

RADIO LORE FOR NOVICE AND EXPERIENCED FAN

This Superhetrodyne Should Please by Ease of Assembly

Giant Eight-Tube Receiver May be Constructed With Little Difficulty by Unskilled Fan.—Wiring is Simplified.—Operates Cheaply

BY WILMER S. TRINKLE

Not so many years ago the man who played with radio was up against many problems. Very little definite information was available, especially about the construction of parts and receivers. The parts necessary to build a set were not, as a general rule, to be had when you wanted them, and even in some of the larger cities there was not one electrical store that had an agency for selling "wireless" parts.

To-day the radio public does not have to go many blocks from its home or office before it passes several stores that handle a reliable stock of radio material. Parts may be had in quantity and are generally much superior to the average makes of three years ago.

In the writer's opinion, an important step in the right direction is the policy of the various manufacturers in standardizing and matching their products. The chances are that if it is necessary to replace a damaged transformer, another one of the same make may be installed with the assurance that it will work correctly.

The receiver described embodies quite a few features that should be of interest to any one who would like to own a "super," but is started away by a long list of parts and accessories.

But comparatively few parts are necessary to build this receiver, and they are designed to work well together. The thoughtless substitution of parts not designed to work with the rest of a set, particularly in a superhetrodyne, is responsible in many cases for mediocre results.

As you can see from the circuit diagram, this set is an eight-tube "super." It can be used either with a loop or an antenna and ground. The loop jack may be pulled out and the set will automatically be connected to the antenna and ground. You can readily see that making the set adaptable to either system, without complicated connecting and switching arrangements, is a decided advantage.

This is accomplished by means of an antenna coupler consisting of a secondary, tuned with the first condenser, and an untuned primary. The double-circuit jack connects the receiver to the antenna and ground in its normal position and disconnects them when the loop jack is inserted.

A suitable antenna for this set is a single wire about 40 feet long. The usual precautions of making careful insulations and installations should be taken. This wire may be used either in or out-of-doors, preferably the latter.

The intermediate frequency transformers, oscillator and antenna coupler are all similar in appearance and may be bought in the form of a complete kit. The oscillator is used with a separate tube to heterodyne the incoming wave and tunes to the desired frequencies with a .00025 condenser.

The intermediate transformers are of the air-core variety and are wound on rather a large core. This cuts down the amount of wire needed to produce the proper inductances. The field of these coils is not extensive and permits close mounting without "interstage coupling." This is a decided advantage where space is at a premium.

The transformers are very closely matched, the manufacturers claiming one-third of 1 per cent. accuracy. This matching of the frequency peaks is accomplished by means of a small shunt condenser across the secondary. This small capacity cuts down the amount of inductance necessary to tune to the desired intermediate frequency and consequently lowers the radio-frequency resistance. These condensers are inclosed in the case of the transformer and are shown in dotted lines in the circuit diagram.

A rather clever mechanical arrangement

that vernier dials are an absolute necessity. The dials specified use an indicator having a fine hairline, making the accurate logging of stations.

Take all the precautions possible when installing the audio frequency amplifier. The volume delivered by the second detector of a superhetrodyne is much greater than that given by the detector in other circuits. This means that, as a general rule, not as much audio amplification is necessary with a "super" as with the average set.

The writer has found that in his own personal sets, one stage of good transformer or two of resistance-coupled amplification will deliver sufficient volume for comfortable listening-in.

Two stages of resistance-coupled amplification are incorporated in the set described. The coupling condensers and resistances are inclosed in a small bakelite case and all the connections are made internally. In cases of these coupling units are about the same size as the base of the average audio transformer and the terminals are marked in the same fashion. This means that the wiring is greatly simplified, and the chances of error are greatly reduced by those who have ever hooked up the various condensers and leads involved in the usual resistance-coupled amplifier circuit.

These coupling units are designed for use with from 90 to 135 volts plate voltage and from 1½ to 4½ volts grid bias. If it is possible, use the higher voltage as the results will more than repay you for the outlay for the extra "B" battery. When the set is in operation the "C" battery voltage should be adjusted to the best operating point which is indicated by the best quality and the lower "B" battery current consumption.

No interstage jacks are used with this receiver, the output of the second stage going direct to the single circuit output. The volume is controlled by a variable high resistance shunted across the "G" and "F" posts of the second audio coupler. The adjustment of this noninductive resistance gives a smooth control of the volume. The volume delivered by the set is also controlled by the potentiometer in the radio-frequency unit.

If the builder has a preference for the transformer-coupled type of audio amplification, the transformers may be substituted for the resistance coupling units. The circuit diagram will be the same whichever you use, due to the fact that the terminals of both types are marked the same.

If transformers are substituted, be sure to use the best possible, preferably of a low ratio. It is suggested that one of the new semi-power tubes like the UX112 be used in the last socket if transformers are used. The sockets are built so that either the old standard or the new "UX" tubes will fit.

The "E" battery current is turned on by a filament switch, located in the lower right-hand part of the panel. This position shortens the length of the filament leads and is convenient from an operating viewpoint.

Flament control jacks are not necessary in this set due to the fact that the entire eight tubes are used all of the time. This simplifies the wiring considerably. The filament circuit of the tubes is split up into two divisions of four tubes each. Both of these four tube sections have their filament temperature regulated by a separate automatic filament control designed to give the proper current to the complete section. This means that the filament controls are cut down to two and is a further aid to the simplification of the wiring.

The parts needed to build this set are as follows:

One Victor superhetrodyne kit.
Two General Instrument Company .0005 S. L. P. condensers.
Two Mar-Co vernier dials.
One Centralab 500,000-ohm modulator.
One Parker-Aeolus 400-ohm potentiometer.

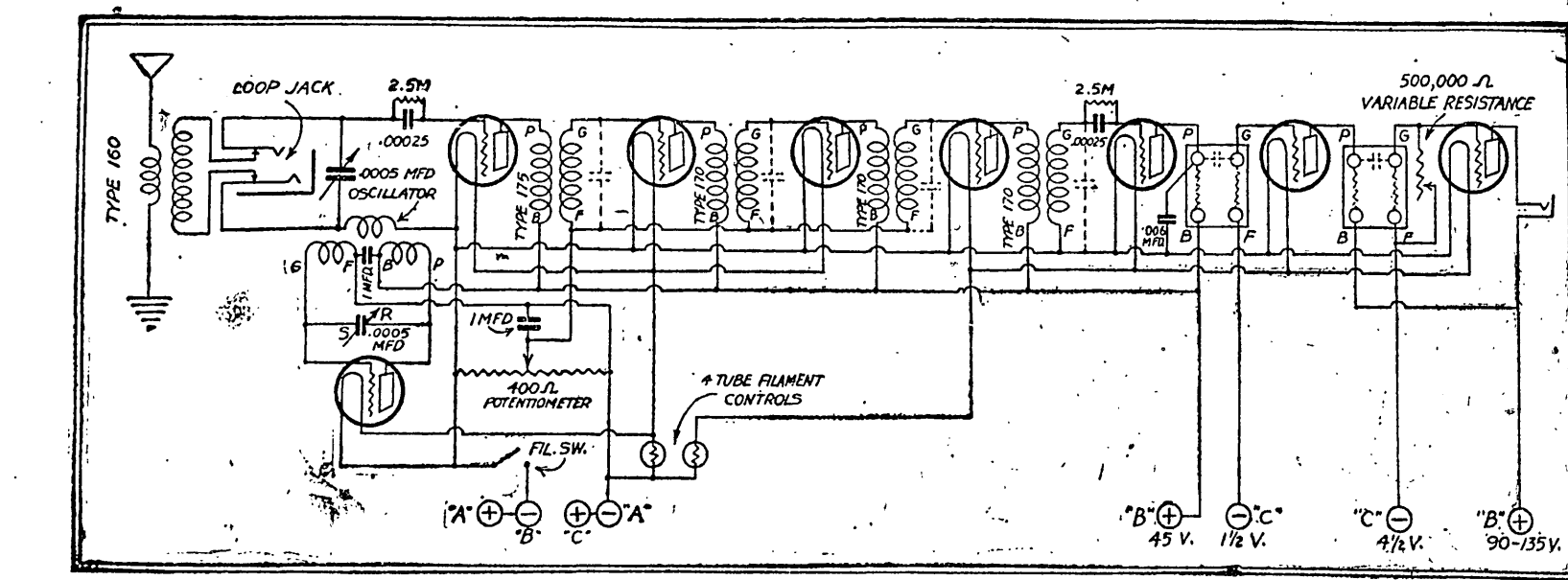
Eight Eby sockets.
Two Branch-stals No. 43.
Two Sango condensers with clips .00025 mfd.
One Sango condenser .006 mfd.
Two Bopier by-pass condensers, 1 mfd.

Two Durham grid leaks 2.5 megohms.
One Yaxley filament switch No. 10.
One Yaxley double-circuit jack No. 4.
One Yaxley single-circuit jack No. 1.
Ten Eby engraved binding posts marked as follows: Ant. Gnd. A-, A+, B-, B+, B-136, C+, and two C-.

One Eby binding post strip.
One Westinghouse Micarta panel 7x20.
One baseboard 7x20.

When buying the dials, be sure that they are marked with the zero to the right; in other words, "clockwise." Another thing is that the sockets specified may be used with either the old type standard or the new "UX" base tubes. The set is designed to be used with "A" type quarter-ampere tubes and a six-volt storage "A" battery. These tubes give a great deal more volume in this set than the other variety, and the storage battery will be cheaper to maintain with a multi-tube set of this character than dry batteries with the small tubes.

It is advisable to mount all of the



Wiring Diagram of Simplified Superhetrodyne Receiver

ment is incorporated in each transformer to add sufficient eddy current loss to the circuit to keep it from oscillating. In this way the amplification factor is adjusted to be the same in each transformer. This adjustment and the variation of the shunt condenser is made in the factory and when the case is sealed.

The incorporation of these shunt condensers across the secondary of the transformers also makes it virtually unnecessary to match tubes. The variation in the different tube capacities is so small in relation to the capacity of the shunt condenser that it is negligible.

The tuning of this receiver is so sharp

To determine if the noise in the radio receiver is due to a fault in the set or is actually interference coming in on the air, disconnect the aerial and ground wires and if there is no reduction in the intensity of the noise while the broadcast music is stopped by the disconnection, the probability is that the source of the noise is in the receiving set, in the form of a loose connection, faulty batteries, or defective tube. Also shake the ground wires near the connection, to make sure that the noise is not caused by a bad connection.

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Battery Lore.

Before overhauling the set for the winter months, first disconnect the storage battery and take it to the nearest service station and have an expert put in new acid and electrolyte if necessary, and give it a full charge. Possibly there are a few plates which should be replaced or a cell dead. Only a battery man can determine this. It is advisable, even if the battery is charged at home, to have it overhauled every so often, just as an automobile owner cares for the battery of his car. By the timely adjustment of a small fault, the purchasing of a new battery may be avoided.

a second shock. Smith actually asked me whether there was anything on the air I might be particularly interested in. "I discovered the other day that I've become somewhat selfish as a radio fan," he explained. "I've always tuned in for what I wanted to hear irrespective of the wishes of my guests."

I complimented Smith on the new feature of his radio ownership. Since it happened that I had come over to learn whether his set would get DX, naturally I announced my preference. Imagine my surprise when, instead of treating me to a series of squawks and tube noises in the preliminary work of debugging about for the distant stations, he plugged in the car phones and spent a few minutes surveying the situation. "You see," he explained, "there is no reason why I should try to get this station on the loud speaker until I am sure of getting it clearly in the phones. I wouldn't attempt to give you a demonstration of the hill climbing feature of my car until I was certain I would climb the hill alone."

Later we were listening to a conventional dance orchestra when Smith revealed another new improvement. It was a simple matter after all, but just one of those things few radio fans stop to consider. He suggested that we were



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RADIO BUSINESS IS \$350,000,000

Outlook Indicates Half-Billion
Soon, Says Corporation Official

David Sarnoff Declares Industry, in
Still in Infancy.—Sees Unlimited
Developments of Broadcast Pro-
grammes.—America as World
Leader

That the radio industry will show a
\$350,000,000 business for 1925 and that in
its infancy, with unlimited and undreamed
developments in the near future, were
high points made by David Sarnoff, Vice
President and general manager of the
Radio Corporation of America, in an ad-
dress last Thursday before the Boston
Chamber of Commerce.

According to Mr. Sarnoff, the business
difficulties of last summer effected a com-
plete and highly favorable reorganization
of the industry. The business will soon
reach half a billion and there is no in-
dication that it will stop there. And, in
his opinion, the broadcasting of educa-
tional features, entertainment and general
information will soon attain unheard of
proportions in its scope and in the fields
served.

He said, in part:
"The social revolution created by radio
broadcasting will become more apparent
as time goes on. Five years ago the man
who once during his lifetime heard the
living voice of the President of the United
States was among the privileged few of
his fellow citizens. To-day President
Coolidge can speak and has spoken,
simultaneously to an audience of approx-
imately 25,000,000 people. Five years ago
it was a mark of cultural distinction, con-
fined to residents of metropolitan areas, to
attend an operatic performance or listen
to a great symphony orchestra. To-day
millions in this land are able to tune in
by radio and listen to the same symphony
orchestras.

"The element of entertainment thus far
has been the predominant appeal of the
broadcasting programme. So much so
that it is turning the broadcasting di-
rector into an impresario. In his new role
many problems have arisen that call for
solution. Not the least is the relation of
broadcasting to established fields of en-
tertainment.

"Thus far radio has sought its leading
programme features from the opera, the
concert hall, the orchestra and the stage.
The day may come when the relationship
will be reversed—when the broadcasting
station will comb the field of original
talent; when broadcasting will create new
reputations, instead of capitalizing on
old ones; when the opera, the stage or the
concert hall will draw from radio in re-
sponse to the demand of the public to see
as well as to hear its favorite artists;
when, broadcasting will compete with
music publishers for original compositions,
and not only buy but sell music publish-
ing rights. This may seem a far cry,
but radio broadcasting has advanced far-
ther from the days of mechanical music
to the present day of star programmes.

"And yet the fact remains that enter-
tainment is but one field of public appeal
from which broadcasting may draw.
Radio, as the latest and greatest means
of mass communication known to man,
must be essentially popular in appeal, but
its true mission, I desire to emphasize,
is the mission of service, of which enter-
tainment is but a part. Motoring began
as a sport, but the automobile industry
reached its greatest stability when the
motor car became an essential element of
transportation. The telephone was a toy
at the beginning and a novelty later on,
but to-day it is a point-to-point communi-
cation service, of incalculable utility to
business and the home. But it required
more than 15 years to develop the auto-
mobile to the transportation stage, and
over a quarter of a century to make the
telephone a general service in the home."

Radio broadcasting, Mr. Sarnoff said,
has not only a mission to perform in the
fields of music and entertainment, but it
has a distinct service to render in the
fields of political and general education.
Popular interest in government, he as-
serted, would be enormously increased if
great national issues were fixed for debate
in Congress for special night sessions and
broadcast by radio. He predicted that the
broadcast would come when the Board of Edu-
cation of every metropolitan community in
the United States would include in its
activities a special extension course to be
broadcast by radio from local stations.
Commenting upon the growth of trans-
atlantic wireless services, Mr. Sarnoff de-
clared: "The year 1925 closes with the
United States in undisputed position of
leadership in world-wide wireless. We
have drawn the leading nations of the
world toward us by invisible strands of
communication. Radio circuits are now in
operation between the United States and
England, France, Germany, Italy, Poland,
Sweden, Norway and the Argentine.
Across the Pacific we are connected by
radio with Japan, Hawaii, and the Dutch
East Indies."

Of the progress being made in the trans-
mission of pictures by radio, Mr. Sarnoff
said:
"The perfection of this system to a
stage of commercial practicability would
be an extraordinary accomplishment in
the field of communication. The day
when a facsimile message can be flashed
across the seas instead of woven letter
by letter and the word into com-
pleted sentences and paragraphs, will open
a new era in international communi-
cations. Letters, drafts, notes, contracts
and other legal documents could then be
almost instantaneously reproduced thou-
sands of miles from the sending point and
thus greatly add to the momentum of
business economy and convenience.

"Already we are operating photo-
radiogram circuits from Honolulu to San
Francisco and from San Francisco to New
York city, for test purposes and very
soon service by this method to and from
Europe will be opened upon a commercial
scale."

Causes of Swinging Signals.
Swinging signals are caused, in most
cases, by the aerial at either the trans-
mitting or receiving station being loose
and swinging, sometimes grounding or
coming near enough to affect the capacity
of the aerial. Induction and capacity make
wave length and when either is affected,
it is bound to change, and when the
aerial circuit is not in resonance with
the oscillating circuit at the transmitter
or with the input to the detector at the
receiving set, the transfer of energy will
be less with fading the result.

The Faulty Set.
Open circuits constitute one of the de-
fects most commonly found in radio re-
ceivers. This defect is denoted by a
deadness in the phones, which persists,
although all parts of the equipment
have been examined and appear to be
all right. Opens may occur in the bal-
listic circuits, the primary or secondary
inductances, the tickler circuit, or in the
variable condensers. These circuits may

be tested for continuity by connecting
one side of the circuit tested to one ter-
minal of the circuit to be tested, and
touching the second terminal with the
other side. The absence of a "click" in
the phones as the circuit is made and
broken will denote an open in that circuit.
When opens occur in variable condenser
circuits, they are usually due to a high
resistance contact which develops on the
surface of the condenser plates, due to
oxidization, and making what is equiv-
alent to an open circuit.

Abuse Ruins Set.
Although a receiving set is constructed
with the greatest care and strongest ma-
terials obtainable, it will not withstand
hard usage and continue to give efficient
results. Many operators will twist dials,
poke into the works, and jab in the phone
or loud-speaker plugs with unthinking
violence—and then wonder why their set
does not remain perfect forever. A radio
set will stand up under a good deal of
abuse, but eventually, if continuously
subjected to harsh treatment, something
will give way or loosen, and effectiveness
will be reduced. The delicate wiring, ad-
justments and connections must be re-
garded with the same care that a person
would exercise toward the timing gears,
carburetor adjustment or valves of an
automobile.

RADIO PROGRAMMES

Continued from Page Ten.

WKRC—CINCINNATI—222.
7:45 p. m.—Songs and service under the
auspices of Walnut Hills Christian
Church.

11:00 p. m.—Classical programme including
instrumental and vocal solo.

WLVI—NEW YORK—288.
8:00 p. m.—Paulist Choristers.

WLVI—PHILADELPHIA—384.
2:00 p. m.—Concert.

WMAK—LOCKPORT—285.
10:25 a. m.—Service from First Presbyterian
Church.

7:30 p. m.—Service from Church Hill Tabernacle,
Buffalo.

WMCA—NEW YORK—341.
11:00 a. m.—Services from the Fourth Church
of Christ, Scientist.

8:00 p. m.—Homer's Homers.
8:00 p. m.—Jugo Zeller—Talk on Laquer.
10:30 p. m.—Bernays Johnson, radio engineer,
Buffalo.

WNYC—NEW YORK—226.
8:00 p. m.—"Prophecy and Fulfillment," ora-
tory composed and conducted by Henry
Hacker, orchestra from New York Phil-
harmonic Society, and Inez Barbour, so-
prano, from Church of St. John the
Evangelist.

WOAW—OMAHA—226.
10:00 a. m.—Chapel services.

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R-A-D-I-O Exclusively
94 DORRANCE STREET
Opp. Narragansett Hotel

RADIO DOCTOR
WEST 5825-R
CALL DAY AND NIGHT
FOR APPOINTMENT

3:00 p. m.—Christmas cantata, "From Prophe-
cy to Manager."
7:00 p. m.—Bible study period.
10:00 p. m.—A cappella choir.

WOO—PHILADELPHIA—508.
10:45 a. m.—Services from Bethany Presby-
terian Church.
2:30 p. m.—Bethany Sunday school.
8:00 p. m.—Sacred recital.

WOK—CHICAGO—217.
7:00 p. m.—Studio programme.
2:00 a. m.—Orchestra.

WPG—ATLANTA CITY—209.
3:15 p. m.—Organ recital.
4:15 p. m.—Community vocal and instrumen-
tal recital, St. James Episcopal Church.
9:00 p. m.—Concert orchestra.
10:00 p. m.—Orchestra.

WQJ—CHICAGO—447.
10:30 a. m.—The services of the People's
Church.
4:00 p. m.—Sunday afternoon concert.
9:00 p. m.—Orchestra.

WSAT—CINCINNATI—328.
3:45 p. m.—Address by Dr. S. Parkes Cad-
man.
3:45 p. m.—Chime concert.
9:15 p. m.—Atwater Kent Radio Hour.
Featuring Jeanette Freedland, soprano,
and William Simmon, baritone.
10:15 p. m.—Orchestra.

WSM—NASHVILLE, TENN.—222.
8:30 p. m.—Services will be broadcast from
First Presbyterian Church.

WSUI—IOWA CITY, IA.—483.
10:15 p. m.—Familiar hymns, William G. Ed-
mondson, Jr., tenor.

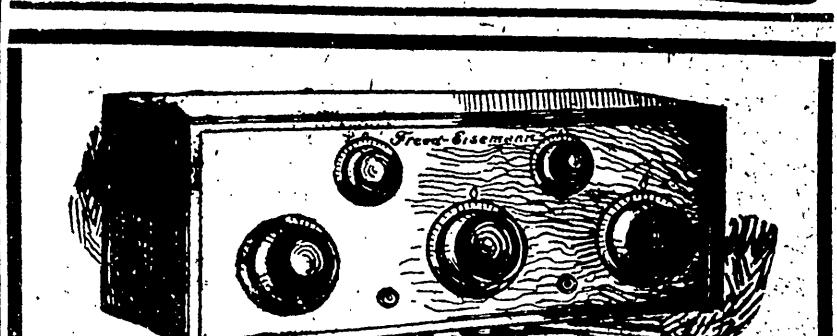
WTAG—WORCESTER—308.
3:45 p. m.—Musical conference in the Bedford
Branch Y. M. C. A.
7:30 p. m.—Musical programme by Maj. Ed-
ward Jones and the "Capitol Family."
9:15 p. m.—Atwater-Kent radio hour.

WWJ—DETROIT—332.
11:00 a. m.—Services at St. Paul's Episcopal
Cathedral.
2:00 p. m.—Orchestra.
7:30 p. m.—"Capitol Theatre Gang."

WYJ—CHICAGO—447.
10:30 a. m.—The services of the People's
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4:00 p. m.—Sunday afternoon concert.
9:00 p. m.—Orchestra.

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3:45 p. m.—Address by Dr. S. Parkes Cad-
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9:15 p. m.—Atwater Kent Radio Hour.
Featuring Jeanette Freedland, soprano,
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10:15 p. m.—Orchestra.

**Santa Claus Says—
GIVE HIM A
BRACH PROOF
Radio Plug**



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5-TUBE BALANCED
RADIO FREQUENCY
RECEIVER **\$75**
LESS
EQUIPMENT

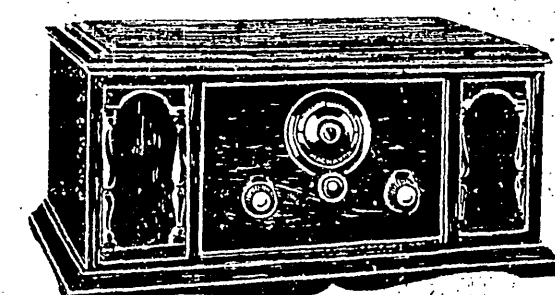
Crosley 2-Tube De Luxe (less equipment) \$23.50	Crosley Super-Tridyne 3 Tubes (less equipment) \$60.00
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Crosley 3-Tube De Luxe (less equipment) \$32.50	5-Tube Pollyroyal complete ready for use \$89.50
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\$1.00 a Week Are the Terms on Any
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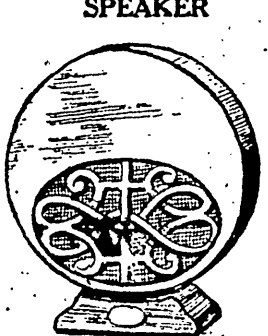
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5-Tube
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Frequency Set



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THE SINGLE CONTROL SET

TELEPHONE
Built Like a Violin
**CABINET
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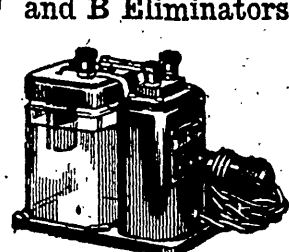


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Trickle Charger Keeps
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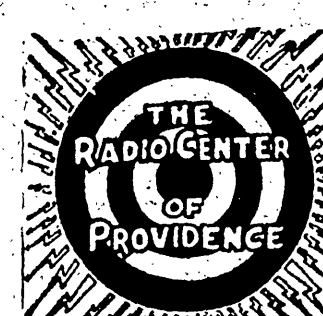


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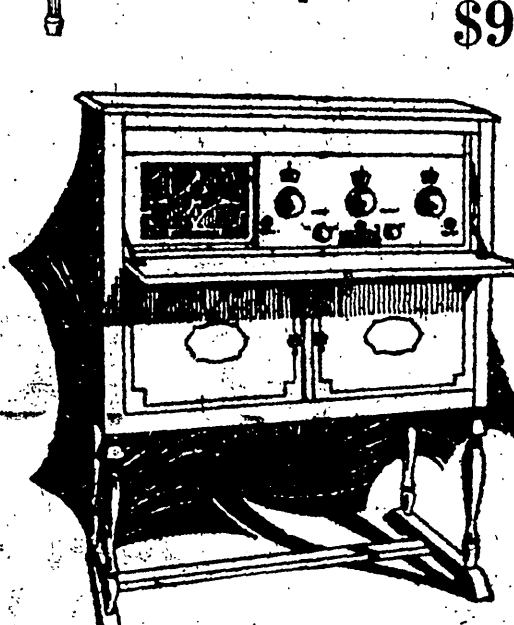
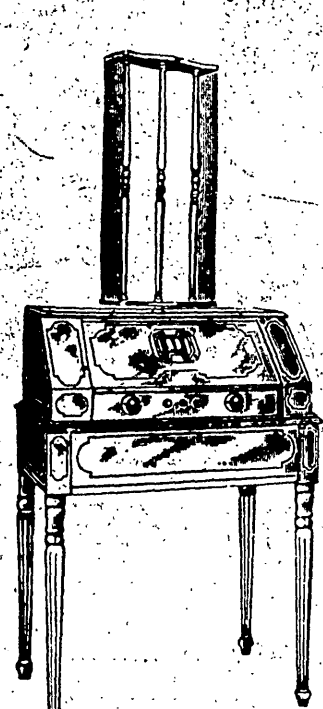
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The finest example of Radio Art, now on the market—Both in appearance and per-
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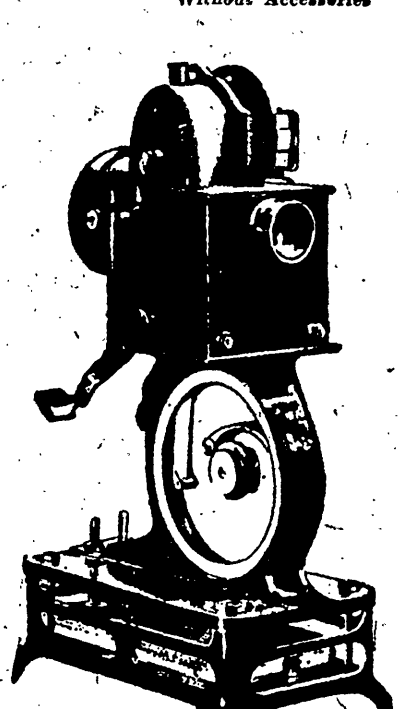
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Supreme selectivity and sensi-
tivity are obtained by this
beautiful eight-tube Super-Het-
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it has five tuning circuits, for
selectivity and power, it may
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control.

Price, including eight Radio-
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\$260.00

**Pathe Motion
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Take and exhibit perfect motion
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Use your own films or select from
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Tubes and Batteries Extra

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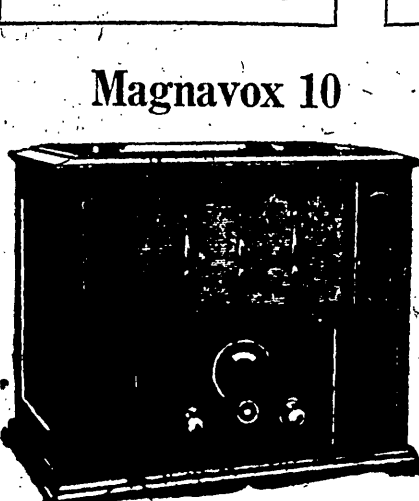
**Bremmer-Tully Counterphase
4-Tube Kit** **\$38.00**
This circuit is worthwhile and
gives excellent results.
Parts for Broadcast Universal
Circuit in Stock.

Any Set Demonstrated in Your Home Upon Request

**Most Complete Line of
LOUD SPEAKERS**
in Providence
\$4.50 to \$245

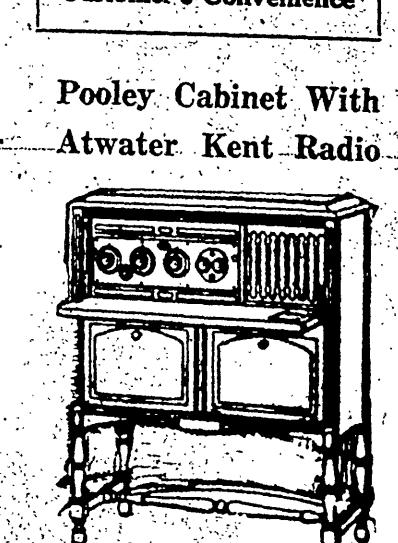
TABLES and CABINETS
to Fit Most Sets
Carried in Stock From
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TERMS
Arranged to Suit
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Magnavox 10
All Models in Stock
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speaker) \$145.00
Magnavox 75 Console Model. Built-
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All tubes and batteries extra

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Ready for Delivery
Model 6-A
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Tubes and Batteries
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**Pooley Cabinet With
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Equipped with the Model 20
Compact Atwater Kent 5-Tube
Panel Type Receiving Set and
Radio Speaker. Reproducing
Unit. Complete, less Tubes and
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EXPERTS SOLVING KNOTTY PROBLEMS

Frequency Band Above 10 Meters May Not Be Used for DX Sending

Dr. A. H. Taylor Explains Why Radio Stations Few Hundred Miles from High-Frequency Transmitter Miss Signals While Others at Greater Distance Hear

Recent developments in high-frequency experiments at the United States Naval Research Laboratory at Belknap have indicated two rather startling conclusions regarding this phenomenon.

One of these theories attempts to explain why stations located within a few hundred miles of a high-frequency transmitter cannot pick up its signals while receivers thousands of miles away, even as far as half-way around the world, can receive them clearly.

The other is that it may never be possible to utilize the frequency band above 10 meters for distance transmission.

Dr. A. H. Taylor, physicist, in charge of the Belknap Laboratory, is the author of these conclusions. Dr. Taylor bases them on the results of experiments over a long period as well as on the reports of observers scattered throughout the world.

Dr. Taylor would not discuss the possibility of the utilization of high frequencies for broadcast transmission and reception in the near future.

According to Dr. Taylor, it is pretty well established that the magnetic field of the earth influences the motion of electrons in the atmosphere and that it has an important bearing on high frequency waves, whereas the low frequency waves are not appreciably affected.

"An appeal to this influence and to the well-known laws of the reflection and refraction of waves," says Dr. Taylor, "has resulted in a theory that appears to fit the facts fairly well and which, although by no means complete, will at least, we hope, encourage theoretical and experimental work which will throw light on the subject."

"Perhaps the most striking fact which has come out of the studies of high frequency transmission is the obvious existence of a 'skipped distance' combined with the fact that in many cases the signals at relatively great distances are much stronger than they are at relatively short distances."

"It appears that the change from normal radio conditions, which has led to extraordinary range of communication with low power at about 100 meters or 300 kilocycles."

According to Dr. Taylor's theory, there is a gradually increasing state of ionization in the high level of the earth's atmosphere. It is believed this is due to the sun's rays and other causes. The velocity of radio waves is higher when travelling through ionized regions than when through un-ionized space.

When the wave is sent out by the antenna it travels at an angle toward the Heavenside-Kennelly layer. As ionization increases in the high levels, the velocity of the wave increases so that it is gradually bent over because the top of the wave travels more rapidly than the bottom. Thus, it is bent back toward the earth. From the reaction of the induced currents in this earth's surface at the base of the wave, the earth itself has an action tending to straighten the wave out.

This means that the wave cannot be received at any point between the place sent out and the place where it again returns to the earth. Of course, there is also a ground wave which makes the signal audible for a short distance from the transmitting station, but fading on the ground wave is very pronounced.

If the wave happens to come down around 600 miles away, a station in that locality can get a very good signal, while a station 200 miles closer to the transmitting station could not pick it up at all.

"The skipped distance in the summer night time is much greater than it is in the daytime," says Dr. Taylor, "and the skipped distance gradually increases toward midnight. This is what we expect. Although the winter night skipped distance is not accurately known, it is very definitely known that the skipped distance is decidedly greater than it is during summer nights, and this again seems reasonable because the ionization should be less in the winter time and, therefore, should not penetrate to so low a level because the periods of sunlight are shorter and the intensity of sunlight less."

The length of the skipped distance, Dr. Taylor says, depends entirely on how close the Heavenside layer is to the earth. The closer the layer, the less the skip, and vice versa. Quite often there is a first, second, third and fourth skipped distance as the wave travels up and down at an angle from the earth to the layer.

Dr. Taylor says the angle at which the wave leaves the antenna depends upon the frequency at which transmission occurs. The higher the frequency, the flatter the angle; that is, the nearer the earth's surface the wave will go out.

"This means, for instance," says Dr. Taylor, "that at about 20,700 kilocycles the wave, in order to be properly reflected, will have to leave so nearly horizontal that it will be very heavily absorbed by the earth. In addition, the curvature of the earth will actually get into the way of it so that it cannot reach the layer with such an angle as to be reflected. According to this, we are not likely to see very satisfactory communication over great distances on waves shorter than 10 meters, that is, of higher frequencies than 30,000 kilocycles."

"The only way we can conceive of communication at high frequencies being feasible over long ranges would be, to have them started preferably in a beam from comparatively high altitude, so that they would come to the reflecting area at low angle without being absorbed by the earth. This point, no doubt, will be proved or disproved in the not very far distant future."

GOOD MUSIC PREFERRED

Music Critic Says Classical Programmes Are Winning Popularity.

Are musical taste and appreciation being uplifted and are radio listeners swinging over to the classics?

"Yes!" is the emphatic answer of Percy A. Scholes, British music critic, who is on a tour of America.

"For example," he observed, "we read in musical history that Beethoven was born in 1770, but for thousands he was only born in 1900 or 1910 when phonographs or reproducing pianos came into our homes. And for millions more Beethoven was only born in 1921, 1923 or perhaps as late as 1925, when many of us first acquired radio receiving sets."

"Introduction of broadcasting was the greatest event in the history of the art of music," he continued. "That America should have developed such manifold broadcasting activities is matter for congratulation. Our British experience is sure to be the American experience—give listeners plenty of fine music and they will learn to like it."

Less than 18 months ago he recalled English radio enthusiasts by the hundreds, charged that Bach, Beethoven and Wagner were acceptable to "highbrows who like to swank about their superior tastes," but were not suitable to tired workers.

"Likewise, it appeared that the average listener had little or no time for music by composers with unpronounceable names ending in 'sky' as one listener expressed it. A great many persons do

mandated a few 'nice sentimental songs' or some 'honest American jazz.'"

"These attitudes have virtually ceased," he continued. "At last, British listeners are learning to admit works of classical composers, music that has artistic impulse. On the other hand they are not adverse to what we call 'amusement music,' the sort that enjoys a life of about two years and then falls into oblivion."

As music critic for a British broadcasting organization Mr. Scholes's duties consist principally of a fortnightly review of the leading musical events of London. This is broadcast from the London station, linked with all other stations of the country, and requires approximately 15 minutes. In addition critics of books, dramas and films are heard at regular intervals.

FARMERS LIKE MARKET REPORT

Long Day Tolders Have Little Time for Concerts.—Want Information.

Due to the wonders of radio, the farmer can now enjoy most of the pleasures of his city brethren in the nature of entertainment furnished by the various broadcasting stations. However, as much as this feature would appeal to the city dweller, it came as a surprise to me to

learn that the average farmer does not look upon radio as a means of entertainment because he does not have the time to sit in, his rule being early to bed and early to rise.

What appeals to the farmer is the broadcasting of weather, stock and market reports. The stock and market reports enable him to dispose of his products at the best time, thus insuring a maximum price. Getting this information from day to day stops him from shipping his produce in to a glutted market.

During the long winter months the farmer has more time for a radio as entertainment because work on most farms is light and confined mostly to chores. A friend of mine who owns and lives on a farm, when asked why he did not have a good radio set, said: "I did have one but I couldn't keep the women folks at work, so got rid of it." Which was a new angle of looking at it.

I dare say that any farmer who owned a radio set could pick up these stock and market reports every day they are sent out, no matter what part of the country he lives in. In addition to these quotations, other information of interest to the farmer is broadcast from time to time on such topics as the prevention and cure of disease in poultry, hogs and cattle, etc.

It is not necessary for the farmer to

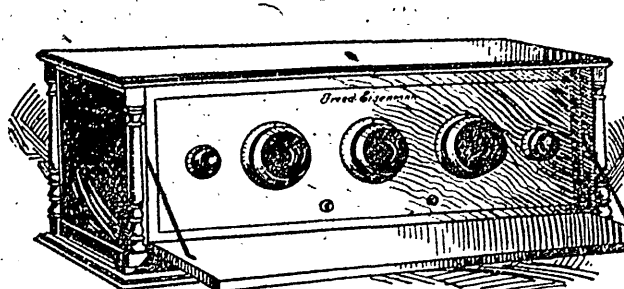
have an expensive set unless he wants to entertain the entire family at one time. An investment of \$25 would give him a good set for the use of telephones.

Marshall & Co.
R-A-D-I-O Exclusively
94 DORRANCE STREET
Opp. Narragansett Hotel

YOUR BATTERY IS THE LIFE OF YOUR RADIO
WE WANT YOU TO GET THE BEST RESULTS POSSIBLE. OUR SERVICE WILL DO IT. DROP IN AND LET US EXPLAIN WHY.
WHEN YOUR BATTERY NEEDS RECHARGING, OUR SERVICE CAR WILL CALL FOR AND DELIVER TO OUR RENTAL SERVICE ENABLING YOU TO ENJOY YOUR RADIO WHILE YOUR BATTERY IS BEING RECHARGED.

Battery Service Company
236 Broad Street Phone 1020
DISTRIBUTORS OF WESTINGHOUSE BATTERIES

FREED-EISEMANN



Model N. R. 45
6 Tubes less equipment **\$160.00**

A 6-tube Neutrodyne Receiver with superior quality of tone reproduction! Encased in beautiful mahogany cabinet with drop front. Priced without equipment \$160.

Our Easy Terms—\$2.25 a Week

Household Furniture Co.
231-237 WEYBOSSET STREET

Christmas Specials!

We have just received another shipment of Polyonal Receiving Sets. These sets have proven very satisfactory, owners having heard stations from Canada to Texas and Colorado. This Providence made set is guaranteed by the manufacturers and ourselves. Price of set, minus equipment—

The above set complete with tubes, 100 hour storage battery (Rubber Case), 2 large "B" Batteries, Music Loud Speaker, E. Z. Plug..... **\$75**
We also have the new SONORA in stock. Complete, set up in your home..... **\$150**

Radiola..... **\$197**
No. 125..... **\$130**
Freed-Eisemann NR 15..... **\$130**
Freed-Eisemann NR 18..... **\$173**

Free-Eisemann NR 7..... **\$173**
Tubes, Batteries and Speakers in stock.
Hear the new Brandes Type "H" to appreciate tone reproduction.

AT Scattergood CO.
For 39 years the leading Credit Furniture House in Providence.
210 WEYBOSSET ST.

THE BEST GIFT OF ALL

A RADIO/GIVES ENJOYMENT EVERY DAY FOR YEARS

You expect satisfaction and pleasure from your radio. By purchasing a set of proven value from this **DEPENDABLE** store you avoid disappointments.

WE CARRY THE FOLLOWING SETS:

RADIOLAS	FRESHMAN
2-Tube Radiola III..... \$9.90	5-Tube Model 5-F-2..... \$39.50
4-Tube Radiola III-A..... \$23.50	5-Tube Concert Model..... \$75.00
2-Tube Radiola Amplifier..... \$18.00	5-Tube Model 5-F-5..... \$60.00
4-Tube Regeno Flex (complete) \$100.00	5-Tube Console Model..... \$89.50
6-Tube Radiola, No. 25..... \$165.00	The sets listed in this advertisement are on display in our showroom.
8-Tube Radiola, No. 28..... \$260.00	
Radiola Loud Speaker..... \$18.00	

All Sets Sold on Easy Payment Plan

A small down payment required and the balance payable in small weekly payments. Maximum time allowed, 50 weeks.

Free Demonstration in Your Home

R. I. ELECTRICAL EQUIPMENT CO.
45 WASHINGTON ST.
TEL. UNION 1052 (FIRST RADIO STORE IN PROVIDENCE) INC. 1892
OPEN EVENINGS UNTIL CHRISTMAS

CITY HALL HARDWARE CO.
150 WASHINGTON ST.
GREATEST RADIO VALUES!

Reg. \$15.00 Radiola III.
Two-tube Set, without accessories—
On sale Monday **\$9.33**
This Set Will Operate a Loud Speaker

REG. \$2.00 CRYSTAL SETS..... 69c

Reg. \$80 Model 20 Atwater-Kent Radio Set..... \$59.47
Reg. \$155 Grebe Synchrophase New Model M. W. 1. On Sale..... \$114.93
Reg. \$110 Model, W. H. T. New Freed Eisemann Set..... \$77

Radio Tubes
Type 201-A. All guaranteed to test up to standard.
On Sale at **69c each**

Bell-Tone Adjustable LOUD SPEAKERS
Sold on a Five-Day Trial Basis.
Sale Price **\$4.98**

The 1926 model tuning control



Moulded from genuine Bakelite—to avoid losses experienced with metal construction dials. A MAR-CO precision instrument thruout.

MAR-CO DIALS

By splitting a single degree into hair's breadth divisions, MAR-CO dials bring up stations—you now pass over. Only these supremely selective tuning controls cope with 1926 broadcast congestion. Handsome, responsive, and without the least suggestion of backlash. Specified by designers of this season's foremost circuits. Fit any set. Nickel finish \$2.50. Gold Plated \$3.00. Provided with scales reading 0 to 100, or 100 to 0, as preferred.

The ideal gift for your radio FRIENDS a set of MAR-CO Dials

Martin Copeland Co. Providence, R. I.

HEAR the mellow stringing of a cello through a Farrand Speaker—then listen to it through other speakers. Hear the beautiful lower chords of an organ, the lowest notes of the basso, the highest "C" of the soprano, the jazz of Lopez, the overture of a Symphony orchestra—hear them all through a Farrand Speaker—then listen to them through other speakers. Don't buy your speaker on hearsay, buy it on earsay. COMPARE.



JUNIOR MODEL \$16.50

The Farrand Speaker Senior—with 17-inch cone, and proportionately larger bronze base is priced at \$32.50

Farrand Speaker

WHOLESALE DISTRIBUTORS:
Narragansett Radio Corp'n.
133 Dyer Street Providence
The Post & Lester Co.
89 Broadway Providence

CIVILIANS UNITE IN SIGNAL CORPS

Organization Reveals Brilliant
Men Deeply Interested in Radio

New Body May Be Unit of Regular
Army Signal Corps in Time of
Emergency.—Fifteen Posts Lo-
cated Throughout Country.—Phil-
adelphia Men Active

By JAMES A. EYSTER

Radio as a science is the chosen profes-
sion of many very brilliant men, and as
an art it enlists thousands of young men
in its various ramifications. As a "hob-
by" it is second to none in its gripping
fascination, amounting in many cases to
a veritable "monomania."

But to every youngster who grows up
in this fascinating pursuit comes a time
when he wishes he could put it to some
practical use. He dreams of hearing an
SOS call, of playing some heroic part
in saving a ship or aiding in an emer-
gency on land.

It is particularly to those who have
a vision of usefulness for their hobby, in
which skill will count, that this article
is addressed.

That radio is used in the army is well

known. It is not, however, fully realized
that the Army Signal Corps, which uses
radio, also must use to their fullest pos-
sibilities every possible means of com-
munication. The Signal Corps branch of
the service is charged with the develop-
ment, procurement, use and maintenance
of all types of communication apparatus,
and in the fulfillment of this mission it
maintains laboratories, manufactures and
buys equipment, and builds telegraph and
cable lines and operates them.

At the present time it is operating prac-
tically all of the communication systems
of Alaska, including wire, cable and radio,
so it is seen that its peacetime services
are by no means inconsiderable.

An association has been formed re-
cently, called the American Signal Corps
Association, comprised of civilians who
are interested in Signal Corps activities.
The purpose of this organization is the
furtherance of our national defense by
the development of a bond of helpful per-
sonal interest and understanding between
the members of the Signal Service of the
Army of the United States (Regular Army,
National Guard and Organized Reserves)
and persons interested in allied civilian
activities to the end that, in the case of
a national emergency, the Signal Corps
and civilians will have a mutual and sym-
pathetic conception and understanding of
our national needs in the matter of sig-
nal supplies, signal operation and the
procurement of trained specialists for the
Signal Corps service.

The Signal Corps Association plan was
formulated in April, 1924, in Chicago. At
that time the chief signal officer of the
army was entertained in that city by the
Chicago post of that organization which
was the only post of the American Signal
Corps Association and was purely local
in character. General Saitzman, chief
signal officer, was very favorably dis-
posed toward making the organization na-

tional in character, and the matter was
discussed at that time.

Subsequently, this was done, so that
at present 13 posts have been formed
throughout the United States. The coun-
try is divided into army corps areas.
Philadelphia is in the Third Corps Area,
which comprises Pennsylvania, Maryland,
Virginia and the District of Columbia.

The Philadelphia post was the second
to be organized in the Third Corps Area,
Baltimore being the first; the Pittsburgh
is just now in process of organization.
The Philadelphia post was organized
Jan. 12, 1925, through the suggestion of
the signal officer of the Third Corps
Area.

The question of admissibility of am-
ateur radio operators was early discussed,
with the result that it was made very
plain that they were definitely wanted in
the organization. In fact, several mem-
bers of the Lansdowne Radio Club take
an able and prominent part in the ac-
tivities of the association.

These activities have as their object the
bringing of the members into closer per-
sonal association, their instruction in
communication methods as used in the
Signal Corps, and the perfecting of an or-
ganization in which their previously
gained skill in communication may be of
practical benefit to the country.

The meetings last season covered the
entire scope of technical activities of the
Signal Corps. This year the services of
Capt. John A. Ballard, signal officer of
the Twenty-eighth Division (the Pennsylv-
ania National Guard) have been secured
through the good offices of the War De-
partment and the Seventy-ninth Division
headquarters.

He has prepared a series of 10 lectures,
covering the organization of the army and
its communication units and their use by
the various services. He is an experi-
enced lecturer and will give material of
great value to civilian radio men as well
as to the communication expert.

POOR VERNIERS CUT RECEPTION

Inability to Work Dials to Get
Clear DX Signals is Indication.

Fault Shows Up Positively in Dis-
tance Attempts.—Verniers Only
Required on Variable Condensers
of Average Set.—Style In-
carnated in Dial Good

BY FRANK CHAPMAN

Have you ever tried to bring in a dis-
tant station that you could hear, but not
quite understand clear enough, but when
you would turn the dials you would either
go too far one way or the other? If so,
your set was not equipped with good
verniers.

Verniers are only required on the vari-
able condensers of the average set, al-
though some sets using variometers to
tune with need them there, too. There
are numerous verniers, some of part of the
condensers, in the form of extra plates, a
gear arrangement, or a small gear work-
ing against the large one. Others have a
separate small variable condenser attached
to them, while others use a small rubber
dial rubbing against the regular dial.
Then there is another type that has the
vernier incorporated in the dial itself, and
it is this type I like best.

Not all dial verniers are better than
the others, however, because some of them
have a back lash and there is a small
amount of lost motion that is detrimental
to good tuning. A dial vernier does not
necessarily have to be one having a ver-
nier covering the whole dial, because most
anyone can tune to within a degree or so
of the exact point on the dial, and one
having a vernier with a radius of a few
degrees will answer the purpose.

The verniers which do not move the
main condenser plates are not liked by
the writer because they have a tendency
to either introduce losses or become noisy.
As a rule, the vernier is not of the high
grade type as your main tuning condenser

and, where it is not, it is bound to intro-
duce losses, which should always be
avoided where possible.

In the external friction type, in which
a small rubber comes in contact with the
main dial, while they do not introduce any
losses into the condenser, they usually do
not hold their adjustment, and when the
hand is removed the first adjustment is
spoiled. This has the same effect on
tuning as those having lost motion.

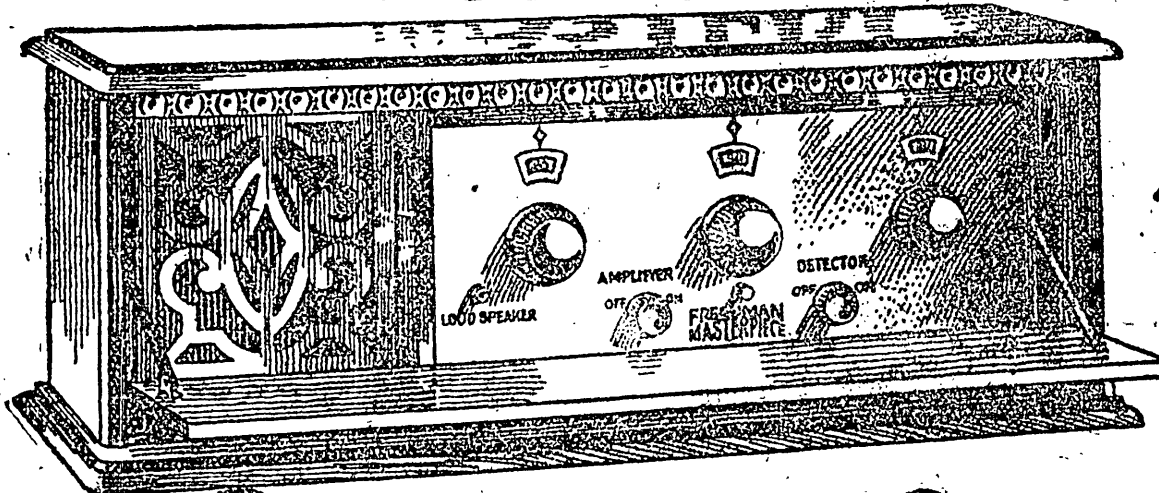
The geared type of vernier is good when
properly designed so as to eliminate any
lost motion or end play in the gears.
Some of them have very high ratios, hav-
ing to turn the small gear 100 revolutions
to move the large dial one revolution. This
gives you a very fine adjustment and al-

lows you to tune into the exact wave
length, and this means maximum volume,
because it is only when the circuits are in
resonance that maximum transfer of en-
ergy takes place.

A bad feature of the extra plate vernier
is that you do not have any direct reading
of where it is set, and it is for this reason
you do not see it on tuned radio fre-
quency sets such as the neutrodyne type.
If they were used they would throw the
log sheets of your station records out, be-
cause one time you would get a certain
station on 63 and the next time with the
vernier set at a different angle it might
come in on 62 or 65, and where your set
tunes sharp this would make the station
inadmissible.

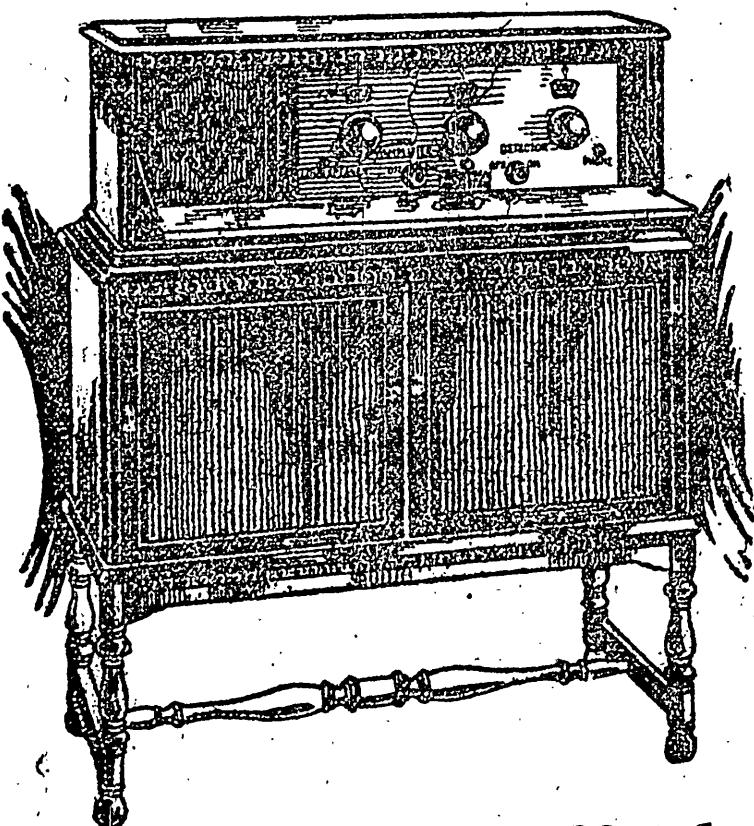
The World's Greatest Radio Receiving Set!

New and Improved
**FRESHMAN
MASTERPIECE**



75

The Franklin Receiver
With built in Loud Speaker of
Great Volume and Superb Tone



Console Cabinet to Match

Ruggedly built, heavy, five-ply genuine mahog-
any, the design of the cabinet is identical to the
pattern of the receiving set. The doors to the
compartments open from the front, affording
ample room for all batteries, battery chargers,
eliminators and every accessory that could pos-
sibly be used in connection with a radio set. This
useful and attractive console cabinet is priced
at only Forty Dollars.

The Freshman Masterpiece five tube radio
receiver is known all over the world as the
"WONDER SET." It's ease of operation,
it's distance getting ability and mellow tone
have spread happiness and education in
hundreds of thousands of homes in every
part of the globe.

People who could easily afford to spend three
and four times the cost of a Masterpiece for a
radio receiver, have signified, in no uncertain
terms, their decided preference for one of
these "WONDER SETS." To satisfy this
insistent demand we were induced to en-
case them in cabinets of rare beauty—fine
enough for the most exquisite home.

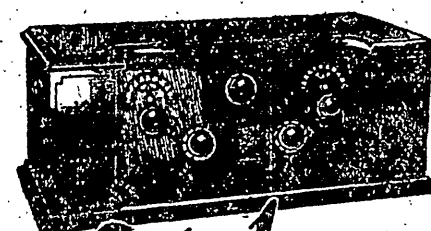
The Franklin Model, illustrated above, is the pride of
the Freshman line. This receiving set, with built-in
loud speaker, is encased in a heavy five-ply genuine
mahogany cabinet. The front cover opens in deak-like
fashion, a most convenient and attractive arrangement.
As a result you have the WORLD'S GREATEST
RADIO RECEIVER, with built-in loud speaker, in a
charming piece of furniture all for only Seventy-Five
Dollars.

CONVENIENT
TERMS ARRANGED

EMPIRE RADIO CO.

23 EMPIRE STREET

CROSLEY



The Super-Trirdyn Special
Beautifully made mahogany cabinet, finished
in two tones, oil rubbed—Ample space for all
necessary A, B and C dry cell batteries. Art
metal dials. New Crosley developed vernier
condensers and worm type tickler \$60.
popular model

3 tubes are enough!
in the
SUPER-TRIRDYNS

Thousands of owners of these Crosley's Trirdyn circuits, in which 3 tubes do
the work of five, report equal, if not better results side by side with radios costing
twice to ten times the price.

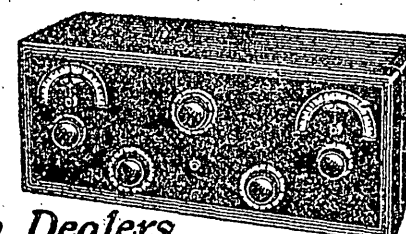
All radio engineers know that simplicity of apparatus is one of the secrets of
clear, undistorted radio reception.

Crosley accomplishes all that can be expected in radio with 3 tubes and adds no
more to justify a price or a theory. Utmost economy in tube and battery consump-
tion is a feature of these sets.

The Super-Trirdyn Regular

A trim, compact little cabinet of mahogany, beau-
tifully finished with oil rubbing—a greatly desired set
where inconspicuous radio is wanted. Same radio,
exactly, as the Super-Trirdyn Special, only housed in smallest pos-
sible cabinet \$45.00

Prices Quoted without Accessories



At Authorized Crosley Dealers

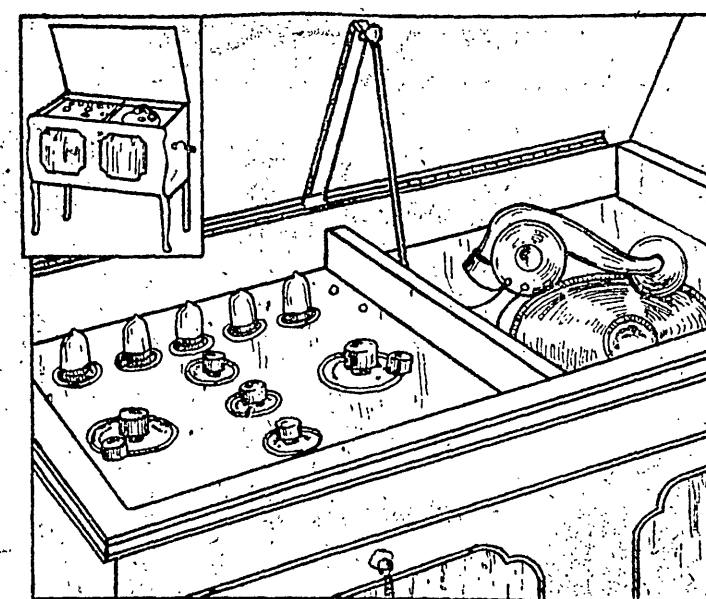
RADIO

Exercise
Sets
—for use on any
Phonograph.
\$3 to \$15
Third Floor

Home of
Shepard
Mail and Phone Orders
Filled Union 7500
Built by Victor and Servis—Growing on Both

Victor
Records
—will be on many
Christmas trees.
75c to 3.50
Third Floor

Talking Machine Store—Third Floor
For A Musical Christmas



**A 5-Tube Radiola
And a Console Phonograph**

The latest phonograph-radio combination, with built-in loud speaker
and radio cabinet.

Price includes batteries,
tubes, loud speaker unit,
and battery box.

\$145

We install this outfit in
your home and instruct
you in the operation.

\$10 IS ALL YOU NEED PAY DOWN

Balance 3.00 a week, payable monthly.

NEW TUBES USED BY COAST GUARD

Cutters Tampa and Modoc Have Highest Powered Transmitters

Newly Invented Thoriated Tungsten Tubes Recently Installed.—Invention Does Much in Safeguarding Maritime Life.—Iceberg Warnings

Not many months ago, two coast guard cutters, the Tampa and the Modoc, employed in the ice patrol, were equipped with the highest power telephone and telegraph transmitters carried by any ship under the American flag. These transmitters contained recently invented thoriated tungsten tubes.

Thorium was one of the substances found to be radio-active, soon after Becquerel's discovery of radio activity and defining of radio by the Curies. The present invention combines these two metals for use in the thoriated tungsten tube. This is now a household friend and electric lights and thorium in one of its forms illuminates many a watch face.

Success for the ice patrol consists not only in finding the ships, but also in conveying quickly to ships at sea exact information of the whereabouts of these menacing "floaters." Most ships traversing the Atlantic are now equipped with radio apparatus; hence the fitting of these control boats with the best radio transmitters which could be produced.

For the purpose of providing dependable long-range, high-powered transmitters, the coast guard commissioned the General Electric Company to develop a transmitter especially for the use of these control boats which would not be exposed to dangerous voltages if thrown against the panel in heavy seas.

Strength, reliability and simplicity of tuning also were demanded. The emitted wave length, or frequency, must be absolutely independent of variations due to rilling and pitching of the ship. All these requirements were met.

Greatest among the problems was the development of a high-power, low-voltage vacuum tube. Available were low-voltage tubes, using up to 200 volts direct current obtained from a motor-generator, and high-voltage operating on 10,000 volts or more of direct current.

To have provided this latter high voltage on shipboard would have required a motor-generator set, a step-up transformer, a rectifier with two or more kenotron tubes, and an elaborate filter to smooth out the ripple in the rectified wave.

Research specialists produced a new tube rated at only 200 volts on the plate, but four times as powerful as previous low-voltage tubes. Its output is 1000 watts.

By means of this tube, power is supplied from the direct-current, motor-generator set, eliminating the transformer, kenotron, rectifier and filter, heretofore necessary.

Ice patrol warnings from this equipment, while reaching much farther than ever before, will no longer be a source of interference with commercial traffic and broadcast entertainment.

Discovery and development of thoriated tungsten for this purpose resulted from the combination of a scientific investigation and a happy accident. Investigation of the so-called "halogen effect" in incandescent lamps by Dr. Irving Langmuir led to a more searching study of factors governing emission of electron from filaments.

In one series of experiments with tungsten filaments, the vacuum was made much higher and higher, electron emission unexpectedly became steadily greater until finally, when the bulb was immersed in liquid air, the emission was 10,000 times its original value.

This was an astonishing result; but when the experiments were repeated with another lot of wire, no such increase in emission developed. An investigation of the two lots of wire revealed the fact that the second was pure tungsten, but the first contained thorium, often used in lamp filaments to prevent evaporation.

Further study disclosed the fact that when a tungsten filament contained thorium, the thorium is reduced to thorium, which diffuses to the surface, and there forms a continuous layer one atom deep. The electron emission is then that of thorium, which is much higher than that of tungsten, while the high affinity of thorium for tungsten prevents the surface thorium from evaporating.

If, by accident, the filament is overheated and the surface layer of thorium is evaporated, the filament can be "reformed" by operating it at a high temperature for a short time to cause more thorium to diffuse to the surface, and then bring the temperature back to normal.

Because of the high electron emission of thorium a thoriated tungsten filament is very efficient, that is, in the small sizes used in receiving tubes a number of filaments may be run from a set of dry batteries without unduly shortening the life of the battery. In power tubes, with large filaments, this life is very great because of the low operating temperature of the filament, which the emission characteristics of thorium make practical.

By the use of the cone and box type of loud speakers which do not contain any metal such as in the horn of the first types. The newer type give out the true notes similar to the sound produced by a high grade phonograph. The cone type reproduces faithfully the sounds put into it. By that is meant, that if the signals are the least bit ruffled they will come out the same way, whereas in most types of other loud speakers the rough edges are smoothed off. The cone type is rapidly being recognized as one of the most perfect types of loud speakers, but it does not amplify the signals as great as some other types.

The latest trend in loud speaker design is patterned after the phonograph types in that they are box shaped to harmonize with the radio set, the sound box being

enclosed and the front of the loud speaker resembling the front of the sound chamber of a high grade phonograph. Now that the phonograph people are in the radio game, we can look forward to more improvements in the line of cabinets and loud speaker design which will tend to produce a better looking radio cabinet and get away from the objectionable horn shaped loud speaker which is now in the majority of homes.

Bear in mind you cannot get a cheap loud speaker that will faithfully reproduce all the notes of musical instruments.

Resistance May Mean Loss

Poor Connections or Cords Cause Leaks. Other Resistances Necessary.

You probably have read that resistance in your set means losses. It does when it refers to coils or poor connections, but there are resistances which are necessary, and these are the rheostats, grid leaks and potentiometers.

The filament of your tubes requires a certain amount of current to pass through them to operate them efficiently. More or less than the stated amount either means the tube is not operating at its highest point or is being forced with a consequent loss of power.

When the filament is properly operated, a variable low resistance, known as a rheostat is placed in series with the A battery and the filament of the tubes. In the case of a WD tube using an A battery of 1 1/2 volts the filament rheostat is about six ohms. When the dry cells are new the rheostat is turned part way on and as they get older and the voltage drops off, the rheostat arm is turned farther around and less resistance is used until the arm is all the way over, when the battery is run down.

With the 100 and 201-A types a 25-ohm rheostat is used. With the 100 tube a 4 1/2-volt filament battery is used and a six-volt one for the 201-A type.

The grid of a tube is normally positive, thereby allowing the flow of electrons between the filament and plate. The incoming signal changes the voltage of the grid with the strength of the signal changes and this changes the flow of current across from filament to plate in like proportion. During this process the grid attracts many negative electrons and accumulates a negative charge which shuts off the flow of electrons to the plate, blocking the tube. The grid leak being across the condenser allows this negative charge to leak off and the tube operates again.

Do not wait until your tubes won't work again.

Vagrant Waves of Interest to Fans

About 2,000,000 words in Government messages are broadcast monthly from Washington through the army and navy radio and wireless stations.

President Doumergue of France has his own receiving set and makes it a point, whenever possible, to set aside half an hour every night for listening in.

One hundred and forty-four broadcasting stations located in 90 towns and cities throughout the United States are now broadcasting weather forecasts daily.

There are 10 broadcasting studios along Broadway, in New York city. India has three broadcasting stations, two in Calcutta and another in Bombay. Women radio listeners in Great Britain outnumber the men by almost two to one.

The United States has 566 broadcasting stations, as compared with 233 stations now operating in foreign countries.

What is believed to be the world's record in underground reception was made by Milo F. C. 200 feet in a mine at Cowdry, Colo. The programme was sent from a station in Hastings, Neb.

Because of the popularity of radio in England, it is almost impossible to induce cooks to accept jobs in the suburbs or the country unless they are sure that kitchens are provided with an extension for the wireless installation.

A radio receiving set has been substituted for a minister in the Lescroart Community Centre, in Uniontown, Pa. It is planned to pick up all the religious programme possible and present them to the audiences that assembled in the building.

Symphony concerts by radio with the first violin in New York, the bassoon in New Orleans, the bass Los Angeles and piccolo in Piccadilly and the saxophone in Saxony, is predicted by exhibitors at the National Radio Exposition, Chicago, as the result of a demonstration in long distance co-ordination. A violinist was accompanied by the pianist three miles away.

Do not wait until your tubes won't work again.

before charging your battery, give the battery a regular charge.

How often you charge your battery depends on how much you use your set and the capacity of the battery.

A vacuum tube is fragile, so do not handle it as you would an ordinary incandescent lamp.

Some crystal sets get out of town stations but any station will, if it is regenerated.

Radio is here to stay so get your set now, and you can start experiments.

To find the positive and negative posts on a storage battery, dip the wires in a dilute solution of salt in water. Bubbles will form most copiously on the wire attached to the negative terminal of the battery.

To experiment with all freak hookups is an expensive hobby.

Solder flows more readily if the iron is wiped frequently on a woolen rag.

In winding loose couplers the two coils should be wound in the same direction.

When using two lead speakers, connect them in series, using a "B" battery of 90 to 130 volts and a "C" battery.

As an experiment, try to clear up signals and cut static interference by inserting a variable grid leak in the ground lead.

Taxicabs are now dispatched by radio in Birmingham, Ala.

By the end of 1925 it is expected that 5,000,000 radio sets will be in use in the United States.

Station WJZ receives more mail from invalid persons and those afflicted with blindness than from any other class.

It is estimated that 2,000,000 radio sets and parts, having a retail value of \$500,000,000, will be produced in the United States this year.

Jamaica, N. Y., has "curfew" for loudspeakers. A city ordinance is violated if noise is loud enough to disturb neighbors after 9 o'clock at night.

One of the smallest radio receiving sets in the world is mounted in a shirt-button, five-sixteenths of an inch in diameter. It is audible on a loud speaker nine feet distant.

"B" Battery Wiring.

When connecting up more than one "B" battery, be sure they are wired correctly. The current in the batteries will buck each other if the negative is connected to the negative and positive to the positive.

RADIO EDITORS ORGANIZE ASS'N.

Society Aims at Enforcement of National Rules and Regulations

Will Also Work for General Improvement of Field.—All Radio Writers of United States and Foreign Countries Invited to Become Members

One of the events growing out of the Fourth National Radio Conference, held recently at Washington, was the formation of a national organization of radio editors and writers, to be known as the National Association of Radio Writers.

This organization was effected by the "radio scribes" in the Chamber of Commerce building, Washington, immediately following the adjournment of the conference. It has for its aims the promotion of the welfare of its members, the furthering of the efforts of the Department of Commerce in enforcing the radio regulations of the country and the improving of radio conditions generally.

Its first official act was to draw up and adopt resolutions commending Secretary of Commerce Herbert Hoover for his administration of the radio affairs of the nation and for the manner in which he and his assistants conducted the radio conference, and pledging him the support of the organization in carrying out the recommendations of the conference, which the association endorsed in toto.

The following officers were elected: Harry La Mertha, radio editor, the St. Louis Globe Democrat, President; Stephen L. Coles, radio editor, the Herald-Tribune, New York, Vice President; Thomas Stevenson, Stevenson Radio Syn-

dicate, Washington, Secretary; Stuart C. Mahoney, radio editor, the Country Gentleman, Philadelphia, Treasurer; Sergeant-at-Arms—Paul Croghan, of Department of Commerce Press, Washington; Assistant, Sergeant-at-Arms—A. J. O'Leary, of the same department.

The Shorter, the Better. Both the ground and lead-in wires from the antenna should be as short as possible. They cannot be run all over the house and near other wires and metal objects without affecting the operation of the receiver.

Complete parts to build the well-known 4-Tube Browning-Drake Set at a price within the reach of all, including a very simple Picture Diagram anybody can follow. Complete for.....

One tube sets, an ident Xmas gift.....

Certified 23 Plate Low Loss Condensers.....

Marshall & Co. R-A-D-I-O Exclusively 94 DORRANCE STREET Opp. Narragansett Hotel

The Shorter, the Better. Both the ground and lead-in wires from the antenna should be as short as possible. They cannot be run all over the house and near other wires and metal objects without affecting the operation of the receiver.

Weybossett RADIO CO.

261 WEYBOSSETT ST. PROV. R. I.
NEXT TO GLENWOOD FURNITURE CO.

Open All This Week Until 10:00 P. M.—Thursday Until 11:00 P. M.

BUY THEM A RADIO SET FOR XMAS

This five tube tuned R. T. set as pictured will be sold by us exclusively for a limited time only absolutely complete including a 100 Amp. Storage Battery, Speaker, Tubes, Aerial, etc. Nothing more to buy—

\$59.50

Easy Terms Arranged If Desired

Browning-Drake

Complete parts to build the well-known 4-Tube Browning-Drake Set at a price within the reach of all, including a very simple Picture Diagram anybody can follow. Complete for.....

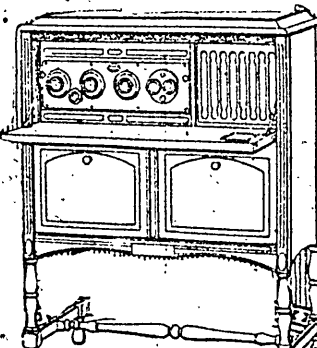
\$26.95

One tube sets, an ident Xmas gift.....	\$5.95
Certified 23 Plate Low Loss Condensers.....	79c
Tubes Type 201A or 169, Special.....	69c
Duraphones, List \$3.50, Very special.....	\$1.19

FOR CHRISTMAS A Pooley Atwater Kent Radio

Model 1600-R-2

Equipped with built-in Pooley floating horn and Atwater Kent 5-tube Model 20 Compact Receiver. Ample battery compartment.



Model 1600-R-2

American walnut or English mahogany. Height 3 feet 5 1/2 in.; length 2 feet 10 1/2 in.; depth 16 1/2 in. Complete, without tubes and batteries, \$200

Delight Your Family—

every member of it—with a Pooley Radio Cabinet for Christmas. Exquisite beauty it will bring—and endless entertainment.

See and hear the several models we have ready to demonstrate to you. Priced from \$75 to \$295.

M. STEINERT & SONS

Steinert Bldg. 495 WESTMINSTER ST. Oak Hall Bldg. PAWTUCKET

POOLEY RADIO CABINET ATWATER KENT RADIO

WORLD RADIO CORP. World Special!

Again the World Repeats! As a special offer to radio fans, many of whom were unable to take advantage of this remarkable value when we featured it during our Opening Days—we are featuring for

MONDAY, TUESDAY AND WEDNESDAY

A Special Sale of

W. R. C. "B" Batteries

Famous World Radio Corp. Battery; 22 1/2 in. x 10 1/2 in. x 1 1/2 in.; long-life; 100 amp. per insulated cells; uniform, steady, even current. No "crackling." No "highest possible quality. Do not confuse with ordinary "B" Batteries

\$1.60 for 1—\$1.61 for 2

Quantity is Limited—Come Early! OPEN EVENINGS UNTIL XMAS

1¢

ic extra gives you a second Battery

World Radio Corp.

121 WESTMINSTER STREET Prov., R. I., Butler Exchange, Opp. Arcade

Open Every Evening Till 9 P. M.

The Shepard Radio Store—Known For Its Service—Street Floor

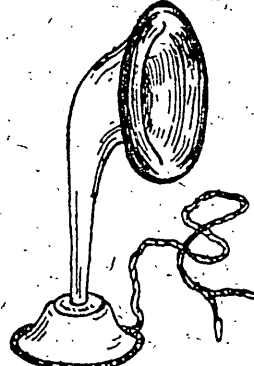
Now! You Can Have the Joys of Radio for Christmas!

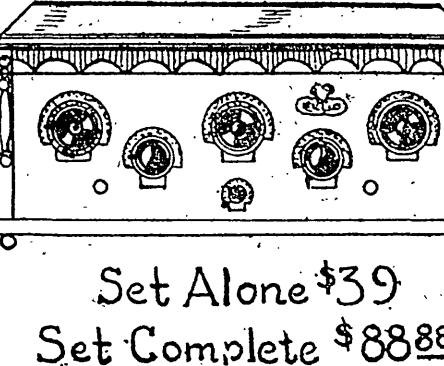
The Much-Talked-About NEW RAMWAY

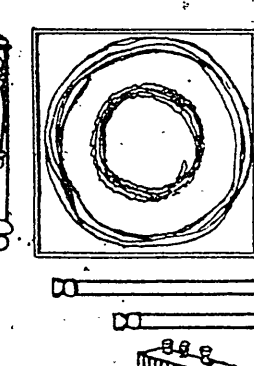
in a smaller cabinet at the amazingly low price of

\$39

and No Initial Payment Required!







Set Alone \$39
Set Complete \$88.88

THE price is so low that even if the name Ramway meant far less than it does in the radio field, the event would still be outstanding and remarkable.

Think then how earnestly we can express our belief that there is nothing like this set at the price—for it is nothing less than the same wonderful Ramway Receiver that in the Console Model at a much higher price won instant and widespread interest.

The beautifully designed mahogany cabinet with piano finish does credit to the finest home. Its panel, matching the cabinet, is adorned with handsome silver-plated, oxidized brass, making it indeed an attractive set.

The possession of this fine set for Christmas will mean a real thrill for the family—a gift that will keep on giving and giving.

You would not expect special terms when the cost of the set is scaled down to this small price—yet they are the most liberal and easiest terms that The Shepard Radio Store has thus far announced on any set.

Remember—not a discontinued model—but a new creation of wonderful capability. No flimsy, unreliable parts—but the modern, scientifically accurate parts that are the very heart of a set, and must obviously be right. Constructed entirely of Erla parts.

NO INITIAL PAYMENT REQUIRED

from those who have charge accounts with The Shepard Store or from ANYONE furnishing satisfactory references.

2.50

A WEEK All You Need Pay

If you purchase the set alone at only \$39 (plus the usual 5% carrying charge on the unpaid balance).

\$5 a Week on the Set Complete

This New Ramway, fully equipped, for 88.88

In selecting the equipment the greatest care has been exercised to assure complete satisfaction—and the guarantee of The Shepard Radio Store is squarely behind each set.

We recommend for use with this receiver the following equipment:

- 5 U X 201 A Radiotron Tubes
- 1 Harvard 80 Amp. Hour Rubber Case Storage Battery (with 18 months guarantee)
- 2 Burgess Large 45 Volt B Batteries
- 1 Burgess C Battery
- 1 Bristol Baby Grand Loud Speaker
- 1 Flieron Antenna Outfit

Making the complete outfit \$88.88.

The Shepard Radio Store has thus far announced on any set.

There is no time to lose. Resolve now to have the radio you have wanted—and have it for Christmas.

The Shepard Radio Store

Home of WEAN—Rhode Island's Oldest Broadcasting Station

SPEAKERS ARE IMPROVING.

Tin Horn and Goose-neck Now Being Replaced by Cone and Box Types.

Like the old phonograph, the cone type of loud speakers used with radio sets were the long horn type and these gave way to a small type with goose neck. Most of them were made of tin, thin sheet iron or other metals having a definite rate of vibration, which gave harsh sounds but plenty of volume, but to-day the construction of loud speakers is vastly different.

We now have the cone and box type of loud speakers which do not contain any metal such as in the horn of the first types. The newer type give out the true notes similar to the sound produced by a high grade phonograph. The cone type reproduces faithfully the sounds put into it. By that is meant, that if the signals are the least bit ruffled they will come out the same way, whereas in most types of other loud speakers the rough edges are smoothed off. The cone type is rapidly being recognized as one of the most perfect types of loud speakers, but it does not amplify the signals as great as some other types.

The latest trend in loud speaker design is patterned after the phonograph types in that they are box shaped to harmonize with the radio set, the sound box being

enclosed and the front of the loud speaker resembling the front of the sound chamber of a high grade phonograph. Now that the phonograph people are in the radio game, we can look forward to more improvements in the line of cabinets and loud speaker design which will tend to produce a better looking radio cabinet and get away from the objectionable horn shaped loud speaker which is now in the majority of homes.

Bear in mind you cannot get a cheap loud speaker that will faithfully reproduce all the notes of musical instruments.

Resistance May Mean Loss

OLD GRIST MILL DOG BREAD

IT'S BETTER THAN BEEF

ALL GROCERS REGISTRATION AND PEDIGREE BLANKS FREE

SEND TO: MRS. W. H. WRIGHT, 100 BOSTON ST., BOSTON 25, MASS.

**Buy on Our Gradual
Payment Service**
and pay as little as \$2 weekly after
small down payment.
BROADCASTING STATION W J A R

The Outlet Company

Our Guarantee

Each set fully guaranteed, with free service for six months if we install it. We maintain a large and thoroughly trained service force to care for every set we sell and install. A modest charge for installation.

An Overwhelming Response To This Great Radio Sale Still Time To Buy For Delivery Before Christmas

A NOTHER Radio Event that equals in value our last tremendous radio offer when we sold over 800 sets and could have sold a great many more if we could have secured them.

R EALIZING that many radio fans were disappointed, we immediately set out to secure another great value—here is the result—

The combined efforts and huge purchasing power of 15 famous department stores bring to all music lovers this most remarkable Radio Value

Store Open
Thursday
Night Until
9 O'Clock

THE NEW *David Grimes* 5-TUBE RADIO SETS



Complete
With All
Necessary
Equipment

(nothing else to buy)

Sale Price

\$69.97

The Set
and
Equipment
Sells
Regularly
For \$113

Set Without
Equipment
\$39

You Can Buy
This Set on Our
**Gradual
Payment
Service**
as
low
as
**\$2
Weekly**

Radio Store—5th Floor
Remember—we have only 500 of
these sets as our allotment!
Be here early

**We Have Just a Few Hundred of
These Sets and We Feel
Confident They'll Sell Quickly**

Of course we could not get this manufacturer to give us an unlimited supply, as he is sacrificing his profit for this eventful selling and charging it to advertising—for advertising—it will be—every person that buys one will be its best salesperson and ardent enthusiast—so come early if you want one. This set has a record of receiving distant stations, those far away come in very distinct and clear as a bell.

Just How We Are Able To Do It

The Radio Departments of Fifteen Great Department stores, located in as many different cities, combined to make this purchase totalling 12,000 sets, one of the largest single purchases ever made in the history of the Radio business.

**This is a New Five-Tube
Storage Battery Set. It is
Up to Date in Every Respect**

One of the very finest 5-tube sets that has appeared on the market this year. You can tell the moment you look at it that this is no ordinary radio set—the beautiful hardwood cabinet with overlay panels of mahogany finish and the shielded black metal panel front handsomely engraved and emblazoned in copper—is unusual in itself. The moment you feel the velvety fine precision tuning of the dials you know that here is as fine a 5-tube set as money can buy.

YOU HAVE SEEN THE DAVID GRIMES SET ADVERTISED ON POSTERS AND BILL BOARDS ALL OVER THE COUNTRY

**Remember—Every Set is New
In The Original Factory Box**

Just as the set left the factory it comes to you—and besides this famous set you get accessories of the highest grade. The famous "Musette" bakelite bell loud speaker is a marvel of clearness and mellow tone. The other equipment as listed at right is nationally known and guaranteed.

**Here Are The High Grade
Accessories You Receive
With The Set for \$69.97**

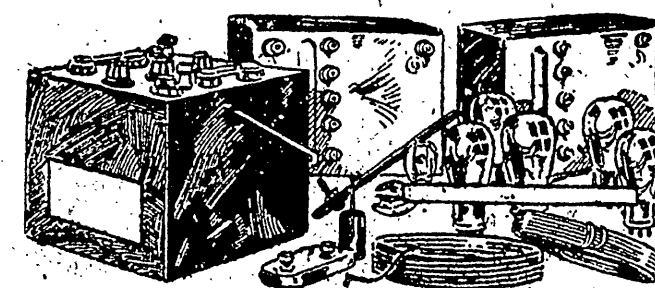
5 Genuine Cunningham Tubes, 1 Westinghouse or U. S. L. Rubber Case Storage Battery, 2 Large 45 Volt "B" Batteries, 1 22½ Volt "B" Battery, 1 "C" Battery, 1 Complete Aerial Equipment, 1 \$12.50 Musette Bakelite Bell Loud Speaker.



The Musette Horn

is known as "the Stradavarius of Radio." It lists regularly for \$12.50. It was awarded the trophy at the Radio World's Fair, September, 1924. Just think!

You get this horn as part of the outfit.



The Outlet Company

WEATHER BUREAU WARNS BY RADIO

Government and Private Fliers
Receive Forecasts Twice Daily

Washington Collects Reports from
All Sections of Western Hemisphere and Adjoining Oceans.
Life and Property Reaps Benefit in Unlimited Measure

The public generally would be surprised to learn of the nature and extent of the meteorological service of the Weather Bureau in aid of aviation, and that special accommodations are provided in the forecast room for representatives of the air service of the army and navy.

Telegraphic and radio weather reports come in twice a day to the forecast room from about 275 observing stations in all parts of the country and from Canada. As fast as they are received, these representatives of flying services copy on their charts any information important to aviators, and telephone the route forecasts directly to certain flying fields. At times, special service is asked for by messenger to the country and from Canada. As fast as they are received, these representatives of flying services copy on their charts any information important to aviators, and telephone the route forecasts directly to certain flying fields. At times, special service is asked for by messenger to the country and from Canada.

Furthermore, the full system of morning and afternoon telegraphic weather reports received at Washington and the regular and special forecasts are sent by messenger to the Navy Department and are promptly sent by telegraph or wireless to Lakshur for use by the navy meteorological officer of that place.

Conditions which are unusual or dangerous for fliers receive prompt attention at the Washington forecasting station and at each of the other four district forecast centers, located at Chicago, New Orleans, Denver and San Francisco. Weather information, forecasts and warnings for the group of States comprised within districts are issued from these centers, always with aviation interests in mind.

Direct service is given as conditions and facilities warrant. Local service is rendered by officials at about 135 field stations of the Weather Bureau. It must be borne in mind in connection with the hazards of flying that the most any meteorological service can do is to give information and warnings; aviators frequently disregard warnings of approaching storms or other poor flying conditions, believing themselves competent to fly in spite of unfavorable weather, just as a ship's captain may put out to sea fully armed with knowledge of bad conditions ahead, but sure of his ability to manage his vessel nevertheless, or hoping for better conditions than those predicted.

Radio service is supplied twice daily for the benefit of marines and aviation interests on the Atlantic and Pacific coasts. Weather bulletins and forecasts are broadcast from the Arlington, Va., naval radio station at 10:30 a. m. and at 10:30 p. m. They consist of reports on surface conditions and upper air data based on the regular 8 a. m. and 8 p. m. observations of the Weather Bureau.

These bulletins include any reports received too late for the regular morning or evening forecast and as a second feature summarizing general atmospheric conditions, barometric readings at high and low centers, wind and weather forecasts for offshore areas, storm warnings and flying weather forecasts, for each of six aviation zones.

During the hurricane season additional ship reports are received by radio from the Gulf of Mexico and the Caribbean seas and distributed in connection with this service.

Aviators flying in any of the three zones served by the special Pacific bulletins issued from the San Francisco radio station receive information about 10 a. m. based on 5 a. m. observations of the same day, and at 7:30 p. m. based on 5 p. m. observations, except for those taken at Alaska, Honolulu, Guam, Manila, China and Japan, at slightly different hours. These bulletins are in all essential respects like those for the Atlantic coast.

USING LOOP AERIALS

Set Manufactured to Operate from Loop Too Sensitive for Regular Aerial.

Can I use a loop aerial with my set is a question which comes to the minds of most of our radio fans. With nine out of 10 radio sets, the answer is no. First of all, a set should be built to operate from a loop and if this is done, it is really too sensitive to be used with a regular aerial because it is so sensitive it picks up too much energy and the energy may not be radio. When this is the case, the set is noisy and may be compared to two people listening to a conversation carried on in a loud voice where one of the listeners was partially deaf and the other had good hearing. The man with good hearing received too much energy for his ears.

The popular type of neutrodyne sets do not give satisfactory results when used with a loop aerial even though they do have two stages of radio frequency amplification. The objection to them being that the coils in the set (neutrodyne) pick up energy themselves, whereas in a loop set the loop is all that should collect any radio energy.

To be successful on out-of-town stations, a set designed for loop aerial reception should have from five to six tubes incorporating two or three stages of radio frequency amplification. It is radio frequency amplification which makes the operator of a loop aerial possible due to the fact that energy picked up by the small loop is very low and it requires two or three stages of radio frequency amplification to build this feeble energy up so as to actuate the detector. If the energy delivered to the detector is below what is known as the threshold value, the detector will not function.

MANY STATIONS ANNOYING.

Thus May Eliminate Interferences by Using Wave Trap.

As better radio weather continues, you are no doubt confronted with having too

Marshall & Co.
R-A-D-I-O Exclusively
94 DOUBLEDAY STREET
Opp. Narragansett Hotel

LABORATORY SUPPLIES
Glassware—Porcelain—Chemicals
Geo. L. Claflin Company
72-78 NORTH MAIN STREET
Opposite First Baptist Church

FOREIGN DEVICES INFLUENCE RADIO

Household Electrical Apparatus
Often Causes Trouble with Set

Interference May Not Be Entirely
Eliminated But Use of Shields or
Chokes Aid—Regulation of Spark
in Apparatus May Also Mitigate
Difficulty

Co-operative effort on the part of radio fans and the owners of electrical sources of disturbance is the most effective remedy for man-made interference, according to the Radio Laboratory of the United States Bureau of Standards.

"Much of the work of mitigation of electrical interference results in an improvement in the operation of the electrical devices or supply lines, and is thus a double gain," the Standards Radio Laboratory asserts.

"There are, however, some electrical devices which, even when in perfect working order, cause disturbances which result in interference with radio reception. In many cases it is possible to provide filters, shields, chokes, etc., either at the source of disturbance or at the receiving set, which do much to relieve the difficulty. In other cases, electrical devices are virtually inevitable and must be regarded, like atmospheric disturbances, as part of the inherent limitation of radio reception.

"In other words, the limitation of radio reception is not only the distance and the strength of the transmitting station, and the sensitivity of the receiving set, but also the omnipresent background of slight electrical disturbances which drown out signals below a certain intensity. This background of electrical disturbance is the underlying reason why reception from local stations is inherently superior to reception from distant stations."

Here are a few suggestions offered by the Standards Radio Laboratory toward decreasing interference:

"The first thing to do in tracing the source of trouble is to make sure that it is not in the receiving set itself."

"The next thing is to open the electrical switch at the house meter; if the interfering noise is still heard, the source is then known to be outside the house. It is then desirable to report the situation to the electric power company. Many of the companies have apparatus for the

purpose of following up complaints of this kind.

"Usually a sensitive receiving set with a coil antenna is used to determine the direction from which the interfering noise comes, and the output is taken from place to place until the source is found. The location of such sources is often a very difficult and baffling undertaking.

"The trouble sometimes comes from a spark discharge over an insulator or to ground, or between a pair of wires, or it may be that the wire is touching some object such as a tree, pole, guy wire, etc. Such a spark discharge is a loss of power to the operating company and a potential source of serious trouble, and for these reasons the company is probably more interested in finding and eliminating this type of trouble than the radio listener.

"Large leaks and sparks may often be observed at night, especially in hot weather. However, sparks which are too small to be readily noticed may cause serious interference to radio reception.

"A frequent cause of interference is power line inductance, which is due to the presence of power wires near the antenna receiving set. A humming sound in the telephone receivers will usually identify this source of interference. A method of eliminating, or at least reducing, the magnitude of this interference is to place the antenna as far as possible from the wire lines and at right angles to them.

"Sparks are produced in the normal operation of many types of electrical apparatus (such as motors, doorbells, buzzers, gasoline engines, X-ray apparatus, voltmeter machines, some forms of battery chargers, rural telephone ringers, heating pad thermostats).

"Sparks are also sometimes produced at defective insulators, transformers, etc., of electric wire lines. Sparks usually give rise to electric waves which travel along the electric power wires and are picked up by the radio receiving sets.

"The noise thus produced in a radio set may come from a disturbance which has travelled several miles along the electric power lines.

"One remedy for such types of interference is to eliminate the spark. This is possible if the spark is an electrical leak and not necessary to the operation of the machine in which it occurs.

"Many very useful electrical machines, however, require for their operation the making and breaking of electrical circuits while they are carrying current, and whenever this happens a spark is produced. It is impossible to eliminate these machines, so it is necessary to make the speaker of such nature as to arrange the circuits that the radio-frequency current is reduced or prevented from radiating.

"To prevent the radio-frequency current produced by a spark from getting on to the lines connecting the sparking apparatus, some form of filter circuit is necessary. A condenser (1 microfarad, more or less) connected across the sparking point

will reduce or short circuit a considerable amount of the interference, or a condenser connected from each side of the line to ground will serve the same purpose.

"A choke coil in each side of the line in addition to the condensers connected to ground forms a simple filter circuit, which should prevent frequencies in the broadcast range from getting on the line.

"A high inductance (choke cell) or high resistance connected in each side of the line changes the characteristics of the circuit so as to reduce the amount of power radiated. If such a filter circuit is not effective or is impractical, the apparatus may in some cases be surrounded by solid metal sheet or wire screen which is thoroughly grounded. The screen should completely surround the apparatus. This may be difficult.

"For example, in shielding the ignition system of a gasoline engine the spark coils and all wires and other parts of the system must be enclosed in metal shields and these must be well grounded."

Tom Trainor's Christmas Cider

Cider is the logical, law-abiding beverage for your Christmas dinner. Tom Trainor's Cider is made from russet apples from a sterling orchard.

Delivers throughout Elmwood and Edgewood, or call around in your car. No parking restrictions.

Elmwood Fish Market
Greenwich St., at Public

a stone's throw from Elmwood Ave.
Two phones—Broad 0761—Broad 0762

The Soldering Iron.
It is virtually impossible to make a soldered connection with a red-hot holder.

ing iron. The tool must be hot, but if it turns cherry colored while being heated it should be allowed to cool a little before any work is attempted with it.

You Can Always Do Better at the
Economy
AUTO SUPPLY CO. INC.

RADIO STORE 26 W. Exchange St. • AUTO SUPPLY STORE 30 W. Exchange St.
OPPOSITE FREIGHT STATION

**WE DEFY
COMPETITION**

XMAS GIFTS TO SUIT ONE AND ALL

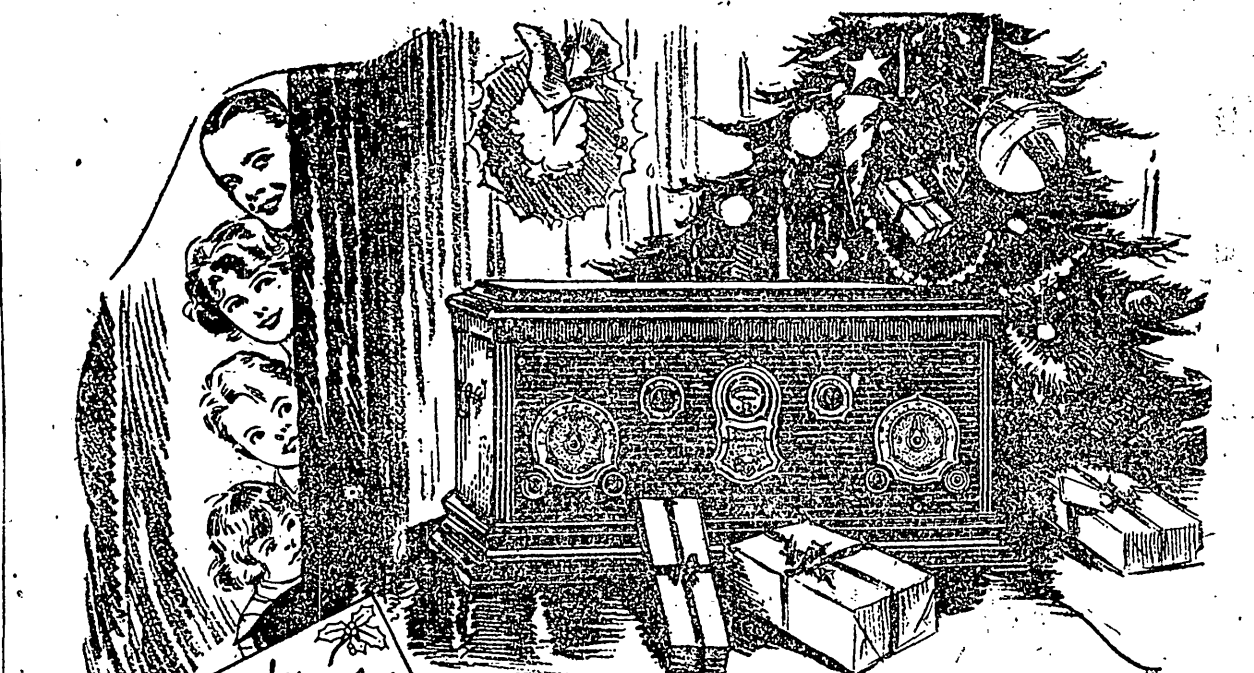
THE BIGGEST HOLIDAY SALE

**NOW ON AND CONTINUED DURING
CHRISTMAS WEEK**

**EVERY BARGAIN AND MANY MORE OFFERED BY US
FOR THE PAST TWO WEEKS REMAIN IN EFFECT
PROVIDING WE STILL HAVE IT IN STOCK**

**OPEN EVERY EVENING TILL 10 P. M.
DURING CHRISTMAS WEEK**

We Undersell Because We Underbuy



For the
Entire Family

**The Unselfish Gift
at Christmastide,**

A STROMBERG-CARLSON Receiver does not confine its pleasures merely to the person to whom it is given.

The entire family may enjoy its simple two-dial operation; its unmatched ease of selecting the finest radio entertainment; its rare power to re-create all sound faultlessly.

Also—its almost perfect ability to reject unwanted broadcasting and other interference, no matter how near or how powerful—the famous Stromberg-Carlson quality of "Rejectivity."

This absence of extraneous noise, due to totally shielding all four radio frequency circuits, gives an unalloyed sweetness of tone, distance without effort, and sound volume without confusion.

Stromberg-Carlson Telephone Mfg. Company
Rochester, N. Y.

Stromberg-Carlson
Makers of voice transmission and voice reception apparatus for more than 30 years.

We Are Authorized Dealers in Providence for
The Famous New Stromberg-Carlson Sets
RADIO STORE—FIFTH FLOOR

The Outlet Company
Broadcasting Station WJAR

WORLD RADIO CORP.
"The Largest Exclusive Radio Store in New England"

Another "WORLD" Beater!
the "WORLDMASTER-OPERAOLA"
LOUD SPEAKER

Only 1000 available
Now! Act Today!

DEALERS WANTED
to handle "WORLD" products throughout New England. Excellent proposition! For full information write to:
Wholesale Dept.
World Radio Corp.
349 Washington St., Boston

Choice New England Territories Now Open to Live, Responsible Dealers!

TRADE IN—
Your Old Loud Speaker & Head Phones

A Most LIBERAL ALLOWANCE on your LOUD SPEAKER or Head Phones—we'll take in any type—Cone Speakers—Horn Type Speaker—Cabinet Speakers or any that you might own—even Head Phones—and allow you a most LIBERAL ALLOWANCE on the price of this WONDERFUL SPEAKER! We want EVERY RADIO OWNER IN NEW ENGLAND to fully realize what IDEAL RECEPTION IS—The "WORLDMASTER-OPERAOLA" will bring it to you!

10 DAY FREE TRIAL!
Try it for 10 DAYS—at our expense—if at the end of that time you don't agree that it's the Finest Speaker you ever listened to—we'll refund your money—that's how much faith we have in this Speaker! You take no chances!

\$20

1 First Payment Weekly

No Set is Better Than the Speaker

Many a radio purchaser has spent days in selecting a radio set, and dismissed the speaker purchase with only a glance—and then regretted it. The most scientifically designed radio set on the market today cannot do itself justice if it is forced to function through the limitations of a poorly designed speaker. And by the same token, many a low priced radio set of limited ability is giving permanent satisfaction because the speaker has been selected with care.

The "WORLDMASTER-OPERAOLA" will prove this!

MAIL-ORDER COUPON

World Radio Corp.

121 Westminster St., Providence
Butler Exchange Building (Opposite Arcade)

Gentlemen—I think your offer is very fair. I'm willing to try your "WORLDMASTER-OPERAOLA" Speaker for 10 days. If I am satisfied I'll keep it; if I'm not you'll return my money. I am enclosing \$1.00 as my first payment.

Name _____
Address _____
City _____ State _____
Please tell us something about yourself. FJOSD 2025

Open Every Evening Till 9 P.M.

M. STEINERT & SONS

AUTHORIZED RETAILERS IN PROVIDENCE, PAWTUCKET AND FALL RIVER OF

ATWATER-KENT RADIO SETS and POOLEY-ATWATER RADIO CABINETS

Oak Hall Bldg.—312 Main St.
Pawtucket

Steinert Bldg.—495 Westminster St., Providence

52 North Main St.
Fall River

ATWATER-KENT RADIO

If You Get Money for Christmas

Give yourself the finest present of all—not just "a radio", but THE radio, an ATWATER KENT Receiving Set and Radio Speaker.

IF YOU GET MONEY FOR CHRISTMAS

there is nothing you can buy that will give you so much pleasure the whole year around.

Buy an ATWATER-KENT BECAUSE:

It is the product of a quarter-century of experience in building fine electrical instruments.

It is accurate, precise, beautifully built by careful, expert workmen.

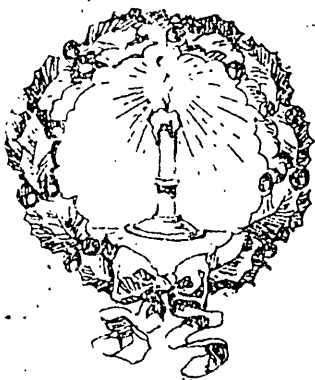
It is simple in design and simple in operation, worthy of the finest room of the finest home.

It is built for all-round performance—in tone and volume, distance and selectivity.

And When You "Think" Radio—"Say" ATWATER-KENT!

Then you will know how much you may expect of the perfected radio of to-day.

Radio Brings Companionship



Radio..
Provides
New..
Interests

A Five Tube Set No Larger Than a Row of Books

On an end table, a low book case or any other piece of furniture the Model 20 Compact takes its place in perfect harmony with the rest of the room.

But whatever size you like, if you want a really fine instrument designed for all-round satisfying performance, come in to-day and hear an ATWATER-KENT Receiving Set in operation.

M. STEINERT & SONS

Exclusive Distributors in Rhode Island of Atwater Kent Receiving Sets and Radio Speakers
35 ARCH STREET BOSTON, MASS.

Christmas Morning

Be sure there is a Radio among the presents but above all, be sure it is an

Atwater-Kent Radio

WITH AN

Atwater-Kent Radio Speaker

You will be amazed to know how far radio has advanced—to know how easily you can get your favorite station and how much volume you can get with perfect tone.

\$80

is the Genuine price of
a Genuine
ATWATER KENT RADIO

To obtain factory guarantee and service, set must bear ATWATER KENT name plate and serial number on inside cover and be purchased from an authorized dealer only.

Radio Is the Gift of Happiness



Our Terms
Will - - -
Interest - - -
You - - -

Summerfield's

274 to 280 Weybosset Street — Providence

ARE FULLY AUTHORIZED
LOCAL REPRESENTATIVES FOR

ATWATER-KENT RADIO

COMPLETE SHOWING OF ALL MODELS

BUY YOUR ATWATER-KENT AT RHODE ISLAND'S OLDEST RADIO STORE

R. I. ELECTRICAL EQUIPMENT CO.

TEL. UNION
1052

45 WASHINGTON STREET

(FIRST RADIO STORE IN PROVIDENCE)

INC.
1892

Buy Your Atwater-Kent Set at The Shepard Radio Store

Owners of WEAN—Rhode Island's Oldest Broadcasting Station—a Store Known For Its Service and Conveniently Located On The Street Floor

B. & H. SUPPLY CO.

116 MATHEWSON STREET

PHONES GASPEE 5550-1-2-3. SEE US FOR A DEMONSTRATION

REGISTERED
ATWATER KENT DEALERS

Music Dept.-Pianos-Radios-Phonographs Open Evenings Until Christmas!!!

New Player Piano Outfit! Take Three Years To Pay

**YOUR OLD PIANO TAKEN IN EXCHANGE AND
A LIBERAL ALLOWANCE MADE
12 MUSIC ROLLS, 1 PLAYER BENCH, FLOOR LAMP
NO INTEREST FOR CREDIT**

This New Player Piano outfit consists of a handsome and stately Player Piano in beautiful combination mahogany—a very easy action—a sweet, melodious tone—a piano that a child can play with great ease. Outfit also includes 12 popular Player rolls, a mahogany finish Bench to match and Floor Lamp and Shade.

TAKE 3 YEARS TO PAY

Other Pianos Nationally Known,
Including Player Pianos and Baby
Grands, up to and Including \$2200.

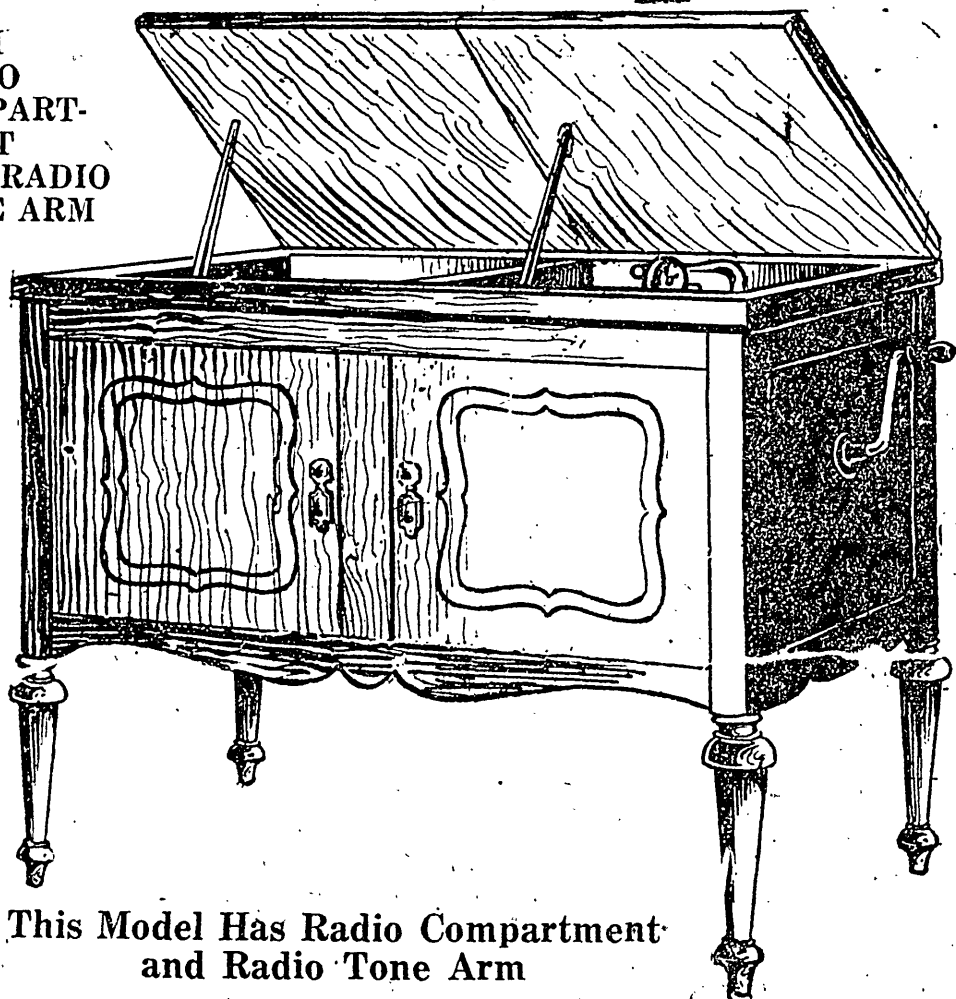
\$298



**LIBERAL ALLOWANCE ON
YOUR OLD PIANO**

PHONOGRAPHS

WITH
RADIO
COMPART-
MENT
AND RADIO
TONE ARM



This Model Has Radio Compartment
and Radio Tone Arm

**\$1 DOWN DELIVERS ANY
PHONOGRAPH
TO YOUR HOME**

We are featuring for to-morrow a very wonderful Console Phonograph in William and Mary period in Mahogany finish; produces a clear, beautiful tone. Has a noiseless guaranteed motor.

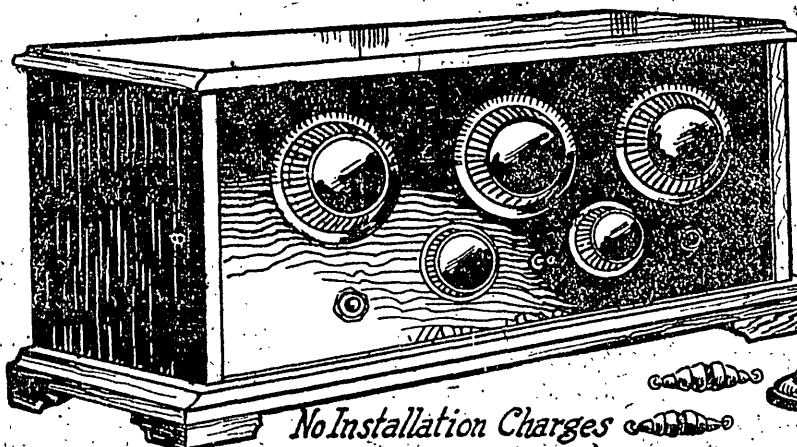
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HALF-PRICE
DON'T DELAY**

Radio Dept

6 Tube RECEIVING Set!

Every Accessory
Nothing More to Buy—Hook 'er Up and the
"Voice of Broadcasting" is at Your Command. A
set for the technical radio expert to enthrall
over—A set to give the great world of
"listeners-in" cascades of delight and admira-
tion. Engineers everywhere have acclaimed
this super-toned set as unequalled for repro-
ducing instrumental and vocal programs. The
clearness and precision of tone, note and
spoken word is due to the latest principles of
resistance coupled amplification perfected to
the highest degree.

EASIEST CREDIT TERMS



No Installation Charges

**ALL
COMPLETE
NOTHING
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TO
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\$79

DOUBLE GUARANTEE

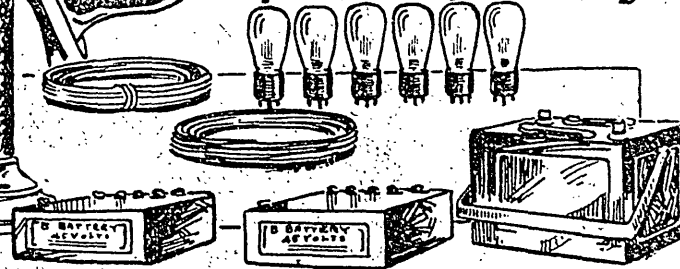
Your Radio Outfit is no better than its guar-
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merfield guarantee plus the manufacturer's.
Guaranteed Tubes, Guaranteed Batteries and
Guaranteed Service. The Entire Outfit Com-
plete with All Parts as Shown on Sale Now.

OUTFIT INCLUDES:

8 Guaranteed Tubes, 1 Guaranteed
6-Volt Storage Battery, 2
Guaranteed 45-Volt B Batteries
(90 Volt), 1 Guaranteed Plug, 1
Loud-Speaker of Well-Known
Make, 1 100-ft. 7 Strand Aerial
Wire, 2 Porcelain Insulators, 2
"Wall-It" Knobs, 25 ft. Lead-In
Wire.

Easiest Credit Terms

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HALF-PRICE
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