments on a plan which in many cases allowed payments to run as long as two or three years. This almost requires the store to be a bank.

Business houses selling on a strictly cash basis dislike any installment system. They think that such selling, instead of being a public benefit, is a national curse. The average credit man feels that high powered go-getter salesmen will load up their customers with a lot of high-priced merchandise, merely

because the buyer knows that he doesn't need to pay for these goods for several months.

Buying a Better Grade

Installment selling has grown tremendously in the last ten years, and if you want to know whether or not the plan



Harold A. "Shorty" Fall, assistant director of Station KYW and former football star, comes into his own. During the last three or four years of KYW's activity in the football field, Shorty has become famous for his keen ability to give the game, kick by kick, down by down, to the radio fans, carrying to his listeners in some of the same thrill and excitement that the grand-stand is enjoying.

price class must be sold on time, if a large amount of trade is to be created. Industries other than radio have been compelled to meet the same problems, and they have met them with great success.

Nine Out of Ten Do It

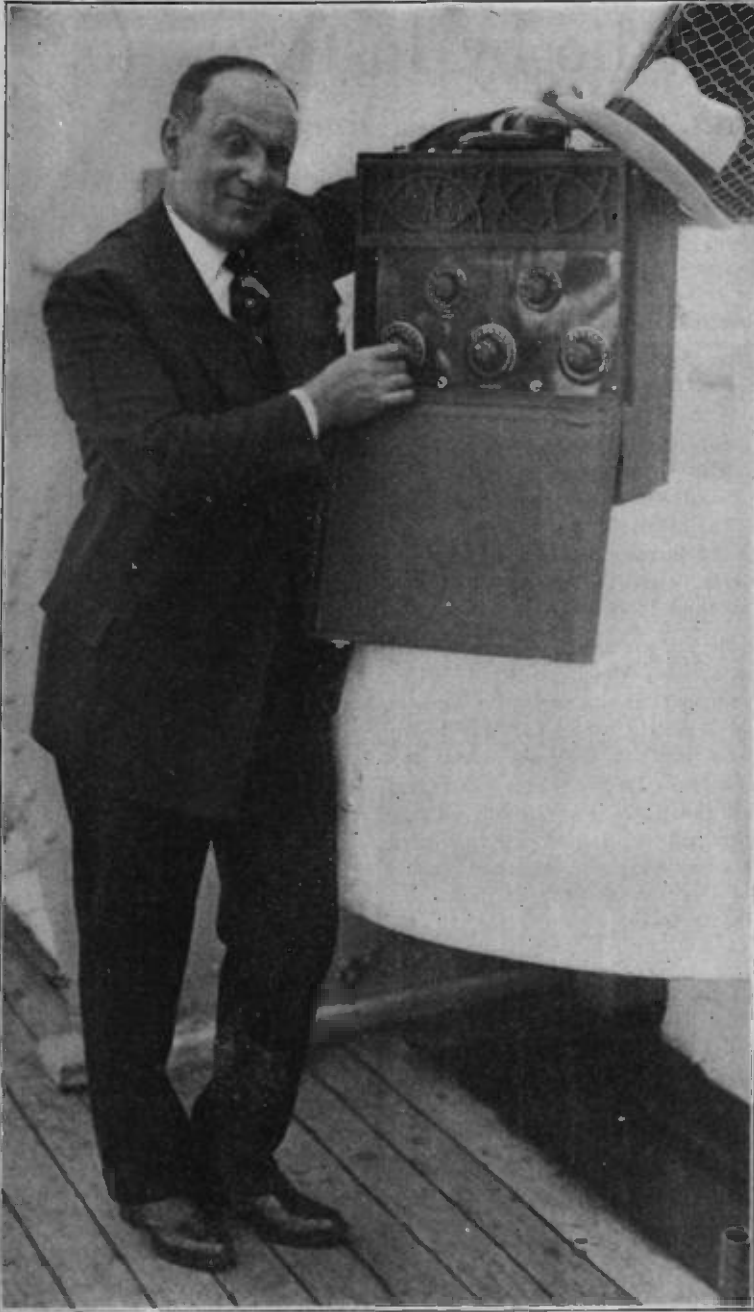
The automobile dealers sell their cars



The arrow points to one of the smallest factory-built radio sets. It is the one-tube Crosley "pup," only 3¼ inches high. Its size may be compared with the radiator of the new Ford.

is successful, look at the large increase of savings deposits in the bank. To be sure, this plan has allowed people to buy a better grade of goods than they could have managed on the cash basis.

Figures given by the various finance companies show that installments are not so hard to collect. Indeed, payments before they are due are very common, and the number of persons who allow their payments to fall behind is so small as to be almost negligible. The loss that is sustained by finance companies on the installment basis is less than one-fifth



He Will Broadcast Again.—The Famous Roxy, Late of the Capitol Theater, on His Vacation Trip to Europe

of a per cent. Somehow, the person who buys on the installment plan usually seems to want to meet these payments, if only to have the satisfaction of knowing that it can be done.

Are Married and Insured

Investigation has proved that the installment buyer has an income larger than the average, often owns real estate, and has personal property usually amounting to over \$1,000. By far the largest part of them are married, and a still greater number have savings accounts, while between 60 and 70 per cent carry life insurance.

The installment plan has given the radio fan the opportunity to buy himself a set that would otherwise be out of his reach. It has enabled the working man to own an automobile, to buy labor-saving devices for his wife, and, most important of all, it has helped him to purchase his own home. In spite of the calamity howl set up by cash concerns, the fact remains that a very large volume of business is being done on the installment plan, in a very satisfactory manner.

Look Up His Character

I honestly believe that the big future of radio lies in selling sets on the time basis. Through my observations I have learned that by far the biggest part of the radio business is done by the stores selling with this plan. I do not want to give the impression that the installment business should be poorly managed, or that credit might be allowed without a real investigation of the character and standing of the buyer. The customer's credit must be gauged with care, so that the taking back of unpaid-for sets will be reduced to a minimum.

The average person usually gets what he wants, and somehow insists that things will come out all right. The best part about this statement is that it usually does.

WAS THE AERIAL DRUNK?

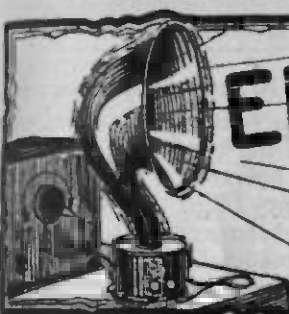
A diet of hops does not agree with radio antennas. F. J. Berneth, living near Baltimore, Md., reports that hops and aerials do not mix well and the best-strung wire can't keep straight when it carries a load.

Mr. Berneth informed WGY of Sche-

nectady, recently that his receiving set failed to respond to ether waves until super-power came along and then he discovered that his antenna, heretofore reliable, steady and respectable, was entertaining and supporting a hop vine.

The ambitious vine, while still very young, gained a foothold on the wire and there, undiscovered, it developed. For

weeks Mr. Berneth puzzled over the affliction of his receiver. Apparently the music, bed time stories, health talks and travelogues, absorbed by the hop vine did not retard its development, for the fruit of the vine attained a useful age. The aerial freed from its load is now doing full duty in picking up electrical impulses.



EDITOR'S LOUD SPEAKER

ALL ABOARD FOR THE SHOWS

Radio this fall is getting off to a perfect start. With various shows scheduled for the next two months all over the country, it looks as if the fans would have fished up to them everything new and worthwhile so that they could make their choice of all the many offerings.

To give the spirit of the times, we have devoted several pages this month to a show which is quite representative of the majority—the one held in Brooklyn. While this is perhaps not as large in size as those of New York and Chicago, still it is a monster affair and reflects very well what will be seen all over the country.

Those of you who live close enough so that you can get around to see the big event, will certainly miss something if you don't go. Others who have shows of their own in other cities will miss a good deal if they do not drop in to see how things are going.

Broadcast listeners who do not happen to be within striking distance of a radio exposition should do the next best thing. It is needless to explain that this means to follow the art through the pages of RADIO PROGRESS.

COOKING WITH ICE

When you want to fry an egg, it is not customary to use a cake of ice for fuel. However, this is apparently what was done at one of the recent shows.

A real life-size cake of ice was laid on a wooden table and on top of this a frying pan. The cook then broke a couple of eggs and dropped them into the pan. An instant later the ice began to melt

underneath the pan and shortly the water on top of the cake actually started to steam. At the same time the egg began to sizzle, and in a few moments it was done to a turn.

How was this done? The answer, "radio." A powerful oscillator of the same nature as your regenerative receiving set (when the tickler is turned too high) was used to send out high frequency waves. Of course these waves penetrated the cake of ice, which is an insulator, just as well as they go through the air.

Frying by Radio

When they struck the frying pan, however, they were converted into currents of electricity, which eddied round and round in the metal of the pan's bottom. The currents were so powerful that the iron was heated to a high degree. Such a hot surface, of course, melted and boiled the water underneath, and at the same time fried the eggs as well as is done in the best Greek restaurant.

This is a very interesting experiment, but it also has a moral. If you put sheets of metal (like condenser plates) near the coils in your radio set, which carry currents of radio frequency, you will be doing the same thing on a smaller scale as was done in cooking the eggs. To be sure, the amount of energy which you waste is so small that you cannot feel the metal get warm.

However, even though the wasted power is a small fraction of a watt, still it represents a big slice of the total power which comes in from your aerial. That is why the warning is always given to keep metal plates at least

two or three inches away from your coils.

BIG CONFERENCE COMING

Secretary Hoover has just sent out invitations to a big party. It will be the Fourth National Radio Conference and will assemble at Washington, starting Monday, November 9.

If this meeting accomplishes as much as any one of the three previous annual affairs, it will advance the art still further. Most of the rules which govern broadcasting were the result of the first conferences.

Where Invitations Go

Who have received the invitation cards? Representatives have been asked from almost every organization which is at all interested in radio. One member of each concern is invited to attend. The groups include all the five hundred odd broadcasting stations, all radio magazines and newspapers which run a radio department. Besides these each manufacturer of receiving sets and the organizations of Broadcast Listeners are asked to send representatives, Amateur Leagues, Radio Trade Associations, and the Commercial Land Stations will each have a man present.

Of course, the Government itself will be heard through the Department of Commerce men. Naturally bodies like the Institute of Radio Engineers and Electrical Engineers will send delegates. Even ship owners' associations and farm organizations are thought to be interested enough in radio to have their men attend.

By Ticket Only

Although there is this wide distribution of invitations, do not

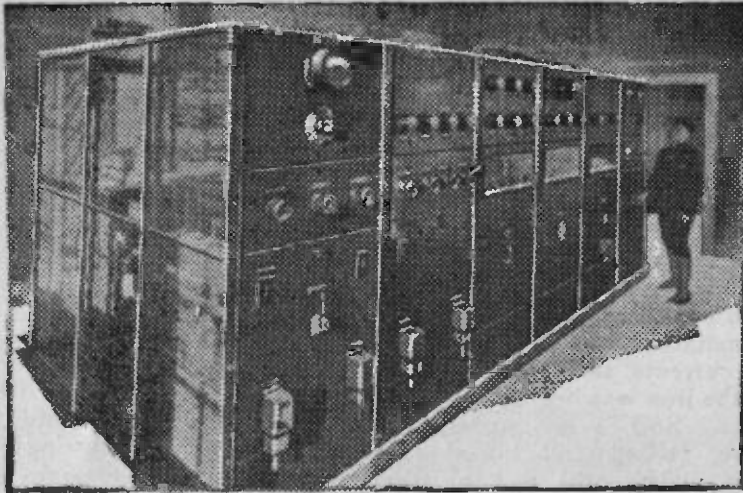
think that they are sent out hit or miss. Every person who is to go as a delegate must have his name sent in to the Secretary of Commerce by October 26. After that date, as the Chinese Laundryman said, "No ticket—no washee."

One of the beauties of these annual meetings is that the discussion is informal and of the heart-to-heart variety. There is no cut and dried program which must be followed. But business moves much smoother and quicker if there is some list of subjects to be brought up. Some of the topics which will be talked over are these:

What kind of licenses or permits should be needed for building a sending station? At present any one can put up a station without even notifying the Government, although, of course, it requires a license to use it after it is built. The licenses of operators also will come in for discussion.

Dividing "A" and "B"

How shall the various classes of communication divide up the waves? Of course, there are "A" and "B" broadcasting stations, as well as commercial land and coast stations, and then there is the question of shipping.



This picture gives a good indication of the phenomenal progress of radio broadcasting. This new Crosley WLW super-power station is designed to be operated automatically by the touch of a single button. Wires connect the station with the studios and auditorium in Cincinnati while the studio is at Harrison, Ohio, about 25 miles away. The picture shows the power panel with its many meters. Two 200-foot towers hold the antenna.

List of Subjects

The basic idea that the radio fans are the ones to be pleased in all aspects of radio. The broadcasting privilege and the various regulations should be made with the idea of service to the public as a basis.

What shall be done about the crowded conditions of the ether? All the broadcasting channels are taken, some by two and three stations requiring a division of time among them.

What about super power of 50 kilowatts and above? The department has been following very carefully the results of tests at Schenectady with this tremendous input to the aerial.

Where shall the sending antennas be located? At present many of the big stations have the site for their transmitter some fifteen or twenty miles away from the big cities in which the studio is situated.

Night Air Hideous

What is the best way of dividing up the time between stations which operate on the same wave frequency? On various occasions it has been known to occur that two broadcasters could not agree and so they both operated at once, making the night air hideous.

What about the broad question of advertising? Most fans do not mind hearing the statement repeated every ten or fifteen minutes that this program is given with the compliments of the "So and So Company." However, there seems to be a tendency for advertisers to start running in matter which is much more direct and which is objectionable to many listeners.

How shall the amateur telegraph code operators and the marine service be treated? They use dots and dashes which sometimes interfere with broadcast programs. Yet each class must be treated fairly.

No Rules as Yet

A new field which is just coming in is re-broadcasting. This is so new that the rules governing it have not been discussed at all, yet it looks like a big thing.

All these various subjects, as well as many more, will form the topics for discussion among those who have the best interests of radio at heart. The meetings will be open for the public to hear and will be reported in the press and possibly broadcast through some of the larger stations. Keep your eyes and ears open when the conference is going on.

WAS WGY TO BLAME?

A youngster had listened frequently to broadcast programs of the General Electric Company. She was visiting a neighbor recently when a storm threatened. As the rumble of distant thunder was heard her hostess remarked:

"We are going to have an electric storm."

A short time later as the thunder continued, the child informed her mother:

"We are going to have a General Electric storm."

Why the Straight Line Condenser?

Should It be Straight Line Frequency or Wave Length?

By HORACE V. S. TAYLOR

A FASHION note says that muffs will be worn again this fall. If the girls really get convinced of this, there will be a scramble to buy them. In the same way the radio magazines are full of advertisements and notices about "straight line" condensers. Is this truly to be just a fashion or fad, or is there some improvement in this form? If you understand the reason for the change, you will see that it is a distinct improvement.

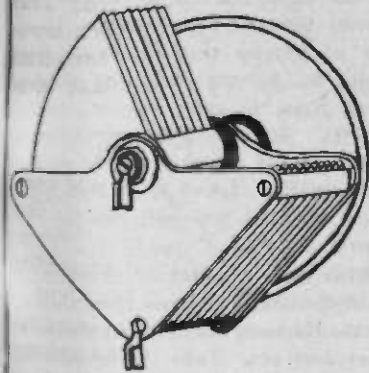


Fig. 1. This Style, Long Popular, is Passing Out

Half Circles Were First

In the first place the ordinary or garden variety of condenser which has been used ever since the dark ages of 1920, is a rotor built up of plates cut in the form of half circles. Fig. 1 shows such a unit with the rotor about two-thirds in mesh. As the knob is turned, it brings more and more of the movable plates into close position with the stationary plates and in this way increases the capacity of the condenser.

Since the plates are semi-circles, the action is perfectly regular and smooth. By this is meant that if adding ten degrees on the dial, from 10 to 20 increases the area of plates in mesh by say one square inch, then the increase from 20 to 30 or from 50 to 60, or from 82 to 92,

each will give the same additional area—one square inch. The capacity varies directly as the area in contact and so this form of plate gives a capacity which varies exactly as the dial reading. It is called a "straight line capacity" condenser.

Doubling Does Not Double Waves

You would naturally think that such a unit would be just the kind to use in a radio set since it would give a straight, smooth curve of stations plotted against dial settings. But here is something which perhaps you did not know. The capacity of a tuner does not vary directly as the wave length, but as the square of that value. As an illustration, if you have a certain wave length with a .0001 mfd. capacity, what value would you need to give double this wave length? The answer is not .0002, but .0004 mfd.

To express it in another way, when doubling the wave length use four times the capacity, when tripling, use nine times, and for quadrupling sixteen times as much condenser is needed. The same thing holds with fractions. If you wanted $2\frac{1}{2}$ times the wave length, you must use $2\frac{1}{2}$ squared, that is $2\frac{1}{2} \times 2\frac{1}{2}$ or $6\frac{1}{4}$ times as much capacity as before.

Why Curve is Not Flat

From this you can easily see that a condenser which gives a smooth, straight curve for capacity will have an irregular curve for the square root of its value. It will produce a tuner in which the stations are bunched around the low numbers and widely separated around the high numbers.

The reason for this is clear if we write down in a row the squares of the numbers as they run along, that is 1x1, 2x2, 3x3, 4x4, etc. Such a row of figures will be 1, 4, 9, 16, 25, 36, 49, 64, 81. Notice that the first few are separated by only four or five, while the difference between

64 and 81 is 17. Expressed in another way, these squares are bunched around the lower numbers, and widely separated at the higher ones. It is the same thing and for the same reason that radio stations are all crowded around the low wave lengths.

Spacing Them Evenly Around

The obvious thing to do would be to make a condenser whose capacity will vary not as the numbers on the dial, but

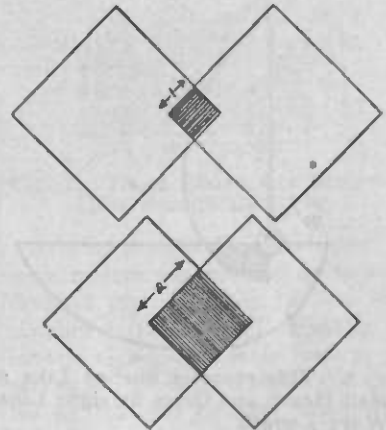


Fig. 2. The Area of Plates in Mesh Increases as Square

as its square. If a unit is built along these lines, the wave length will be equally spaced around the dial. This problem has been solved in various ways.

Fig. 2 shows a condenser whose capacity varies according to the square of the motion. In this model the movable plates do not turn with the dial, but are fed back and forth by a rack and pinion mounted on the dial shaft. Although they do not turn, let us call the movable plates the "rotor" so as to have a name which is easily understood.

The plates of both rotor and stator are square. The ones at the left are fixed while the right-hand plates slide into mesh with the stator. In the top

big jumps at the start and only small ones later on.

The Wave Lengths Must Jump

Since the Bureau of Commerce has decided on spacing equally the frequencies, you will easily understand that the wave lengths must jump irregularly. If they had spaced the wave lengths equally, then of course it would have been the frequencies which jumped around.

nothing to do with the shape or style of condenser plates. The difficulty, which is overcome by proper condenser shape, is that with the old style condenser the motion for tuning at the lower end was so fine that you must have a pretty steady hand to hit the right spot to tune in, while on the low frequencies (long waves) your hand might be somewhat unsteady and still pick up the station without difficulty.

as are labelled "semi-straight line" or "modified straight line" will be found to give results very much like those of Fig. 6, but not absolutely uniform in their spacing. They are usually just as satisfactory to work with although they may not be mathematically exact.

Using the Right Capacity

In all this discussion it has been assumed that the proper value of capacity has been used in the condenser. Notice that in each case the 550 ke. point of Station KSD (St. Louis), is about the same—90 or 95 on the dial. Slight changes in this point are caused by slight differences in the full capacity of the condenser. The lower end of the scale also varies somewhat depending on the amount of leakage capacity which the unit possesses in the zero position of the dial.

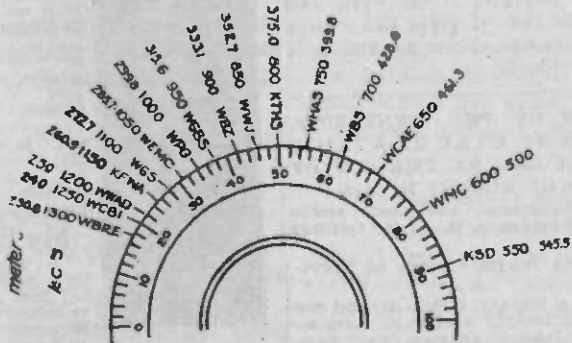


Fig. 5. The Straight Line Wave Length Unit Gives Better Spacing

This explains why Fig. 5 has irregular frequencies and stations, even though the wave lengths are regular. In order to get a good spacing of the call letters, what shall we do? Evidently the thing to do is to arrange a condenser which, instead of giving straight line wave length, will give straight line frequency. Such a unit ought to give equal distances on the dial between the various stations.

A Straight Frequency Plate

What kind of a plate is needed to give a straight line frequency? It looks very similar to that shown in Fig. 3, but the curve is a little bit fuller and more rounded at the sharp end. Such a condenser is shown in Fig. 7. You will see that the plates are not very different from what has been already described. A tuner using this unit gives the even spacing of Fig. 6.

This Condenser Gets it Right

Such a straight line frequency condenser is hooked up in the tuner, whose dial is illustrated in Fig. 6. Here, although the same stations are logged as before, we see that they are distributed in an orderly way around the dial. As before mentioned, we have put down call letters spaced 50 kc. apart, but if every one (with 10 kc. spacing) had been filled in, you would find that they were just as even and regular all around the dial. With such a unit it is just as easy to separate stations on the high frequencies (short wave length) as it is on the low ones.

Of course, it is not necessary that the curve of frequency against dial setting shall be absolutely straight and regular. As long as the different call letters come in at fairly reasonable distances the exact point on the dial does not amount to much. Such condensers

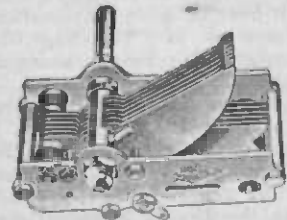


Fig. 7. These Plates Are Shaped to Give Results Like Fig. 6

As the straight line condensers are more modern and are apt to be better designed they are likely to have lower capacity in the off position and so will need to be turned slightly more to pick up the fast vibration broadcasters. Thus we see that the ordinary condenser of Fig. 4 will reach 1300 kc. at 14 on the dial, whereas, the straight frequency unit of Fig. 6 will bring them in at 20. However, there is not necessarily any

Continued on Page 35

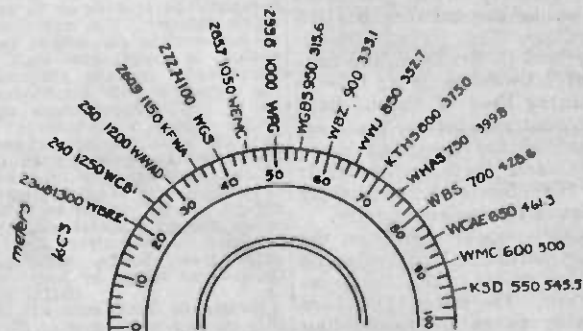


Fig. 6. Straight Frequency is Best, and Gives Each Station an Equal Space on Dial

Here it should be pointed out that by separating the stations we do not mean selectivity in tuning out loud local broadcasters. The latter is a question of selectivity built into the set and has

American Radio Relay League

THE RAG CHEWERS SPREAD

As an illustration of the friendships that are developed through the amateur radio telegraph, officers at the American Radio Relay League Headquarters in Hartford point to the rapid growth of a special group of league members, known as "The Rag Chewer's Club," which is devoted to the promotion of friendly conversations by amateur radio.

In the last few years, when amateur radio stretched out until it was able to carry on reliable communication across the continent and the oceans, the need was felt for some organized group to foster this spirit of radio friendship. A group of league members, in almost nightly communication with each other, formed the charter membership and established the rule that each other league member who carried on a successful half-hour or more conversation with some member of "The Rag Chewer's Club" might also become a member of the club.

So popular did the organization become, that in the few months of its existence it has attained a total membership of over 700, and recommendations for new members are arriving daily at the League Headquarters here.

There are members in every state of the United States and every province of Canada, but the membership that gives the greatest "kick" according to club members, is that which is gradually appearing in countries beyond the sea. Six countries in Europe and Asia are already represented. A well developed effort is on foot in many other nations where there are league members to enlarge the foreign membership of the club by carrying on transoceanic conversations.

EGGS ON THE ETHER

The type of assistance given by transmitting radio amateurs to other members of the community is well illustrated by the system in use between Station 9DKS of Madison, Wis., owned and operated by Herbert O. Brickson, and Station 9DTK of Milwaukee, Wis., belonging to and run by Fred W. Catel. Both men are prominent members of the Traffic Department of the American Radio Relay League, and they operate their stations on the plan of accomplishing the greatest good for the community.

Each day Catel secures reports on the butter and egg market in Milwaukee and lists of livestock prices, which he transmits to Brickson. The latter turns over this information to radio broadcasting station WLBL, operated by the Wisconsin State Department of Markets at

Stevens Point. Here the broadcasting station puts the news on the air by voice, in order that all of the farmers of the state may have the latest and most accurate market information without delay. The entire transaction from the time Catel secures the news, until it is sent over the ether from WLBL, consumes only a few minutes.

The farmers within the hearing of the broadcasting station's voice have been strong in their praise of the work, and the assistance that it gives them helps a great deal in the proper marketing of their farm products.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Radio Progress, published semi-monthly at Providence, R. I. for October 1, 1925.

State of Rhode Island, County of Providence, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared John F. O'Hara, who, having been duly sworn according to law, deposes and says that he is the owner and publisher of the Radio Progress, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, John F. O'Hara, Box 728, Providence, R. I.; editor, Horace V. S. Taylor, Box 728, Providence, R. I.; business manager, John F. O'Hara, 8 Temple Street, Providence, R. I.

2. That the owner is: John F. O'Hara, 8 Temple Street, Providence, R. I.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

JOHN F. O'HARA.

Sworn to and subscribed before me this twenty-ninth day of September 1925.

(Seal) ELIZABETH O'HARA.

Notary Public

(My commission expires June 30, 1926.)

In 15 Minutes I Will Give You the Secret of a Perfect Memory

I Guarantee to Increase Your Memory 100% In 10 Days

Not by any abstract, tiresome, difficult-to-master method; not by the old system of association of ideas or thoughts. Not by hard study, rotation exercises or repetition of words or sounds.



GEO. J. SPINNER
Author and Educator

It is not a book. There is nothing to study—nothing to repeat. It is by far the newest, best simplest method ever devised. I will give you a memory in one week's time that will surprise you. In one month time that occurred 30 days ago will be as fresh and clear in your mind as if they happened yesterday.

My Secret for 30 Years

I have given my secret to thousands. I have used it myself for more than 30 years. It enabled me to rise to my present position as an educator in professional and scientific circles; it gave me a good vocabulary, developed my powers of perception and analysis and fitted me to write on a hundred subjects.

Command Success

My VI-FLECT method of memory-building is for those who are ambitious to improve their business, professional, social or financial condition. VI-FLECT will develop your brain-power—your ability—lift you out of the rut; you will no longer stumble, mumble, nor grope for words with which to express yourself. You will be surprised how easily you can remember names, faces, dates, figures, appointments, duties, etc. It will enhance your importance as an employer, your value as a manager or employee, increase your worth, your ability, expertness, raise your salary, help you in business, professionally, socially, politically—in every way.

Learn My Secret

I prefer to place my secret within the easy reach of everyone. Therefore, the price I am going to ask for VI-FLECT—my wonderful method of memory-building, which I have developed and perfected during my 30 years of constant study and application is ONLY \$5.00.

Let nothing stand between you and a successful, happy, prosperous future. If it is not convenient to enclose the money, or if you prefer, I will mail your copy of VI-FLECT and you can hand the small amount to your postman when he delivers the package. The important thing is—SEND NOW.

COUPON

Geo. J. Spinner,
416 S. Dearborn St., MB738
Chicago, Ill.

Dear Sir: Please send me my copy of VI-FLECT for which I enclose \$5.00. I will try your VI-FLECT method of memory-building for 10 days, and if it does not increase my memory 100% I am to return it and you are to give me my money back without argument.

Name

Address

City State

Fone Fun For Fans

All Right with Jane

Mistress (severely): "If this occurs again, Jane, I shall be compelled to get another maid."

Jane: "I wish you would, mum; there's quite enough work for two of us"—True Story.

He Could Read

"You big bonthead," shouted the construction superintendent to his Swede foreman, "I told you to fire that man and you hit him with an ax."

"Vell, Boss, dose ax, she have sign, For Fire Only!"—The Mutual Magazine.

Pigskin Experts

Pippin: "Oh, look, the players are covered with mud. How will they ever get it off?"

Another Ditto: "What do you think the scrub team is for?"—Chaparral.

His Generous Request

"I hear that Jones left everything he had to an orphan asylum."

"Is that so? What did he leave?"
"Twelve children."—Patton's Monthly.

It Sounds Reasonable

"What causes heavy black smoke to come out of the exhaust pipe of a truck?" the class was asked.

"It is the only place it can come out," replied a candidate.

The Fan's Triumph

Here lies the remains of a radio fan, Now mourned by his many relations; He went to a powder mill, smoking his pipe,

And was picked up by twenty-one stations.—Williams Purple Cow.

Not If He's a Good Shot

"Do you think he will miss me," sang the entertainer in a cracked voice.

"If he does, he ought never to be trusted with a gun again," shouted one of the irate audience.—Medley.

Then He Wouldn't Mind the Cut

"If you found a man with a severe cut on the head that was bleeding freely, what would you do?" the teacher asked.

"I would put a tourniquet on his neck," announced one student of first aid.

STRAIGHT LINE CONDENSER

Continued from Page 33

connection between the shape of the plate and the zero or minimum capacity of the condenser. In buying this unit be careful to get a wide range from minimum up to maximum.

Coil and Condenser Mated

Another point that we have not mentioned but which has been understood throughout the whole article is that the proper coil should be used with the

condenser. A small capacity like the .00025 mfd. of an 11-plate condenser needs a much bigger coil than the .001 mfd. of a 43-plate unit. In every case if there is hooked up the right size of coil then the condenser will cover properly the broadcast range.

For this reason we have not labelled the curves "11-plate condenser" or "23-plate condenser." Indeed Figures 4, 5 and 6 apply to units of any number of plates provided the proper coil is mated to it. And in the same way it is assumed by the manufacturers that the right winding and hook-up will be used with their straight line products. Thus if a straight line frequency condenser of the latest design is connected in a tuner circuit, which has a lot of leakage capacity and the wrong size of coil, the results as logged will show very far from a straight line frequency.

In other words, the manufacturers of these new devices take it for granted that any one who is far enough advanced in radio to appreciate their product will also know enough to use the proper coil and circuit.

Your Friend Will Thank You

When you finish reading this magazine, don't throw it away. Just hand it to your friend. Any intelligent person can understand it, and your friend will thank you.

IZZY A. NUTT—He Does as He is Told.

BY HARVEY



WE SAY—

The

Brooklyn Radio Exposition

WILL BRING—

RECOGNITION
STABILIZED BUYING
NEW BUSINESS

WHY DID—

Western Electric Corporation
David Grimes, Inc.
Marwol Radio Corporation
Tower Mfg. Company
Valley Electric Co.
C. J. Boissonnault Company, Inc.
Herzog Radio Corporation
Powerola Radio Corporation
Wildermuth & Co. (Atwater-Kent)
20th Century Radio Corp. (Garod)

G. J. Seedman & Co. (Grebe)
Victory Electric Supply Co. (Fada)
J. W. Weber, Jr., Inc. (Eagle)
McPhilben Radio Co. (De Forest)
Pyramid Motor Equipment Co. (Thermiodyne)
Marko Storage Battery
Willard Storage Battery Co.
and others

ELECT TO EXHIBIT AT THE BROOKLYN SHOW?

ASK THEM!

TIME: OCTOBER 17th to 24th, 1925

**PLACE: 23rd REGIMENT ARMORY, BEDFORD AND ATLANTIC AVES.,
BROOKLYN, N. Y.**

EXECUTIVE OFFICES

1-7 DeKalb Ave., Brooklyn, N. Y.

PHONE: TRIANGLE 4126

S. T. ROGERS, Managing Director

Happiness for \$6.00 a Step!

Of course we mean one step of amplification. If you have a one or two-tube set you no doubt enjoy it, but it is nothing now compared with what it will be after you add one step of our RADICLEAR amplification. Instead of straining your ears to catch the murmur of that distant station, you will find that it comes in loud and clear.

Of course, any transformer will give increased loudness. Most of them also cause a lot of noise or distortion. The RADICLEAR transformer is noted for the fact that it never plays a tune of its own, but reproduces only the program which the detector feeds to it.



One reason for the clear tone of the RADICLEAR is the measured air gap in the iron. Other units by interlacing the sheets or laminations get variable magnetic resistance. In our product the leaves are not interlaced, but are butted against each other with a measured air gap. The result is that the usual falling off in the tone of high and low notes is not found in this instrument.

The transformer itself sells for \$3.95 postpaid.

If you want the entire kit, containing everything needed to add one step of audio to your set, the price is only \$6.00. The kit contains the famous RADICLEAR transformer, socket, rheostat, four-spring jack, "B" battery binding post, and wire for the whole job. Use the blank for happiness.

TAYLOR ELECTRIC CO.

1206 Broad Street
Providence, R. I.

The Taylor Electric Company,
1206 Broad Street,
Providence, R. I.

Please send me the following by parcel post. (Mark which one you want.)

Radiclear Audio Transformer @ \$3.95

Amplifier set complete @ \$6.00

(Socket to fit.....tube)

Audion Crystal @ 25c.

Gold Plated Cut Whisker @ 15c.

I enclose \$.... to pay for these.
(These above prices include the postage.)

Send them to me C. O. D. I will pay the above price plus postage.

(Indicate which way you wish to pay.)

Name.....

Address.....

**UNITED STATES BROADCASTING STATIONS
ARRANGED ALPHABETICALLY BY
CALL LETTERS**

Abbreviations: W.L., wave length in meters; K.C., frequencies in kilocycles; W.P., wattpower of station.

K.C. W.L. W.P.

*KDKA—Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.	970-309-	var.
KDPM—Westinghouse Elec. & Mfg. Co., Cleveland, O.	1200-250-	500
*KDZB—Frank E. Siefert, Bakersfield, Cal.	1430-210-	100
KFAB—Nebraska Buick Auto Co., Lincoln, Neb.	880-341-	500
KFAD—McArthur Bros. Mercantile Co., Phoenix, Ariz.	1100-273-	100
KFAJ—University of Colorado, Boulder, Colo.	1150-261-	100
KFAU—Boise High School, Boise, Idaho	1080-278-	500
KFBK—Kimball Upson Co., Sacramento, Cal.	1210-248-	100
*KFB�—Leese Brothers, Everett, Wash.	1340-224-	100
*KFBV—Bishop N. S. Thomas, Laramie, Wyo.	1110-270-	500
*KFDJ—Oregon Agricultural College, Corvallis, Ore.	1180-254-	500
KFDM—Magnolia Petroleum Co., Beaumont, Tex.	950-316-	500
KFDX—First Baptist Church, Shreveport, La.	1200-250-	100
KFDY—S. Dak. Ste. Col. Ag. & Mech. Arts, Br'kngs., S. D.	1100-273-	100
KFEQ—Scroggin, & Co. Bank, Oak, Nebr.	1120-268-	500
KFFV—Graceland College, Lamoni, Iowa.	1200-250-	100
KFGC—Louisiana State Univ., Baton Rouge, La.	1120-268-	100
KFGD—Oklahoma College for Women, Chickasha, Okla.	1190-252-	200
KFGH—Leland Stanford Junior Univ., Stanford Univ., Cal.	1110-270-	500
KFGX—First Presbyterian Church, Orange, Texas.	1200-275-	500
KFI—Earl C. Anthony, Los Angeles, Cal.	640-469-	3000
KFJF—National Radio Mfg. Co., Oklahoma, Okla.	1150-261-	275
KFKX—Westinghouse Elec. & Mfg. Co., Hastings, Neb.	1040-288-	2000
KFLR—University of New Mexico, Albuquerque, N. Mex.	1180-254-	200
KFLV—Swedish Evangelical Mission Church, Rockford, Ill.	1310-279-	100
KFLZ—Atlantic Automobile Co., Atlantic, Iowa.	1100-273-	100
*KFMQ—University of Arkansas, Fayetteville, Ark.	1000-300-	750
KFMR—Morningside College, Sioux City, Iowa.	1150-261-	100
*KFMX—Carleton College, Northfield, Minn.	890-337-	500
KFNF—Henry Field Seed Co., Shenandoah, Iowa.	1130-266-	500
*KFNV—L. A. Drake Battery Sup. Co., Santa Rosa, Cal.	1310-229-	100
*KFOA—Rhodes Dept. Store, Seattle, Wash.	660-454-	1000
KFON—Echophones Radio Shop, Long Beach, Cal.	1290-233-	100
KFOO—Latter Day Saints Univ., Salt Lake City, Utah.	1270-236-	250
KFOR—David City Tire & Electric Co., David City, Neb.	1330-226-	100
KFOX—Technical High School, Omaha, Nebr.	1210-248-	100
*KFPG—K. M. Turner Radio Corp., Los Angeles, Cal.	1260-238-	250
KFPY—Los Angeles County Forestry, Los Angeles, Cal.	1300-231-	500
KFPZ—Symons Investment Co., Spokane, Wash.	1130-266-	100
KFOA—The Principles, St. Louis, Mo.	1150-261-	100
KFOB—Searchlight Publishing Co., Fort Worth, Texas.	1140-263-	150
KFOC—Kidd Brothers Radio Shop, Taft, Cal.	1300-231-	100
KFOZ—W. E. Riker, Holy City, Calif.	1350-222-	100
KFQZ—Taft Products Co., Hollywood, Calif.	1330-226-	250
KFRB—Hall Bros., Beville, Texas.	1210-248-	250
KFRU—Ethical Radio Co., Bristow, Okla.	760-395-	500
KFGS—Echo Park Evangelistic Assn., Los Angeles, Cal.	1090-275-	500
KFUM—W. D. Pyle, Colorado Springs, Colo.	1240-242-	100
KFUV—Concordia Seminary, St. Louis, Mo.	550-545-	500
KFUT—University of Utah, Salt Lake City, Utah.	1150-261-	100
KFVE—Film Corporation of America, St. Louis, Mo.	1250-240-	500
KFVW—Airfan Radio Corporation, San Diego, Cal.	1220-246-	500
*KFWA—Browning Bros. Co., Ogden, Utah.	1150-261-	100
KFWB—Warner Bros. Pictures, Inc., Hollywood, Cal.	1190-252-	500
KFWD—Arkansas Light & Power Co., Arkadelphia, Ark.	1130-266-	500
KFWH—F. Wellington Morse, Jr., Chico, Cal.	1180-254-	100
KFWI—Radio Entertainments, Inc., So. San Fran., Cal.	1360-220-	500
KFWM—Oakland Educational Society, Oakland, Cal.	1430-207-	500
KFWO—Lawrence Mott, Avalon, California	1420-211-	250
KFWU—Louisiana College, Pineville, La.	1260-238-	100
*KFXC—Santa Maria Val. R. R. Co., Santa Maria, Cal.	1430-210-	100
*KFXF—Pikes Peak Broad. Co., Colorado Springs, Col.	1200-250-	500
*KGB—Tacoma Daily Ledger, Tacoma, Wash.	1200-250-	100
KGO—General Electric Co., Oakland, Cal.	830-361-	3000
KGU—Marion A. Mulrony, Honolulu, Hawaii	1110-270-	500
KGW—Portland Morning Oregonian, Portland, Ore.	610-491-	500
KHJ—Times-Mirror Co., Los Angeles, Cal.	740-405-	500
KHQ—Louis Wasmser, Seattle, Wash.	1100-273-	100
*KJR—Northwest Radio Service Co., Seattle, Wash.	780-384-	1000
*KLDs—R. Ch. Jesus Christ, L. D. Sts., Independence, Mo.	680-441-	1000
KLS—Warner Bros. Radio Supplies Co., Oakland, Cal.	1240-242-	250
*KLX—Tribune Publishing Co., Oakland, Cal.	590-508-	500
KLZ—Reynolds Radio Co., Denver, Colo.	1130-266-	250
KMA—May Seed & Nursery Co., Shenandoah, Iowa.	1190-252-	500
KMO—Love Electric Co., Tacoma, Wash.	1200-250-	100
KNRC—Clarence B. Juneau, Hollywood, Cal.	1440-208-	250
KNX—Los Angeles Express, Los Angeles, Cal.	890-337-	500
*KOA—General Electric Co., Denver, Colo.	930-322-	5000
KOB—New Mexico Col. of Agriculture, State Col., N. Mex.	860-349-	750
*KOCB—Omaha Central H. School, Omaha, Neb.	1160-258-	100
KOIL—Monarch Manufacturing Co., Council Bluffs, Ia.	1080-278-	500
KOP—Detroit Police Dept., Detroit, Mich.	1080-278-	500
KPO—Hale Bros., San Francisco, Cal.	700-428-	500
KPRC—Houston Printing Co., Houston, Texas.	1010-297-	500
KPSN—Pasadena Star-News, Pasadena, Cal.	950-316-	1000
KOP—Apple City Radio Club, Hood River, Ore.	1110-270-	100
KOV—Double-Hill Electric Co., Pittsburg, Pa.	1090-275-	100
*KRE—Berkeley Daily Gazette, Berkeley, Cal.	1160-258-	100
KSAC—Kansas State Agric. College.	880-341-	500

K.C. W.L. W.P.

KSD—Post-Dispatch, St. Louis, Mo.	550-545-	750
KSL—The Radio Service Corp., Salt Lake City, Utah	1000-300-	1000
*KTAB—Tenth Ave. Baptist Church, Oakland, Cal.	1250-240-	500
KTBI—Bible Institute of Los Angeles, Los Angeles, Cal.	1020-294-	750
KTCL—American Radio Tel. Co., Inc., Seattle, Wash.	960-310-	1000
KTSH—New Arlington Hotel Co., Hot Springs, Ark.	800-375-	500
KTW—First Presbyterian Church, Seattle, Wash.	660-454-	100
KUO—Examiner Printing Co., San Francisco, Cal.	1220-246-	100
KUOM—State Univ. of Montana, Missoula, Mont.	1230-244-	200
KWKC—Wilson Duncan Studios, Kansas City, Mo.	1270-236-	100
*KWKH—W. G. Paterson, Kennonwood, La.	1110-273-	500
*KWSC—State College of Washington, Pullman, Wash.	860-349-	500
KWVG—City of Brownsville, Brownsville, Texas.	1080-278-	500
*KYW—Westinghouse Elec. & Mfg. Co., Chicago, Ill.	560-535-	2000
KZKZ—Electrical Supply Co., Manila, P. I.	1110-270-	100
KZM—Preston D. Allen, Oakland, Cal.	1240-242-	100
KZKQ—Far Eastern Radio, Manila, P. I.	1350-222-	500
*KZUY—F. Johnson, Elser, Baguio, P. I.	833-360-	500
WAAB—Valdemar Jensen, New Orleans, La.	1120-268-	100
WAAC—Tulane University, New Orleans, La.	1090-275-	100
WAAF—Chicago Daily Drovers Journal, Chicago, Ill.	1080-278-	200
WAAM—I. R. Nelson Co., Newark, N. J.	1140-263-	500
WAAW—Omaha Grain Exchange, Omaha, Neb.	1080-278-	500
WABA—Lake Forest University, Lake Forest, Ill.	1120-227-	200
WABO—Lake Avenue Baptist Church, Rochester, N. Y.	1080-278-	100
WABX—Henry B. Joy, Mount Clemens, Mich.	1120-246-	100
WADC—Allen Theatre, Akron, O.	1160-258-	100
*WADF—Albert B. Parlet Co., Port Huron, Mich.	1090-275-	500
WAHG—A. H. Grebe Co., Richmond Hill, N. Y.	950-316-	500
WAMD—Hubbard & Co., Minneapolis, Minn.	1230-244-	500
*WAPI—Alabama Polytechnic Institute, Auburn, Ala.	1210-248-	500
WARC—Am. Rad. & Research Corp., Medf'd H'ldse, Mass.	1150-261-	100
WBA—Purdue University, West Lafayette, Ind.	1100-273-	250
WBAK—Pennsylvania State Police, Harrisburg, Pa.	1090-275-	500
WBAO—James Millikin University, Decatur, Ill.	1110-270-	100
WBAP—Wortham-Carter Publishing Co., Fort Worth, Tex.	630-476-	1000
*WBAV—Erner & Hopkins, Columbus, Ohio	1020-294-	500
WBAZ—John H. Stenger, Jr., Wilkes-Barre, Pa.	1170-256-	100
WBBG—Irving Vermilya, Mattapoisett, Mass.	1210-248-	100
*WBBL—Grace Covenant Church, Richmond, Va.	1310-229-	150
WBBM—Atlas Investment Co., Chicago, Ill.	1330-226-	150
WBBP—Petoskey High School, Petoskey, Mich.	1260-238-	200
WBBR—People's Pulpit Assoc., Rossville, N. Y.	1100-273-	500
WBCN—Foster & McDonnell, Chicago, Ill.	1130-266-	500
WBES—Bliss Electrical School, Takoma Park, Md.	1350-222-	100
WBOQ—A. H. Grebe Co., Richmond Hill, N. Y.	1270-236-	100
WBT—Southern Radio Corp., Charlotte, N. C.	1090-275-	250
WBZ—Westinghouse Elec. & Mfg. Co., Springfield, Mass.	900-331-	2000
*WBZA—Westinghouse Elec. & Mfg. Co., Boston, Mass.	1240-242-	250
WBAC—Connecticut Agric. College, Mansfield, Conn.	1090-275-	500
WCAD—St. Lawrence University, Canton, N. Y.	1140-263-	200
WCAE—Kaufmann & Baer Co., Pittsburg, Pa.	650-461-	500
WCAH—Entekinc Electric Co., Columbus, O.	1130-266-	500
*WCAJ—Nebraska Wesleyan Univ., Univ. Place, Nebr.	1180-254-	500
WCAL—St. Olaf College, Northfield, Minn.	890-337-	500
WCAO—A. A. & S. Brager, Baltimore, Md.	1090-275-	100
WCAP—Chesapeake & Potomac Tel. Co., Wash., D. C.	640-469-	500
WCAR—Southern Radio Corp. of Texas, San Antonio, Tex.	1140-263-	100
WCAU—Durham & Co., Philadelphia, Pa.	1080-278-	500
WCAX—University of Vermont, Burlington, Vt.	1200-250-	100
WCBC—University of Michigan, Ann Arbor, Mich.	1310-229-	200
*WCBD—Wilbur G. Voliva, Zion, Ill.	870-345-	5000
WCBO—First Baptist Church, Nashville, Tenn.	1270-236-	100
WCCE—Charles E. Erbstein, Elgin, Ill.	720-416-	5000
WCES—H. M. Couch, Joliet, Ill.	1090-275-	1000
WCFC—Charles E. Erbstein, Elgin, Ill.	1400-214-	150
WCM—Texas Markets & Warehouse Dept., Austin, Tex.	1120-268-	250
WCNS—Congress Square Hotel Co., Portland, Me.	1170-256-	500
WCS—T. S. Sherer Co., Worcester, Mass.	1120-268-	500
WCWU—Clark University, Worcester, Mass.	1260-238-	250
WCX and WJR—The Detroit Free Press and Jewett Radio and Photograph Co., Pontiac, Mich., (operating jointly).	580-517-	1500
*WDAD—Dad's Auto Accessories, Inc., Nashville, Tenn.	1330-226-	150
WDAE—Tampa Daily News, Tampa, Fla.	1100-273-	250
*WDAF—Kansas City Star, Kansas City, Mo.	820-366-	500
WDAG—J. Laurence Martin, Amarillo, Tex.	1140-263-	100
WDBE—Gilham-Schoen Electric Co., Atlanta, Ga.	1080-278-	100
WDBK—M. F. Bro Radio Store, Cleveland, O.	1320-227-	100
WDBO—Rollins College, Winter Park, Fla.	1250-240-	100
WDBR—Tremont Temple Baptist Church, Boston, Mass.	1150-261-	100
WDBY—North Shore Congregational Church, Chicago, Ill.	1160-258-	500
WDWF—Dutes W. Flint, Cranston, R. I.	680-441-	500
WDZ—James L. Bush, Tuscola, Ill.	1080-278-	100
WDCH—Dartmouth College, Hanover, N. H.	1170-256-	100
*WEAF—American Tel. & Tel. Co., New York, N. Y.	610-492-	4500
WEAH—Hotel Lassen (Rigby-Gray H. Co.), Wichita, Kas.	120-263-	100
WEAI—Cornell University, Ithaca, N. Y.	1180-254-	500
WEAJ—University of So. Dakota, Vermilion, So. Dak.	680-441-	100
WEAM—Borough of North Plainfield, N. Plainfield, N. J.	1150-261-	250
WEAN—Shepard Co., Providence, R. I.	1010-270-	250
WEAO—Ohio State University, Columbus, Ohio.	1120-268-	250
*WEAR—Goodyear Tire & Rubber Co., Cleveland, Ohio.	770-389-	750
WEAU—Davidson Bros. Co., Sioux City, Iowa.	1090-275-	100
WEAY—Iris Theater, Houston, Tex.	1110-270-	500

The Heart of Your Radio Set

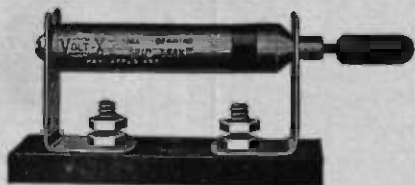
A Grid Leak is essential on every set. There are few sets made which wouldn't be improved by the use of a Variable Grid Leak.

Even the set makers admit that.

But those makers say—"Show us a good Variable Grid Leak,"—because they know that most of the variables on the market have been a failure.

Right now -- we're showing them

Buy It



Try It

Volt-X Ball-Bearing
Variable Grid Leak

If you are not satisfied, return it and get your
money back

This GRID LEAK is made by an organization which has been handling delicate electrical instruments for years. We know what it means to build accurately and substantially. We KNOW that this GRID LEAK is as nearly perfect as human hands and precise machinery can make it —we're glad to have you try it with the knowledge that if it doesn't do what we claim for it, your money will be refunded.

Clip the coupon, and send it in with \$1.00—a grid leak will be mailed at once.

BURTON & ROGERS MFG. CO.

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Please
send me one
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VARIABLE GRID
LEAKS.

I enclose \$1.00 with
the understanding that
this merchandise is guaran-
teed to give satisfaction, or
may be returned.

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ADDRESS.

K.C. W.L. W.P.

K.C. W.L. W.P.

WEBC—Walter C. Bridges, Superior, Wis.....	1240-242-100
WEBH—Edgewater Beach Hotel Co., Chicago, Ill.....	810-370-100
WEBJ—Third Avenue Railway Co., New York, N. Y.....	1100-273-500
*WEBK—Grand Rapids Radio Co., Grand Rapids, Mich.....	1240-242-100
WEBL—Radio Corp. of America, United States (portable).....	1330-226-100
WEBM—Radio Corp. of America, United States (portable).....	1330-226-100
WEBW—Beloit College, Beloit, Wis.....	1120-268-500
WEEL—Edison Electric Illuminating Co., Boston, Mass.....	630-476-500
WEMC—Emmanuel Missionary Col., Berrien Springs, Mich.....	1050-286-500
*WENR—All-American Radio Corp., Chicago, Ill.....	1130-266-1000
WENW—St. Louis University, St. Louis, Mo.....	1210-248-100
WFAA—Dallas News & Dallas Journal, Dallas, Tex.....	630-476-500
WFAV—University of Nebraska, Lincoln, Neb.....	1090-275-500
WFBG—William F. Gable Co., Altoona, Pa.....	1080-278-100
WFBH—Concourse Radio Corp., New York, N. Y.....	1100-273-500
WFBI—Galvin Radio Supply Co., Camden, N. J.....	1270-236-250
WFBL—Onondoga Hotel, Syracuse, N. Y.....	1190-252-100
WFBM—Merchant Heat & Light Co., Indianapolis, Ind.....	1120-268-250
WFBP—Fifth Infantry, Maryland N. G., Baltimore, Md.....	1180-254-100
WFDL—Frank D. Fallain, Flint, Mich.....	1280-234-100
WFI—Strawbridge & Clothier, Philadelphia, Pa.....	760-395-500
*WFKB—Francis K. Bridgman, Chicago, Ill.....	1380-217-200
*WFLR—Robert Morrison Lacey, Brooklyn, N. Y.....	1460-205-100
WGAZ—South Bend Tribune, South Bend, Ind.....	1090-275-250
*WGBB—Harry H. Carman, Freeport, N. Y.....	1230-244-100
WGBF—Finke Furniture Co., Evansville, Ill.....	1270-236-100
WGBQ—Stout Institute, Menomonie, Wis.....	1280-234-100
WGBS—Gimbel Bros., New York.....	950-316-500
*WGBU—Florida Cities Fin. Co., Fulford By-The-Sea, Fla.....	1080-278-500
WGBX—University of Maine, Orono, Me.....	1190-252-100
WGCP—D. W. May, Newark, N. J.....	1190-252-500
WGES—Coyne Electrical School, Oak Park, Ill.....	1200-250-500
WGHP—Geo. H. Phelps, Inc., Detroit, Mich.....	1110-270-500
WGMU—A. H. Grebe & Co., Inc. (portable), Richmond Hill, N. Y.....	1270-236-100
WGN—The Tribune, Chicago, Ill.....	1180-370-1000
WGR—Federal Telephone Mfg. Corp., Buffalo, N. Y.....	940-319-750
*WGST—Georgia School of Technology, Atlanta, Ga.....	1110-270-500
*WGY—General Electric Co., Schenectady, N. Y.....	790-380-3000
WHA—University of Wisconsin, Madison, Wis.....	560-535-750
*WHAD—Marquette Univ. and Mil. Jour., Mil. Wis.....	1090-275-500
WHAG—University of Cincinnati, Cincinnati, O.....	1290-233-100
WHAM—University of Rochester, Rochester, N. Y.....	1080-278-100
WHAP—William H. Taylor Finance Corp., Brooklyn, N. Y.....	1250-250-100
WHAR—Seaside Hotel, Atlantic City, N. J.....	1090-275-500
WHAS—Courier Journal & Louisville Times.....	750-400-500
WHAT—George W. Young, Minneapolis, Minn.....	1140-263-500
WHAU—Wilmington Elec. Specity Co., Wilmington, Del.....	1130-266-100
WHAZ—Rensselaer Polytechnic Institute, Troy, N. Y.....	790-380-500
WHB—Sweeney School Co., Kansas City, Mo.....	820-366-500
WHBF—Beardsley Specialty Co., Rock Island, Ill.....	1350-222-100
WHBH—Culver Military Academy, Culver, Ind.....	1350-222-100
WHBP—Johnston Automobile Co., Johnston, Pa.....	1170-256-100
WHBW—D. R. Klenze, Philadelphia, Pa.....	1390-216-100
WHDI—Wm. Hood Dunwoody I. Inst., Minneapolis, Minn.....	1080-278-500
WHEC—Hickson Electric Co., Inc., Rochester, N. Y.....	1160-258-100
WHK—Radiovox Co., Cleveland, O.....	1100-273-250
WHN—George Schubel, New York, N. Y.....	830-361-500
*WHO—Bankers Life Co., Des Moines, Iowa.....	570-526-5000
WHT—Radiophone Broadcasting Corporation, Deerfield, Ill.....	1260-238-1500
WIAD—Howard R. Miller, Philadelphia, Pa.....	1200-250-100
WIAS—Home Electric Co., Burlington, Iowa.....	1180-254-100
WIBA—The Capital Times Studio, Madison, Wisc.....	1270-236-100
WIBC—L. M. Tate Post No. 39, V.F.W., St. Petersburg, Fla.....	1350-222-100
WIBK—University of the City of Toledo, Toledo, O.....	1460-205-100
WIBO—Nelson Brothers, Chicago, Ill.....	1330-226-1000
WIBT—O. E. Miller, New York, N. Y.....	1420-211-100
WIBW—L. L. Dill, Logansport, Ind.....	1360-220-100
WIL—St. Louis Star, Benson Radio Co., St. Louis, Mo.....	1100-273-250
WIP—Gimbel Bros., Philadelphia, Pa.....	590-508-500
WJAD—Jackson's Radio Eng. Laboratories, Waco, Texas.....	850-353-500
WJAG—Norfolk Daily News, Norfolk, Nebr.....	1110-270-250
WJAK—Clifford L. White, Greentown, Ind.....	1180-254-100
WJAM—D. M. Perham, Cedar Rapids, Ia.....	1120-268-100
WJAR—The Outlet Co., Providence, R. I.....	980-306-500
WJAS—Pittsburgh Radio Supply House, Pittsburgh, Pa.....	1090-275-500
*WJAZ—Zenith Radio Corp., Mt. Prospect, Ill. (Limited).....	930-322-1500
WJBC—Hummer Furniture Co., La Salle, Ill.....	1280-234-100
WJBI—Robert S. Johnson, Red Bank, N. J.....	1370-219-250
*WJBL—Wm. Gushard Dry Goods Co., Decatur, Ill.....	1110-270-500
*WJJD—Supreme Lodge L. O. Moose, Mooseheart, Ill.....	990-303-500
WJR—Same as WCX.....	
WJY—Radio Corporation of America, New York, N. Y.....	740-405-1000
WJZ—Radio Corporation of America, New York, N. Y.....	660-454-1000
WKAA—H. F. Paar, Cedar Rapids, Iowa.....	1080-278-500
WKAF—WKAF Broadcasting Co., Milwaukee, Wis.....	1150-261-250
WKAP—Radio Corporation of Porto Rico, San Juan, P. R.....	880-341-500
WKAR—Michigan Agric. Col., E. Lansing, Mich.....	1050-286-1000
WKBE—K. and B. Electric Co., Webster, Mass.....	1300-231-100
WKBG—C. L. Carrell (portable), Chicago, Ill.....	1390-216-100
*WKBK—Shirley Kats, New York, N. Y.....	1430-210-500
WKRC—Kodel Radio Corp., Cincinnati, O.....	710-422-1000
*WKRC—Kodel Radio Corp., Cincinnati, O.....	920-353-1000
WLAL—First Christian Church, Tulsa, Okla.....	1200-250-150
WLKY—E. C. Hull and H. S. Richards, Oklahoma, Okla.....	1090-275-100

WLB—University of Minnesota, Minneapolis, Minn.....	1080-278-500
WLBL—Wisconsin Dept. of Markets, Stevens Point, Wis.....	1080-278-500
WLIT—Lit Bros., Philadelphia, Pa.....	760-395-500
WLS—Sears, Roebuck Co., Chicago, Ill.....	870-345-500
WLSL—Lane Technical High School, Chicago, Ill.....	1160-258-100
WLW—Crosley Radio Corp., Harrison, O.....	710-422-5000
WLWL—Mis. Soc. of St. Paul the Apostle, New York.....	1040-288-1000
WNAC—Clive B. Meredith, Cazenovia, N. Y.....	1090-275-100
WMAF—Round Hills Radio Corp., Dartmouth, Mass.....	680-441-1000
WMAK—Norton Laboratories, Lockport, N. Y.....	1130-466-500
WMAQ—Chicago Daily News, Chicago, Ill.....	670-448-500
WMAZ—Mercer University, Macon, Ga.....	1150-261-500
WMBB—American Bond & Mortgage Co., Chicago, Ill.....	1200-250-500
WMBF—Fleetwood Hotel, Miami Beach, Fla.....	780-384-500
WMC—Commercial Appeal, Memphis, Tenn.....	600-500-500
*WMCB—Greeley Square Hotel Co., Hoboken, N. J.....	880-341-500
WNAB—Shepard Stores, Boston, Mass.....	1200-250-100
WNAC—Shepard Stores, Boston, Mass.....	1070-280-500
WNAD—University of Oklahoma, Norman, Okla.....	1180-254-250
*WNAP—Wittenberg College, Springfield, Ohio.....	1080-275-100
WNAT—Lennig Bros. Co., Philadelphia, Pa.....	1200-250-100
WNAX—Dakota Radio Apparatus Co., Yankton, S. Dak.....	1230-244-100
WNJ—Radio Shop of Newark, Newark, N. J.....	1290-233-100
WNOX—People's Tel. & Tel. Co., Knoxville, Tenn.....	1120-268-500
*WNYC—City of New York, New York, N. Y.....	190-233-100
WOAI—Southern Equipment Co., San Antonio, Texas.....	760-395-1500
WOAN—James D. Vaughn, Lawrenceburg, Tenn.....	1060-283-500
WOAW—Woodmen of the World, Omaha, Nebr.....	570-526-1000
*WOAX—Franklyn J. Wolff, Trenton, N. J.....	1250-240-500
WOC—Palmer School of Chiropractic, Davenport, Iowa.....	620-484-5000
*WODA—O'Dea Temple of Music, Paterson, N. J.....	1340-224-100
WOI—Iowa State College, Ames, Iowa.....	1110-270-750
*WOK—Neutrownd Radio Mfg. Co., Homewood, Ill.....	1380-217-5000
WOO—John Wanamaker, Philadelphia, Pa.....	590-508-500
WOQ—Unity School of Christianity, Kansas City, Mo.....	1080-278-500
WOR—L. Bamberger & Co., Newark, N. J.....	740-405-500
*WORD—People's Pulpit Association, Batavia, Ill.....	1090-275-5000
WOS—Missouri State Marketing Bureau, Jefferson City, Mo.....	680-441-500
WOWL—Owl Battery Co., New Orleans, La.....	1110-270-100
WOWO—Main Auto Supply Co., Fort Wayne, Ind.....	1320-227-500
WPG—Municipality of Atlantic City, Atlantic City, N. J.....	1000-300-500
*WPRC—Wilson Printing & Radio Co., Harrisburg, Pa.....	1390-216-100
WPCS—Pennsylvania State College, State College, Pa.....	1150-261-500
WQAA—Horace A. Beale, Jr., Parkersburg, Pa.....	1360-220-500
WQAC—Gish Radio Service, Amarillo, Tex.....	1280-234-100
WQAM—Electrical Equipment Co., Miami, Fla.....	1140-263-100
WQAN—Scranton Times, Scranton, Pa.....	1200-250-100
WQAO—Calvary Baptist Church, New York, N. Y.....	833-360-100
WQJ—Calumet Rainbow Broadcasting Co., Chicago, Ill.....	670-448-500
WRAP—The Radio Club, Laporte, Ind.....	1340-224-100
WRAK—Economy Light Co., Escanaba, Mich.....	1170-256-100
WRAM—Lombard College, Galesburg, Ill.....	1230-244-100
WRAV—Antioch College, Yellow Springs, Ohio.....	1140-263-100
WRAX—Flexon's Garage, Gloucester City, N. J.....	1120-268-500
WRC—Radio Corporation of America, Washington, D. C.....	640-469-1000
*WRCO—Wynne, Radio Co., Raleigh, N. C.....	1190-252-100
WREO—Reo Motor Car Co., Lansing, Mich.....	1050-286-500
WRK—Doron Bros. Electrical Co., Hamilton, O.....	1110-270-100
WRM—University of Illinois, Urbana, Ill.....	1100-273-500
WRMU—A. H. Grebe & Co., Richmond Hill, N. Y.....	1270-236-100
WRNY—Experimenter Publishing Co., New York, N. Y.....	1160-258-500
WRR—Dallas Police & Fire Dept., Dallas, Tex.....	1150-261-350
*WRST—Radiotel Mfg. Co., Bay Shore, N. Y.....	1390-216-250
WRW—Tarrytown Radio Research Labs., Tarrytown, N. Y.....	1100-273-500
WSAC—Clemson Agric. Col., Clemson College, S. C.....	890-337-500
*WSAI—United States Playing Card Co., Cincinnati, O.....	920-326-5000
WSAJ—Grove City College, Grove City, Pa.....	1310-229-250
WSAN—Allentown Call Publishing Co., Allentown, Pa.....	1310-229-100
WSAR—Doughty & Welch Electric Co., Fall River, Mass.....	1180-254-100
*WSAX—Zenith Radio Corp., Chicago, Ill.....	1120-268-100
*WSB—Atlanta Journal, Atlanta, Ga.....	700-428-1000
WSBC—World Battery Co., Chicago, Ill.....	1430-210-200
WSBF—Six, Baer & Fuller, St. Louis, Mo.....	1100-273-250
WSDA—The City Temple, New York, N. Y.....	1140-263-250
WSKC—World's Star Knitting Co., Bay City Mich.....	1150-261-100
WSMB—Saenger A/m'h Co., & Maison Blanche N. O. La.....	940-319-500
WSMK—S. M. K. Radio Corp., Dayton, Ohio.....	1090-275-500
WSOE—School of Eng'ng of Milwaukee, Milwaukee, Wis.....	1200-246-500
*WSRO—Radio Co., Hamilton, Ohio.....	1190-252-100
WSUI—State University of Iowa, Iowa City, Iowa.....	620-484-500
WSY—Alabama Polytechnic Institute, Auburn, Ala.....	1200-250-500
WTAB—Fall River Daily Herald Pub. Co., Fall R'vr, Mass.....	1130-266-100
*WTAC—Penn. Traffic Co., Johnstown, Pa.....	1120-268-100
WTAM—Willard Storage Battery Co., Cleveland O.....	770-389-2500
WTAR—Reliance Electric Co., Norfolk, Va.....	1150-261-100
*WTAT—Edison Illum'ing Co., Boston, Mass., (portable).....	1230-244-100
*WTAW—Agri. & Mech. Col. of Texas, Col. Station, Tex.....	1110-270-500
WTHS—Flint Senior High School, Flint, Mich.....	1370-219-250
WTIC—Travelers Insurance Co., Hartford, Conn.....	860-549-500
WWAD—Wright & Wright, Philadelphia, Pa.....	1200-250-100
*WWGL—Radio Engineering Corp., Richmond Hill, N. Y.....	1410-213-500
WWI—Ford Motor Co., Dearborn, Mich.....	1130-266-500
WWJ—Detroit News, Detroit, Mich.....	850-353-1000
WWL—Loyola University, New Orleans, La.....	1090-275-1000

*Additions and corrections.