

RADIO WORLD

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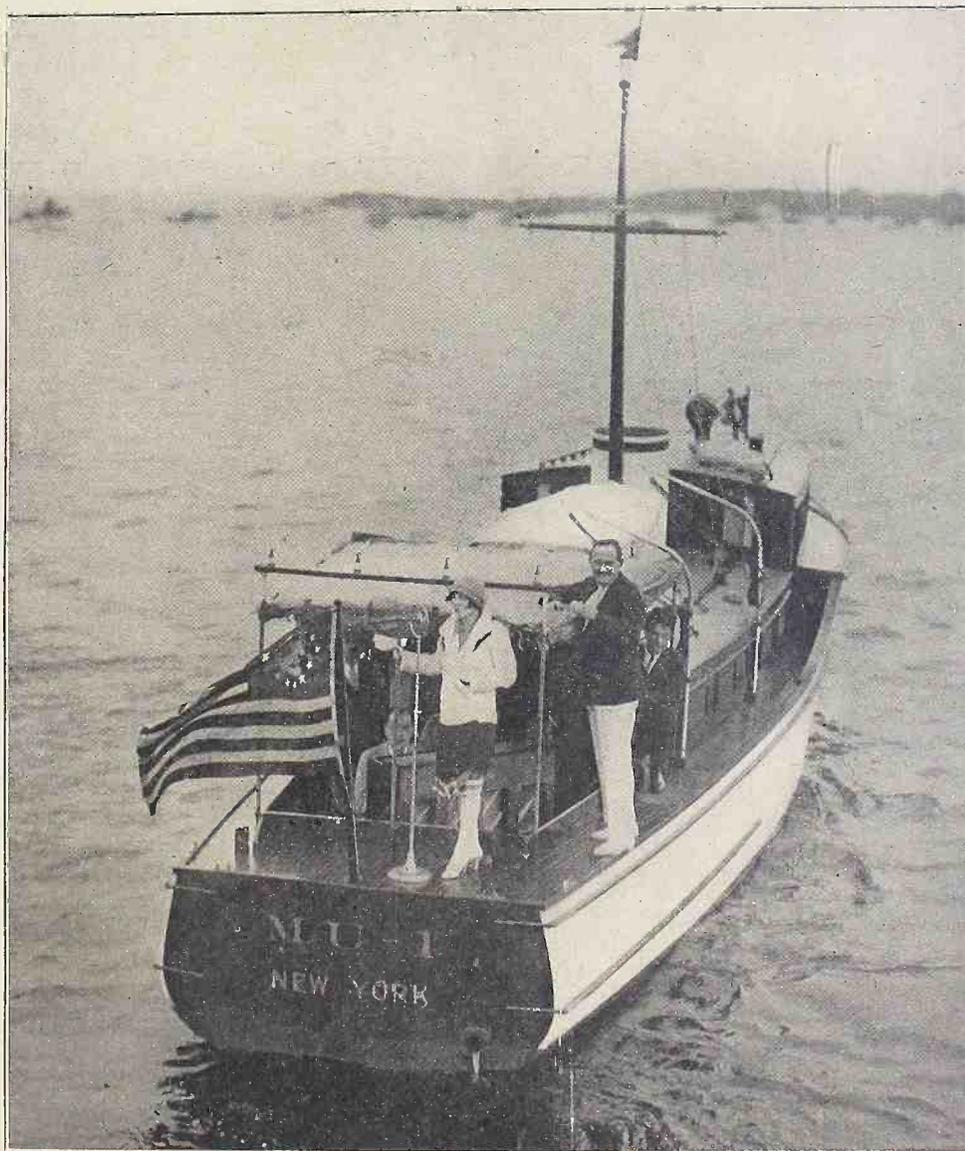
Illustrated

ELIMINATORS AND RECTIFIERS EXPLAINED

*Unusual Efficiency Hints
On By-Pass Condensers*

A SIMPLE DC CHARGER, USING A PAIR OF TUBES

Great Trouble-Shooting Article



(Underwood & Underwood)

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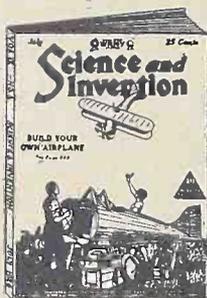


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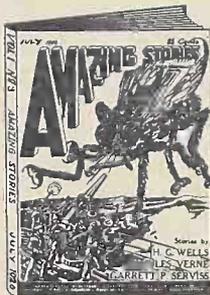
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The Four Rectifier Types

When Alternating Current Is Used as the Source You Have Your Choice Of the Electrolytic, the Vacuum Tube, the Plate Filament (Tungar) Bulb And the Gaseous (Raytheon) Tube

By K. B. Humphrey

ABOUT ninety per cent. of the people of the United States are supplied with alternating current for lighting their houses. There is a definite reason for this in that alternating current is much more economical in distribution than direct current. Now, it is impossible to operate radio receivers on anything but direct current. When it is desirable to operate the set from the lighting mains it is therefore necessary to change from the alternating to direct current. Several different methods are in use for accomplishing the desired results.

Rectifiers may be used in two different ways in radio work; one for direct power, and two, for indirect power. Direct power is used when the device acts directly on the tube, such as in the various types of eliminators. Indirect power is where the alternating current from the line is made to charge a storage battery, which in turn furnishes the tubes with the proper direct current voltages. Both methods are extensively used, the indirect method probably more than the other.

The Electrolytic Cell

One of the most popular types of rectifiers used is the electrolytic type which employs a solution of a neutral salt of ammonium phosphate with two electrodes submerged in it, one being of aluminum and the other of lead or polished steel. There are many variations of this type of rectifier as there is a number of different combinations which will produce the required results. The rectifying effect is produced by the formation of a thin film of oxide or hydroxide on the electrode in combination with a thin gas layer. It is not necessary to go deeply into the chemical action which takes place. The important consideration is that current will pass through in one direction with comparatively little resist-

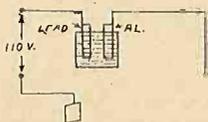


FIG. 1
The electrolytic rectifier.

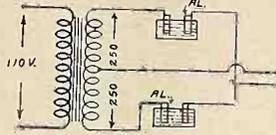


FIG. 2

A step-up transformer used to obtain higher voltages than possible with the Fig. 1 method. Also, both sides of the AC wave are rectified, shown by the two electrolytic cells.

ance and in the other with very high resistance.

This type of rectifier is used in supplying direct current both by the direct and indirect methods.

If the electrodes are made of sufficient size the voltage drop is not excessive and in some cases they are used directly with the 110 volt current as shown in Fig. 1. There is a certain amount of danger in this type of rectifier when applied to the receiving tubes in that the voltage of the line may be impressed directly across the tubes unless a fixed condenser is placed in the ground lead. This is particularly true when this is used for supplying filament current. However, with proper precautionary measures good results may be obtained.

Voltage Limitation

In supplying B voltage by this method the voltage can never be more than about 80 due to the resistance through the rectifier. A better way of providing the proper voltage is through a transformer which will step up the voltage sufficiently so that the receiver will get the full 100 and in some cases 150 volts. The connection is shown in Fig. 2, where two different cells are used which rectify both sides of the wave and give the proper B voltage. The single cell rectifier is often used in the trickle charger devices in combination with a transformer that reduces the voltage. There is no connection between the electric line direct, and the battery may be on charge when the set is in operation. The rate of charge is very small, being about one-quarter of an ampere.

The fact that a receiver is normally used only a few hours out of the twenty-four makes it possible for this type of charger to keep the battery fully charged if the charger is left on continuously. This connection is shown in Fig. 3.

When a charger is used in combination with a storage battery while the receiver is in operation no filter system is necessary, as the battery smooths out the ripples. In case the rectifier is used direct to provide B battery current an elaborate system of filter circuits is necessary to eliminate the hum.

The Vacuum Tube

Another type of rectifier is the ordinary vacuum tube. It is a well known fact that current will only pass in one direction through a vacuum tube. When the plate is positive and the filament is heated a current will flow from the plate

Sets Can be Operated Only On Direct Current, as a Rule, so Rectification of AC is Necessary—Practical Discussion of the Four Types Explains How They Work

to the filament, and conversely when the plate is negative no current will flow. This is explained by the fact that electrons are emitted from a heated body which are attracted to a positively charged body and form a path for the current, while a negative plate repels the stream of electrons and prevents the passage of current.

This device has considerable internal resistance and not always satisfactory results may be obtained without the use of a transformer to step up the voltage.

The ordinary vacuum tube has not a great current carrying capacity and can be used only to supply small currents, such as are used in the plate circuit of receivers. Several tubes are made which have only a plate and filament and are of heavy enough construction to carry more current when necessary. These are the Tungar type of bulb and are used extensively in charging batteries from the alternating current mains.

The Raytheon Tube

Another type of tube has no filament and uses the gas conduction principle. An electrical discharge will take place at a lower voltage from a point than from a flat surface. It is impractical to provide a discharge path in air because the voltages required to force the current across are excessive, and the discharge would be more or less irregular. To overcome these two difficulties the point and flat surface are placed in a gas, thereby reducing the voltage required for operation and providing better conduction. This is known as the Raytheon tube and can be used for any type of rectifier not requiring too heavy a current. For the plate supply on an ordinary receiver the tube serves admirably. Two points are provided and one flat surface, thus making a two-in-one rectifier which rectifies both sides of the alternating current wave and thus provides smooth operation.

Every one of the rectifying devices described, when used as a direct plate or

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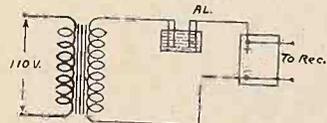


FIG. 3

The trickle charger.

Automatic Control Keeps Station Going

Program Halt, Due to Breakdown, Is Thus Prevented—Big Problem to Keep Tubes in Operation, for If One "Goes," Nothing Is Heard

Automatic operation of one of its transmitters has been developed by WGY, the Schenectady station of the General Electric Company, to prevent interruption of program service resulting from breakdowns.

The best supervised transmitter is liable to go wrong at times and there is always the chance that a break will occur during an important program. At WGY a daily inspection of tubes is made, for the tubes are the very heart of the system. In the 50 kilowatt transmitter of WGY, located about four miles from the control room and studio of the station, there are fifty tubes of one sort or another and the failure of any one of the fifty means a shutdown.

As a rule transmitter trouble is noted quickly and if the faulty tube is spotted at once the change may be made in a few seconds. Occasionally the cause of trouble is not immediately apparent and at such times the spare transmitter is put on the air.

WGY operates, generally, on 50 kilowatts, utilizing the developmental transmitter which was first heard on the air in July, 1925. The main transmitter, operating on five kilowatts is always in readiness for emergency use.

The five kilowatt transmitter, a quarter

of a mile from the control room, may be automatically operated by an ingenious series of fifteen relays, controlled over three lines between control room and transmitter.

If trouble is found with the 50 kilowatt set the control room engineer throws a switch which starts the nine machines supplying the various types of current to the five kilowatt transmitter. This switch starts the machines which generate plate and filament voltages as well as the biases required. A second switch supplies low plate voltage and the attendant may then consult an indicating device in the control room to find out if the transmitter is functioning properly before he throws a third switch which puts the transmitter on full power. There are interlocking relays which automatically control the flow of water used for cooling the power tubes and these relays will automatically shut down the set if any part fails to operate.

The switch-over from one transmitter to the other can be made in fifteen seconds. While automatic operation of the five kilowatt transmitter may be continued indefinitely it is customary to assign an operator to the set as soon as possible after the switch-over has been made.

Mary Lewis to Sing With Werrenrath At Industry Fete

Mary Lewis and Reinald Werrenrath, soprano and baritone, have been selected as the soloists at the Radio Industrial Dinner which will be held at the Hotel Astor, N. Y. City, Sept. 15. The program will be broadcast through at least 32 of the biggest and most important radio stations in the country. Miss Lewis is singing through the courtesy of A. Atwater Kent, for whom she appeared last winter as soloist on one of the Atwater Kent Radio Hours from station WEAF and its affiliated stations.

Mr. Werrenrath will sing through the courtesy of the Victor Talking Machine Company for whom he records. Both Miss Lewis and Mr. Werrenrath will be heard on the Atwater-Kent program again this Winter. The full-time programs begin again on Sunday night, October 3.

15,000,000 To Hear

Fifteen million people are expected to listen to the broadcasting of the program.

Coming during the week of the New York Radio Show, this banquet will see radio manufacturers, jobbers, dealers, broadcasters and artists gathered from every state in the Union at the Astor Hotel Grand Ball Room, while millions of listeners will enjoy the program which will be broadcast by thirty-three broadcasting stations covering the entire East.

More than 200 artists will comprise the talent for the show which will be honored by Miss Lewis and Mr. Werrenrath as headliners with five orchestras and the WEAF Grand Opera Troupe, the WEAF Light Opera Troupe and the WEAF Musical Comedy company presenting every variety of radio entertainment.

Others On Program

Among the other artists who will appear on the bill will be:

The Victor Revellers, The Capitol Family, The Everready Mixed Quartette, Premier Male Quartette, Vaughn DeLeath, Phil Cook, Ernie Golden, Royal Typewriter Salon Orchestra and Singers, Ipana Troubadours, Victor Salon Orchestra, Markel's Society Orchestra.

The largest number of station previously operated from a single microphone was 27 on the occasion of a Presidential inauguration. While the complete list of broadcasters who will participate in the September 15 program has not yet been arranged, confirmation of the booking of 32 stations already has been announced by the committee. The stations are:

WJZ, WBZ, WGY, WGR, WHO, WWJ, WOR, WOC, WLW, WHN, WGN, WEA, WEEL, WJAR, WSCH, WCAP, WTAM, WAHG, KSD, WLWL, WRNY, WFBH, WMCA, WBOQ, WTAG, WCAE, WCCO, WNAC, WEAN, WNAB, WNYC and WTIC.

Daves To Speak

Vice-President Daves, will be the principal speaker at the banquet.

When the Vice-President faces the 33 microphones on the speakers' table his voice will be carried to an audience of listeners that will undoubtedly be the largest ever reached by an official of the United States or any other individual.

Eliminator Filter That Is Popular

30-Henry Chokes Are Connected in Series and Large Condensers Aid

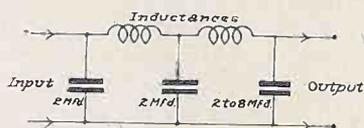


FIG. 4

Filter system used on direct supply.

(Concluded from page 3)

filament supply, requires a filter of some sort to take the ripples out of the current. A popular type of filter connection is shown in Fig. 4, and consists of two inductances of about 30 henrys each in combination with several large bypass condensers of the high voltage type.

There are many variations of this circuit, but this particular one seems to be the most popular, especially for use with the Raytheon tube.

Nothing has been said of the motor generator method of getting direct current, as in reality it is not a true rectifier, but an actual generator of direct

current. The initial cost and features of design naturally limit the use of this type of supply, though it is understood that rapid improvements are being made in along these lines.

So there are several ways of obtaining direct current for use in the radio set when the only supply available is alternating current. In one way AC is an advantage over direct line current in that it may be stepped up or down at will by means of transformers before it is rectified and the proper voltage obtained more economically. For direct current the upper voltage which can be obtained is something less than the line voltage, which is usually 110.

When alternating current is used voltages as high as 500 are obtainable. There are four general classes of rectifiers in practical use: (1), the electrolytic rectifier; (2), the vacuum tube acting as a rectifier; (3), the Tungar bulb rectifier, and (4), the gas conduction tube (Raytheon) rectifier. All of them give good service when properly designed and used with the proper auxiliary apparatus.

ON ITS WAY—

BERNARD

A 6-TUBE RECEIVER

A Simple Battery Charger

Lamps in Series Are Used For Operation From Direct Current—Charging Rate is Governable And May be as High as 6 Amperes—How to Tell Polarity of the Line

By J. E. Anderson

IN districts where the electric power supply is direct current a simple battery charger may be made as shown in Fig. 1.

The material required for its construction is a small piece of board, a porcelain fuse block, two standard screw type sockets, two Fahnestock clips, and two large lamps.

The size of the lamps depends on the charging rate desired. The two lamps shown in the photograph are 200 watt units.

Each of these is supposed to draw 2 amperes, but the actual current through the two in parallel is 3.5 amperes when the voltage source is 110.

This is a rather slow charging rate for a 100 ampere-hour battery, but it is perfectly safe.

The only disadvantage of using such a slow rate is the length of time required to charge a battery of the above size—about 30 hours.

May Charge to 6 Amperes

Any charging rate up to 6 amperes may be used, and if a higher rate than 3.5 amperes is desired all that is necessary is to use larger lamps in the sockets. I prefer the smaller lamps and lower charging rate.

The charger in the photograph has only one fuse block, hence the line is only protected on one side.

This is perfectly all right, provided the fuse is placed on the live side of the line.

If it is desired one double fuse block and two sockets may be used so that a fuse may be inserted in each side of the line.

Under certain conditions this precaution may prevent blowing the main fuse and throwing the entire house in darkness.

Costs 75c For 100 Amp. Hour

The cost of charging the battery with this charger is the cost of burning the two lamps, and there is essentially no difference in cost no matter what size the lamps. One complete charge of a 100 ampere-hour battery comes to about 75c. This is rather high but it is exactly the same as the cost with any other direct current charger in which the voltage is cut down by means of resistances.

The cost may be reduced somewhat if the charging is done in the evening when the light from the two lamps can be used for lighting the house.

Or if there are several batteries to be charged, as many as fifteen 6-volt batteries may be charged for the same cost, provided they are all connected in series.

Two Ways to Tell

Before connecting this charger with a battery it is necessary to determine the polarity of the terminals, so that the posi-

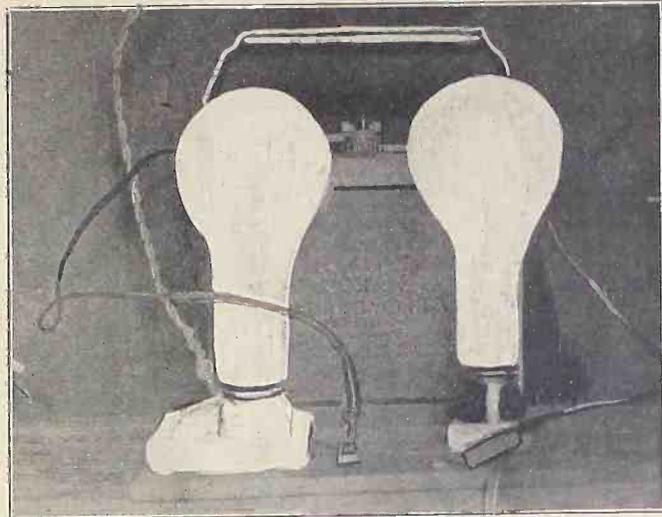


FIG. 1

The DC battery charger constructed by the author.

tive of the charger may be connected to the positive of the battery.

The easiest way of determining this is with a voltmeter. But if a voltmeter is not available the polarity may be determined in the following way. Put some water in a tumbler and then put a pinch

of salt in the water. Put the bare ends of the two wire leads from the charger terminals in the salty water, as far away from each other as possible. Bubbles will appear at both wires but there will be twice as many at one of them. That is the negative.

Yokeman, Tenor, A 13-Station Man

Milton Yokeman, who specializes on ballads and is popularly known as "the silver-voiced tenor," has made such strides artistically this season that he is being featured from thirteen of prominent New York stations, having recently added WNYC, W M S G, WRNY, WGBS and WEBJ to his list. He is the recipient of hundreds of "fan" letters of praise for his beautiful and sympathetic voice, for his way of getting his songs across, and for his excellent diction.



MILTON YOKEMAN

Mr. Yokeman has just been re-engaged as the tenor soloist with the old-time minstrel show featured on alternate Thursdays by station WGBS. He has also organized a string trio which broadcasts with him on Sunday afternoons from WBNY.

Contact Important

The leads connecting the batteries to the set should be looked over periodically to make sure that perfect contact exists. One search disclosed that the lead to the A minus on a storage battery was badly corroded but just making enough contact to light the tubes. After disconnecting and cleaning the wire the all-around efficiency of the set was increased 50%.

Will Rogers Is Paid Biggest Broadcast Fee

Will Rogers recently broadcast for the largest fee ever paid to a talker in England, the check going to a hospital at Rogers' request.

He told England that he was greater than George Bernard Shaw, basing his conclusion on the fact Mr. Shaw was barred from broadcasting on his seventieth birthday, while he was permitted to broadcast without anything to celebrate.

"England made a great mistake," he said, "in not complimenting Mr. Shaw on his birthday. Germany did—but then, Germany does not have to live with him."

He gave England half the credit for Gertrude Ederle's feat in swimming the Channel. "After all," he said, "Britain furnished the beach for her to land on. Otherwise she would be swimming yet."

Best Mike Words In British Book

LONDON.

The compilation of a "radio broadcasting vocabulary," comprising words which may not be confused when transmitted through the microphone, has been undertaken by a committee, which includes Robert Bridges, poet laureate, and Sir Forbes Robertson.

A list of doubtful words is being considered by the committee of experts and their decision will be forwarded to all stations of the English Broadcasting Co., to be adapted by announcers.

One expert said:

"The English language is being made more speakable, due to radio's demands."

Cures for Your Troubles

[Part I of this comprehensive trouble-shooting article, the greatest effort of its kind in radio literature, was published last week, issue of August 28. Part II, the conclusion, follows.]

By Lee Manley and W. E. Garity

IN checking noises in a receiver, the first problem should be to determine whether this is being picked up on the antenna or the loop, or whether it is originating in the set itself. In order to check this on a set employing an antenna, adjust the receiver to a point where the interference or noise is present. Then remove the antenna and ground connections from the receiver and note whether or not the noise ceases. If there is a great decrease in the volume of the noise when the leads are disconnected, it is safe to assume that the noise is emanating from an outside source.

If a loop set is employed, disconnect the loop and place a short length of wire, not over four inches in length, in place of the loop. If the noise ceases when the loop is removed, it may be safely assumed that the noise originates at some outside source. However, if the noise persists after the pick-up circuit, either loop or antenna, is removed, it is safe to assume that the noise is originating in the set itself. The noises referred to in the foregoing are those which are present at all times, particularly when none of the controls are being moved.

Noises in the Set

Noises within the set itself may be caused by one of the following items:

- A defective tube.
- Lirly tube contact.
- Defective battery.
- Defective loud speaker.
- Dirt on loud speaker diaphragm.
- Defective battery contact or a loose connection.

The defective tube should be replaced by a tested one. The tube contacts should be cleaned with a piece of emery cloth or fine sandpaper. Make sure to remove all traces of grit before replacing the tube. Make sure the contact springs of the sockets are clean and are making good contact to the contact pins of the tube.

A defective battery will also cause many noises in a receiving set. The batteries should be checked in the following manner: Connect a pair of headphones across the outside terminals of each individual battery, and note the sound in the head phones. If there is a boiling or frying sound in the head phones when they are connected in this manner, it is an indication of a defective battery, and batteries showing such defects should not be used in a radio set. A loose or defective battery connection will also cause a set to be noisy. A loud speaker with a defective winding will also cause disagreeable noises. Dust and dirt accumulations on the loud speaker diaphragm will cause the set to appear noisy. A condition might arise where the diaphragm of the loud speaker becomes loosened, causing it to rattle when actuated by the incoming signal. Loud speaker defects generally necessitate a factory repair.

Test of Speaker

A transformer winding which is deteriorating will cause a hissing or a frying sound in the amplifier. A loose connection in any part of the receiver, and the loud speaker, which is subject to vibration when the loud speaker is operating, will also cause the set to be noisy. In order to definitely locate the origin of

noises in the receiver, use a pair of headphones and plug them in in place of the loud speaker. This will immediately determine whether the noise is originating in the loud speaker. If the noise persists with the phones plugged in the last stage of amplification, plug into the first stage, if a jack is provided, and repeat the process, plugging into the detector circuit. If but a single jack is provided, and this jack is connected in the output of the audio-frequency amplifiers in order to determine whether or not the noise is originating ahead of the detector or in the audio-frequency amplifiers, connect the telephones in series with the detector B battery lead. In that way, you may determine whether or not the noise is originating ahead of the detector or in the audio-frequency amplifiers. Once the source of the noise is determined, it requires very careful checking of the various parts and connections in the circuits responsible.

"Set operates satisfactorily except when any of the controls are moved; it is very noisy." This condition indicates directly a defective connection caused by a mechanical failure. A defective tube will some times cause this condition, and is apparent when a rheostat is moved or the set is subjected to mechanical vibration. If the noise persists when any of the other controls are moved, such as condensers and coils, it is an indication that there is a mechanical failure which is causing a defective electrical connection. Dust and dirt accumulations on the condenser plates will cause noises to be heard when the condensers are rotated. The plates should be cleaned with an ordinary pipe cleaner. A bent condenser plate touching the opposite assembly will also cause this condition. Some variable condensers are constructed so that the electrical contact is made through a friction washer or through the friction of the rotor shaft to the bushing. This type of contact is quite satisfactory when the condenser is new, but after a long period of operation the parts wear, decreasing the friction, resulting in an indifferent contact which will at times cause the set to appear noisy, particularly so when the circuits of the receiver are tuned to resonance. Vernier drive shafts that have become worn through use will cause the sets to be noisy when the circuits are in resonance. Weak contacts in telephone jacks will also cause this condition.

"Signal Garbled"

"The signal is garbled. We cannot clear up the speech." This is generally caused by a defective oscillation control. Either a defective tube, a defective potentiometer or the neutralizing capacity out of adjustment will generally be found to be the direct cause. Of course, this applies only to receivers employing radio-frequency amplifiers ahead of the detector tube. If this condition is met in a single tube receiver it is generally due to the fact that such signal is too weak fully to actuate the detector tube. In the case of multi-stage radio-frequency amplifiers, this is a rather difficult problem to service. If it be caused by a defective tube, which it rarely is, then matters are simplified.

The balanced or neutralized type of set employs neutralizing capacities for oscil-

lation control. The so-called reflexes and untuned radio-frequency circuits use the potentiometer and in addition introduce losses in the radio-frequency transformers. Some of the straight tuned radio-frequency amplifiers employ a rheostat for each tube, some a single rheostat and a potentiometer; others a variable series resistance in the grid circuit of the first tube. There is another class that employs ingenious arrangements of wiring and parts to take advantage of stray capacities and interlocking stray fields, which have a tendency to prevent free oscillation. Certain other sets, it would appear, leave it entirely to chance and hope that they won't oscillate.

The sets in the latter two groups present very trying service problems.

The effect of this garbling condition is generally only apparent on extremely weak signals. It is generally impossible to eliminate entirely the whistle or carrier wave, and as a result, you receive a combination of voice or music, as the case may be, combined with the lower pitched tones of the carrier wave. Interclanging tubes in the radio-frequency sockets will sometimes lessen the tendency to oscillate, as there is some slight variation in the oscillating characteristics of the tubes, particularly after the tubes have been in operation for any length of time.

New Neutralization

In the case of the failure of balanced or neutralized receivers, it is necessary to readjust the neutralizing capacities to their proper values. This particular service is rather difficult and should only be attempted as a last resort. It is not likely that these neutralizing capacities will vary a great deal from the original setting, unless the set has been abused or has been subject to physical damage.

In the case of sets employing a potentiometer for oscillation control, this condition is extremely rare except when signals are received that are so weak that their modulated power is not sufficient to actuate the grid of the first tube in the series. It should always be remembered that a carrier wave of a broadcasting station is heard at a much greater distance from the station than is the audio-frequency modulation which is impressed on the wave. Sets employing individual tube control rarely have this trouble. The types of receivers using circuit arrangements and placements may be corrected by adjusting a single wire, but the problem is to find that wire. It is generally a grid wire and is, as a rule, oddly shaped and takes apparently a round-about way to get where it belongs. Reducing the radio-frequency B battery voltage will help correct this condition.

The last type mentioned, where no apparent means are used to prevent oscillation, are generally found in very cheap sets, where the poor grade of material used, introduces so many losses that it would be difficult to make them oscillate. Occasionally a set of this type oscillates and causes this condition and the only possible correction lies in tube interchanging and reduction of the radio frequency B battery voltage.

"Too Loud on Speaker"

"It is too loud on the loud speaker." This complaint is rare, but is sometimes heard. It is generally due to an effort to reduce the cost of the receiver, with the result that a telephone jack in the first stage of amplification is omitted, and for the same reason no provision is made for volume control. The only remedy for

How to Tame Wild Sets

this condition is to reduce the voltage of the audio frequency amplifiers to a point where satisfactory volume is had.

"When I take my hand away from the set I lose the signal." This effect is known as a "body capacity" effect and is primarily due to poor design, a poor ground connection, or a poor circuit design. All sets should be equipped with grounded metallic shields. In addition, wherever possible, the shafts of the control knob should be electrically connected to this shield. If this is not possible, the low potential side of the various apparatus should be connected to the control knobs. Some sets have poor circuit design which prohibits the use of a grounded shield, and in cases of this kind, body capacity effects are quite disagreeable and persistent.

Grounding of the A battery will sometimes be helpful in eliminating body capacity effects, but it should be first determined whether or not there is a connection between the ground terminal and the filament circuit within the set itself. For example, if the positive filament circuit is connected to the ground terminal, the A battery should be grounded at the positive terminal. If the ground terminal of the receiver is connected to the negative side of the filament circuit within the set, the negative terminal of the battery should be grounded. In sets of proper design in which shields have been incorporated and body capacity is present, we would suspect that the shield has become disconnected from the ground or battery circuit within the set.

Frying Sound

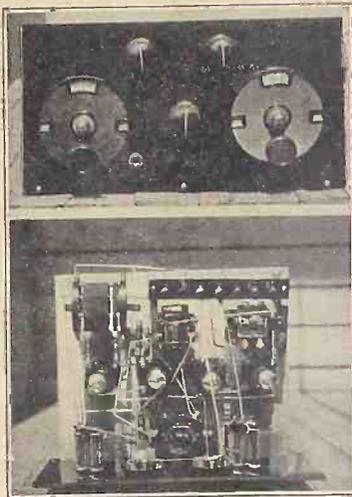
"There is a frying sound in the set." This condition may be brought about by a defective battery, defective tube, a ground in the loudspeaker, a defective battery connection, a transformer that is burning out or in the case of a set employing a gas type 200 detector tube, an excessive B voltage on this tube. The defective tube may be located by replacing the tubes with tested ones. The defective battery should be checked with head phones as described previously. A defective loudspeaker may be tested by replacing same by head phones. All battery connections should be tightened. A defective transformer may be determined by a similar test that is used to locate a defective battery, except that a battery that is O.K. is used and connected in series with the telephones and the winding of the transformer under suspicion.

"When I touch the panel there is a ringing sound." This is invariably due to a microphonic tube and may be eliminated to a certain extent by interchanging the tubes until the best combination is had. The detector and audio-frequency amplifier tubes are the principal offenders in this connection. In sets employing dry cell operated tubes such as the WD or WX11 or the UV or UX199, this condition is exaggerated unless the tube sockets are properly cushioned. There is a certain degree of this condition present in all receivers, even under normal conditions, and it is another reason why radio manufacturers are inclining more and more to the cushion type socket suspension.

Cure for Squeal

"There is a squealing sound in the set all the time." This condition may be caused by a defective tube, one that has become soft or gassy. It may be due also to a defective B or C battery that has dropped in voltage more than 25 per cent. A burned-out primary winding of a trans-

SELECTIVE SET



THE 4-tube Diamond was built by C. C. Paugh, of 462 State Street, Schenectady, N. Y., on a 7x14" panel, as shown above. He uses 99 tubes, except that the last audio stage has a 120. "I have been able to cut out WGY, only a mile away," says Mr. Paugh.

former, or an open telephone jack in the audio-frequency circuit will cause this squealing. Another cause may be the result is the heterodyning of two transmitting stations, or it may be the effect of a nearby receiver interfering with the one in use, however, under the last conditions the squeal will be present at certain definite places on the dial, whereas in the case of a defective battery, tube, transformer or jack, it is continuous throughout the entire scale reading.

"There is a buzzing sound like a motor boat. There is a clicking sound in it." This is a general indication of an open grid circuit. The frequency may vary from one click a minute to a very high pitched note. If the grid leak should become loosened from its clips, this sound will generally result. If a C battery is used, a poor connection or broken connection to this battery will give the same result. If none of these conditions appears to be the difficulty, it will be necessary to make a continuity test from the grid contact spring of each socket to the filament circuit.

"When I touch anything on the set a rattling sound sets up or the set will sometimes go dead and a jar will restore it." This is caused primarily by a loose connection either in one of the tubes or in the connection of the circuit. Investigation of every connection and friction contact in the set should be made. It is well to replace the tubes with tested ones in order to eliminate the tube as a factor. A loose shield or a loose vernier shaft will give these results; particularly so when the circuit is tuned to resonance.

Poor Jack Contact

"It works in the detector jack, but does not operate in the first or second stages." If the A battery connections to the amplifier are properly made, this condition is probably due to a defective telephone jack in the detector circuit or a burned-out primary winding of the audio-fre-

quency transformer connected in the detector circuit.

"It works in the first stage audio-frequency amplifier, but does not operate in the second stage." This is due to a similar reason as previously given. It is caused by a defective telephone jack or transformer in the first audio-frequency circuit.

"The tubes fail to light." This condition may be brought about by a defective A battery, or a defective A battery connection. It may also be due to a faulty battery switch that fails to make proper contact. In the same way a rheostat that does not make proper contact will cause the same effect. Any loose connection in the A battery circuit of the set may cause failure of the tubes to light. If this condition exists only on one or two tubes, it is in all probability due to a burned-out filament. A dirty contact on the tube will sometimes cause the failure of a tube to light. If the contact springs of the socket do not make a firm contact to the tube pins, this condition might also occur. If dry cells are used, check to see that the individual cells are connected in the circuit with the proper polarity. If one or more of the cells are connected with reversed polarity, full voltage will not be had at the tube terminals.

Method of Procedure

In general, the service men should follow a procedure somewhat along these lines. Light the tubes and tune the receiver to the point where the best local station generally is received. Note the volume on the loudspeaker, if one is used. If the volume is weak, tap the tubes with the finger-nail to determine whether or not the audio-frequency amplifiers are operating satisfactorily. If the amplifier is working satisfactorily, a ringing sound will be heard in the loudspeaker. If this ringing does not result, check the polarity and voltage of the various batteries, and replace all defective ones. Inspect the connections of the batteries, and if this does not result in satisfactory reception, try replacing the tubes.

If no sound at all results, immediately replace the loudspeaker with the head phones to determine whether or not the loudspeaker is defective. If no results are obtained, turn off the A battery switch and remove the tubes, and by means of a voltmeter, check the voltage between the filament and plate contact springs of each socket. If satisfactory indications are had and no signal is heard, repeat with a similar operation between the grid and filament contacts, using a pair of head phones in series with a 22½ volt battery in place of the voltmeter. Rather decided clicks should be heard, when contact is made in each instance with the exception of the detector grid. Because of the fact that in the detector circuit, a high resistance grid leak is used, the click will be rather weak. One of the foregoing tests will most probably check up the difficulty and the obvious repair should be made.

We will make a brief analysis of the various types of parts that are commonly used in radio broadcast receivers, as to their possible defects. The common practice in tuned radio-frequency circuits today is to use the air-core type of transformer. These coils are generally wound on some form of tubing. Some manufacturers, depending on the adhesive quality of the binder to hold the wires in shape, do not use any type of tubing for support. These coils are generally wound with a relatively heavy wire, and are not

(Continued on page 28)

The Versatility of a Bypass

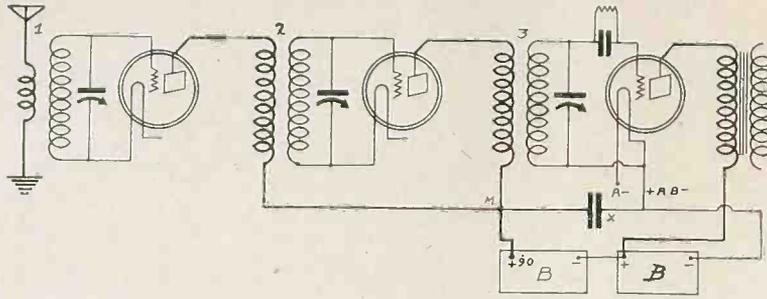


FIG. 1

The radio side of a tuned radio frequency receiver, the coils being numbered 1, 2 and 3 and the bypass condenser being designated as X. The point M is common to the two plate circuits.

Fixed Condenser Located In Set Between B Minus and B Plus Will Aid Regeneration, if the Capacity is Small Enough, or May Squelch Squeals if Capacity is Sufficiently High

By K. B. Humphrey

THE function of a bypass condenser placed across the B battery at a point close to, or inside, the tuned radio frequency receiver may be divided into two parts: (1), as a regulator of the B battery potential, and (2), as a short-circuiting medium for unwanted signals. There has been quite a lot of discussion and much argument as to the proper size of the bypass condenser as used ordinarily, but it may be said safely that the size is by no means critical. It might be kept in mind that the larger the capacity of the condenser the less resistance it offers to an alternating or high frequency current. From this it looks as if the bigger the condenser the better. This is not true in every case because it is often desirable to have a certain amount of regeneration present, and a condenser of very large capacity has a tendency to reduce this.

Effect of High Resistance

The hookup of a tuned radio frequency receiver is shown in Fig. 1. This is of the type which constitutes perhaps 90% of the receivers in use today. The B batteries are connected so that 45 volts are placed across the plate of the detector and 90 volts across the radio frequency tubes. The three radio frequency transformers are numbered 1, 2, and 3. Both primaries from No. 2 and No. 3 coils are brought to a common point M. If there is no bypass condenser as shown at X in the figure the results will be as follows, especially noticeable when an old B battery of the dry cell type is being used, or one with a high internal resistance.

The voltage of a fully charged B battery or a fresh dry cell type will remain constant at the point M no matter what current is being drawn by the tubes. When there is considerable resistance in the cell itself there will be a change in the potential at point M with every variation of the signal impressed on No. 1 coil by the antenna. The point M being

common to No. 2 and No. 3, any signal on No. 2 will be impressed directly on No. 3 without passing through the second vacuum tube at all. The result is that No. 2 stage is more or less ineffective and it will be found that on a strong signal coming in the first stage No. 2 for all practical purposes will be inoperative.

Selectivity Improved

In fact the tuning condenser may be placed at any setting on the dial without materially changing the strength of the received signal in the speaker. Immediately a bypass condenser is placed at X, any change of potential at point M will have a tendency to make a current flow through X and a more constant potential is maintained at M. This condenser cannot, however, atone for extremely poor or rundown batteries, but it does help a great deal in smoothing out the voltage at this point. It will be found that upon the substitution of various sizes of bypass condensers at point X from about .01 mfd. up to 1.0 mfd. that the lower values seem to work efficiently if a small amount of regeneration is wanted. The larger sizes will prevent regeneration to a small extent and if the fan is troubled with too much whistling it might be well for him to try increasing the size of this condenser. With a freshly charged stor-

Considerable Resistance in B Battery Will Result in Potential Changes at M In Fig. 1—How the Bypass Condenser May Avoid Having a Stage of RF Non-functioning and Improve Selectivity

age B battery or a new dry cell B battery the equivalent capacity in the battery takes care of most of this, but it is a good thing to have one in the set as batteries will run down, and it does no harm when it is not needed.

Good On Long Leads

The use of a bypass condenser as a short circuiting medium for unwanted signals is especially valuable when the B battery leads are of considerable length. If the leads are separated to any extent it forms a loop which is a good collector of radio signals. This feeds the radio currents directly on to the plates of the tubes and the selectivity of the receiver suffers. The condenser functions as a short circuit for these signals and prevents them from doing any harm.

It may be seen from the preceding that this bypass condenser is an important factor when the selectivity of the receiver is taken into account. This condenser smooths out the B potential and bypasses undesired signals.

Result of a Test

By actual test on a 5-tube receiver it was found that by increasing the value from .005 to .01 that the sensitivity of the receiver was increased about 15 per cent. A further increase prevented the receiver from oscillating at all and the sensitivity was not very materially injured.

The only way for the fan to determine the value required is to experiment with different sized condensers until the most satisfactory results are obtained.

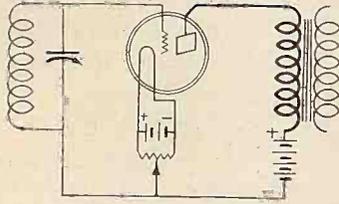
6-Tube Sets Liked, But "Fives" Lead

Shielding Usually Accounts for the Extra Tube on the Radio Side

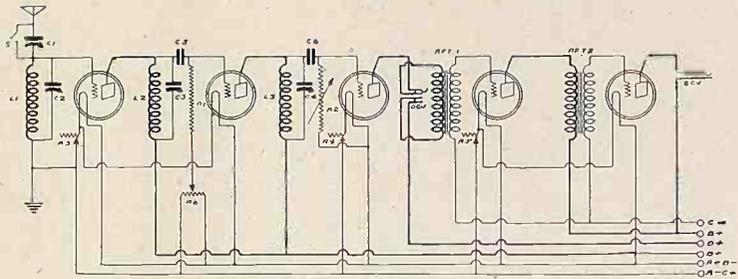
The season of 1925-26 was a 5-tube year, both in the home-constructed and the manufactured set class. The incoming season seems to look with a little stronger favor of the 6-tube set, especially in factory-made products. Tube prices have declined since this time last year, which may have a slight bearing on public acceptance of six tubes as a likely number. But more particularly circuit design, backed by much publicity, has aroused the new interest. However, the 5-tube set is going to maintain its popularity even in the approaching season, and it is extremely doubtful if the sale of 6-tube sets will even approach the sale of the one-tube-less variety.

Generally speaking, the extra tube is included on account of the effect of shielding and the electrical design of shielded circuits. Each stage tunes more broadly than heretofore, enabling greater part of the signal component to be passed by the radio receiver. Thus, with shielding and an extra stage of radio frequency amplification, although the selectivity may not more than that obtainable with one stage less, non-shielded, the side bands of the carrier wave may suffer less in consequence of tuning. It is the extra stage of radio frequency amplification that necessitates the shielding of the entire circuit, so there is no need to be alarmed if a 5-tube set is not shielded.

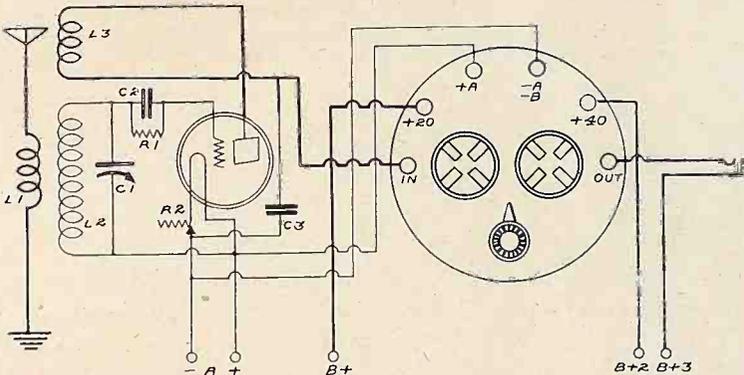
RF & AF Coupling Designs



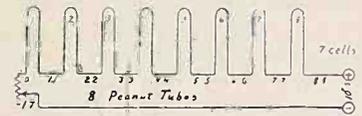
HOW TO obtain the proper bias on the grid of a detector tube with the aid of a potentiometer, so as to increase the sensitivity, instead of using the grid leak and condenser method, is diagrammed above. The arm of the potentiometer may be connected to the minus of the B battery as shown, or left disconnected, the minus going to the plus of the A battery.



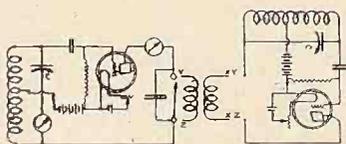
A 5-tube receiver, employing two stages of impedance coupled radio frequency amplification, a non-regenerative detector and two stages of transformer coupled audio frequency amplification. A potentiometer is used in the grid return of the second RF tube for controlling the oscillatory action of this tube. Then ohm rheostats are used in the RF and AF filament circuits. A 20 ohm rheostat is used in the detector filament circuit.



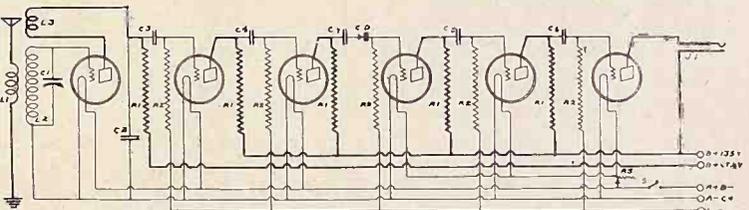
HOW A 2-stage A-K transformer coupled audio frequency amplifier may be hooked to the output of a regenerative tube detector is shown above diagrammatically. The filaments of the AF tubes are singularly controlled. The standard transformer hookup is used in the unit. Higher B voltages than those marked on the unit may be applied.



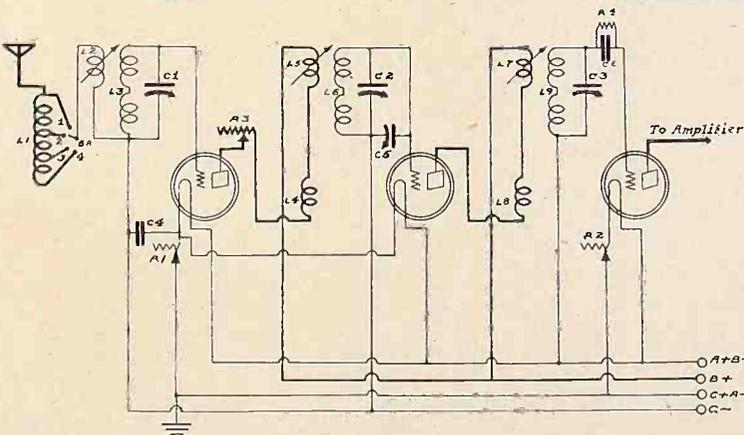
THE filament circuit of an 8-tube Super-Heterodyne, employing peanut tubes throughout. This arrangement is used by the Western Electric Co. These tiny tubes require a filament voltage of 1.1 and a current of .25 ampere. Due to their filament voltage being so low, they are highly adaptable for series connection. The entire eight may be operated on a bank of seven No. 6 dry cells, connected in series. The exact voltage of this series batch, when fresh, is 10.5 volts. Since the 8 tubes require only 8.8 volts, an excess of 1.7 volts exists. This excess is taken up however by the rheostat. Since these tubes draw .25 ampere, the drain is quite heavy and the batteries may run down quickly.



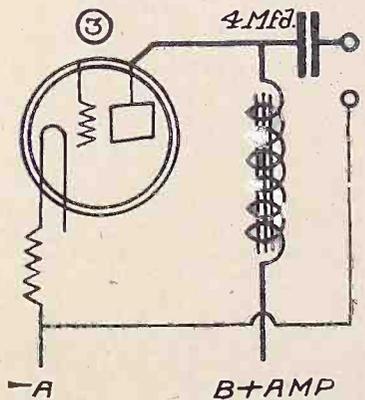
THE WIRING diagram for a radio frequency generating unit is shown above to the left, while the diagram of an audio oscillator appears at the right.



A 6-TUBE receiver, employing two stages of resistance coupled RF amplification, one stage of regenerative RF amplification, a crystal detector and three stages of resistance coupled AF amplification.



THE SCHEMATIC diagram of the Super-Zenith described in the Radio University columns of the July 24 issue of Radio World.



HOW TO hookup an impedance and a fixed condenser to the output of the last AF power tube to keep DC off the speaker.

Interference Sources Are Narrowing Down

Amateurs and Ships Eliminated as Contributors by Government Action, Attention Turns to Electrical Machines and Receivers and Accessories

By **Leon L. Adelman**

The Chas. Freshman Co.

Many no doubt remember the hectic days and evenings during which the matter of receiving a program uninterrupted by interference was a thing less commonplace than the proverbial scarcity of hen's teeth. While for the majority of us the trouble has been cleared up, there still remain many sources of interference.

When broadcasting was in its infancy the BCL blamed the amateur and the amateur in turn blamed the commercial stations. In fact, in many instances both were responsible to an extent for causing the troublesome noises which spoiled reception.

The Government was not long in deciding upon an expediency which would help the situation and in short order issued an amendment to all amateur licenses which forbade the use of the transmitter during the hours between 8 and 10:30 p. m. and during the hours of church services on Sundays.

High Wave Interference

This did much to relieve most of the interference, but it was noticed that the stations operating on the higher broadcast wavelengths were being interfered with. For the first time the BCL recognized that the amateur was not the only one causing the trouble, but that commercial and ship stations, many of which were operating spark transmitters, the worst interference producers, often resorted to wavelengths lower than 600 meters, in fact down to 400 meters. They were within the law in doing so, merely because of the fact that the law was inadequate to cope with the problem.

Many times and often a characteristic expression issuing from the lips of an antagonized and belligerent broadcast listener would be something like this:

"There is that amateur fellow again with the everlasting code playing with his radio and disturbing my reception!"

Then at the same time, the amateur would say: "Hang it all, here comes that inductive interference again." Or knowing it to be another reason he would exclaim: "There is that fool commercial on a wave he shouldn't be using."

Government Steps In

And amid all this vexation, the radio inspector sat back and mused.

With everyone clamoring for equal rights to the air it became the duty of the Government officers to straighten up the tangle. New broadcast stations were demanding the assignment and allocation of a wavelength, forcing their way down to the 200 meter band used by the amateurs. They could not use a higher wave, since none was available, and even as the state of affairs stood there was sufficient interference on the higher waves to dis-allusion even those stations having licenses for operating there.

A way was finally found out, and with certain exceptions, ships are not to use

lower than 600 meters while in the vicinity of the harbor.

This helped matters at the higher end of the wavelength scale, but the lower one, with its congestion, still is in state of equilibrium.

Talk has recently been prolific that the amateurs should have the 200 meter band taken from them, since they do most of their work on and below 80 meters. Immediately on hearing this many amateurs raised their voices in mighty objection. Others remained unaffected.

Nothing to Lose

With a little study of the question and a reasonable amount of logical discussion it will be found that the amateurs have nothing to lose if the law is made so that it will require them to keep below 100 meters. But to force the amateurs to accept anything less than that would be an injustice. In the first place necessity does not demand it and secondly it would be robbing the country of a very valuable asset.

Successful broadcasting has not as yet been accomplished on the wavelengths below 200 meters, to the extent that such a system could be used practically and with satisfaction.

There are approximately 350 broadcast stations in the country and 18,000 amateurs. These broadcasters will be found on wavelengths separated by 10 kilocycles between 200 meters and 550 meters. On the other hand the amateurs are grouped between 20 and 200 meters, the majority of them operating on 80. They use continuous waves for transmitting and there are laws against the only interference which such stations can cause to

DOLL IS HEARD



THE first radio doll to broadcast is shown in the arms of Dorothy Johnston at WMCA. A mechanical device inside the doll makes it talk.

broadcast listeners—key-clicks and power hum.

With the correct precaution, these are readily offset and as regards interference from the amateurs it has become a thing of the past. Now, then, where does all that interference come from? Seek and ye shall find.

If it appears to come from a residence, the following causes should be considered: Fan motors, washing machines, sewing machines, vibrating reed battery chargers, mercury arc rectifiers, tungar rectifiers, vacuum cleaners, loose fuses, defective entrance or circuit switches, various causes of trouble in phase motors, dirty or worn brushes or cut slip rings in other types of motors, induction type of electric furnace, electrically operated refrigerators, defective sockets, high frequency apparatus, etc.

If the trouble seems to be issuing from a factory, you may add to the list the possible trouble from smoke and dust precipitators and electrical flower bleachers.

Besides these few sources of trouble, you may be living in the neighborhood of a power generating station or your receiver or accessories may be causing trouble ascribed to interference.

Private Phone Talk Radioed by Accident

Resident of Aberdeen Complains British Broadcasting Co. Put Nearly the Whole Conversation on the Air
—Rare Occurrence Puzzles Engineers

LONDON.

While a man was telephoning from Aberdeen to a friend he was accidentally connected to the transmitter of the British Broadcasting Co. and almost the entire conversation thus was put on the air. The Postmaster General, who has jurisdiction over the telephone system, made an investigation and reply. He said that his engineers had been unable to ascertain the precise cause of the unfortunate occurrence. They report that a portion of the trunk route concerned runs through a very exposed district, where it

is subject to interference from branches of trees when broken by gales, and that it can only be assumed that some interference of this nature occurred which brought the wires into contact on the evening in question. The Postmaster General concludes by saying that it is impossible to insure immunity from trouble of the kind experienced.

Such accidents, it was said, are of rare occurrence.

Preventive precautions are being improved.

More Plate Volts Oddly Cut Volume

First Inclination Was to Blame Variable High Resistor
For the Phenomenon, But Inquiry Disclosed
Facts Quite to Contrary

By E. R. Stoekle Ph.D.

Member, Institute of Radio Engineers

A peculiar effect recently observed in testing a tuned radio frequency receiver employing a high resistance for controlling regeneration in the RF tubes illustrates how very easy it is to ascribe a defect to some part of a set when the real cause lies entirely outside the receiver.

The receiver employed the standard 5-tube circuit. The plate voltage control resistance was a 200,000 ohm Centralab radiohm which has proved generally satisfactory for this type of control. The radio frequency current of each of the RF tubes was by-passed by 0.5 mfd. condenser so that no high frequency current is obliged to pass through the high resistance. In other words, the resistance serves merely to vary the DC plate voltage applied to these tubes.

Queer Results

The phenomenon showed itself as follows: With 20,000 ohms in the Radiohm, good volume was received on a given station. Then, as the knob was turned to the right, lowering the resistance and raising the voltage on the radio frequency tubes, the signal strength rapidly decreased and with the full 90 volts on these tubes, the volume had dropped to practically nothing. Normally, the reverse action is to be expected. The operator's first conclusion was that the high resistance had probably been burnt out or otherwise proved defective at the low resistance end. Since the Centralab Radiohm is of a type which allows variation down to zero resistance, however, this did not seem reasonable, for the zero resistance position was a metal contact and could not have been easily burned out.

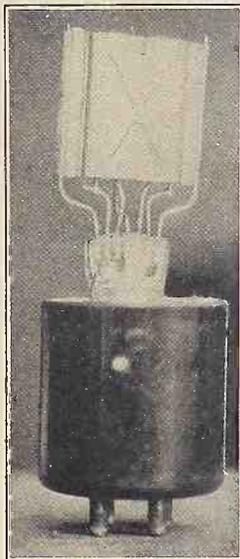
To investigate further a milliammeter was placed in the circuit of the RF tubes. This instrument showed that as the resistance was decreased from the point where maximum volume had been obtained, the current rose very slowly, which was as it should be. The remarkable part was that increasing space current was associated with decreasing signal volume. The slow rise of plate current with increasing voltage indicated that the RF tubes must be reaching voltage saturation as the resistance was decreased. A further investigation showed that the filament pressure was only a trifle over four volts, indicating a badly run down A battery.

Misleading Situation

An operator who discovers an apparently unnatural behavior of any instrument on his receiver usually concludes that there must be a defect in that particular instrument. The above described phenomenon in which an increase in the plate current of a vacuum tube results in a decrease in the amplitude of the radio frequency output certainly is misleading unless carefully analyzed. The following discussion explains the observed effect:

In order that a vacuum tube may function as an amplifier it is important that the electron emission from the filament be sufficient to maintain a space charge in

the form of a cloud of electrons between the grid and the filament. Furthermore, the number of electrons emitted by the filament is limited by its temperature. If the plate voltage is sufficiently high to attract all of these electrons to the plate as fast as they are emitted there will be no accumulation of space charge between the grid and the filament. Obviously, a further increase in the plate voltage cannot increase the current since there are no more electrons available for producing more current. In other words, the plate



(RADIO WORLD Staff Photo)

The plate of a tube exposed. When filaments are underheated, greater voltage applied to the plate cuts volume.

current remains practically constant for further increase in plate voltage.

Slight Effect

Variations in the grid voltage under these conditions will produce only a very slight effect on the passage of electrons from the filament to the plate, and therefore such variations of grid voltage will not be reproduced or amplified in the plate circuit. If, however, the plate voltage be lowered sufficiently to again allow the accumulation of space charge between the grid and the filament, the variations of grid potential will again affect the flow of electrons between filament and the plate, and the tube will again function as an amplifier.

This explains why, in the above instance, increasing the resistance to lower the plate voltage increased the signal strength, whereas, decreasing the resistance to raise the plate voltage decreased the signal strength. The proper correction of this condition in the above instance was, of course, to raise the filament temperature again to the point where the

electron emission was sufficient to maintain a space charge between the grid and the filament for the maximum plate voltage used.

Test A and B Batteries

The above experience indicates how important it is for the set owner to be sure that the A and B voltages on his set be kept at their correct value. It also shows how dangerous it is to jump at conclusions as to defects in the set when the cause of the apparent defect lies entirely outside the set, and may be easily corrected by the simple expedient of keeping one's batteries charged.

Craze for Radio Called Sane Sense

"The world is crazy over radio, and I hope it gets crazier yet," declared C. L. Farrand.

"It used to be that when people wanted to play, and remove the million of worries and cares that present-day life brings with it, they had to dig down deep into their pockets six or seven times a week, to take in a show, or hear an opera, or listen to some good dance music.

"Now all they have to do is turn a couple of little knobs, and all this entertainment is theirs in their own homes. In Summer, in the cool of their electric fan, and in Winter, while they listen to the family radiator steam up, they can play all they want to, with the radio, it's a salutary craze! It doesn't make father half so crazy to make one initial payment for months of entertainment as it used to make him when he had to come across all the time.

"No," Mr. Farrand said cheerfully, "I want the world to play, and I want to help them do it."

Whereupon the radio manufacturer who is a yachting fan rushed off to the waves of Larchmont Bay, forgetting all about radio waves.

Eveready Basso Gets London Honor

One of the most fashionable night clubs in London, the Princess Theatre, will feature a group of American radio artists at the opening of its season in September.

This group of American singers is headed by Wilfred Glenn, basso of the Eveready Hour, which for several years has been a popular feature broadcast each week through station WEAJ, of New York, and its affiliated stations throughout the East and Middle West. The other members of the party are: Franklin Bauer, Lewis James, Elliott Shaw and Eddie Smalley, all well known to American radio audiences.

The Princess Theatre engagement is for six weeks. At the termination of the engagement the American artists will return to New York with a complete new repertoire of English music hall ballads, many of which will be sung to radio audiences in this country during the Fall and Winter.

Comparatively few American radio artists have sung before European audiences and this group is the largest and one of the first engaged for a definite period by a fashionable London music hall.

RESULTS

Results Editor

I have constructed the Symphony receiver, described in the January 9 issue of Radio World by Irving Witz and have had wonderful results. Stations all over the country have been tuned in with ease, all on the speaker.

Radio University

A FREE Question and Answer Department conducted by RADIO WORLD for its yearly subscribers only, by its staff of Experts. Address: Radio University, RADIO WORLD, 145 West 45th St., N. Y. City.

When writing for information give your Radio University subscription number.

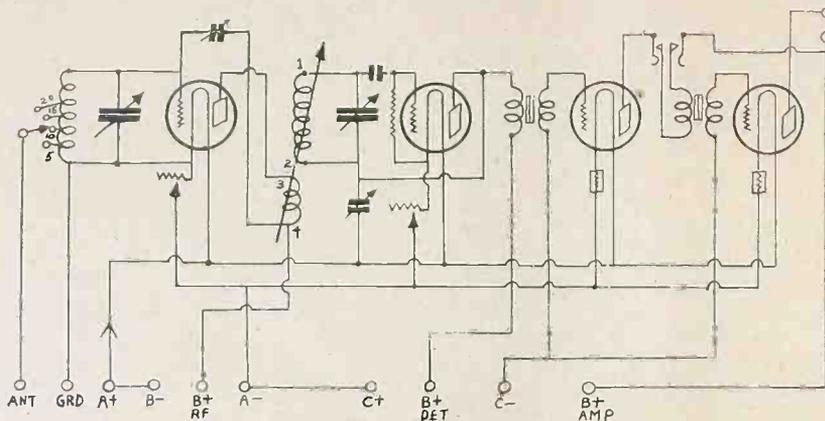


FIG. 421

Circuit diagram of a 4-tube set that has a tuned impedance input circuit, with a tapped aerial coil.

I WOULD LIKE to construct a receiver that has variable conductive aerial coupling, as I understand the signal will be louder and I am a little hard of hearing. For the same reason I would like the earphone listening post to be located at the first audio output. Can this set be made so that little, if any, interference will be caused to neighbors, due to radiation? I have two 10-ohm rheostats and two Amperites, 1A and 112, and I would like to use these in the set.—Harold C. Richmond, Fort Worth, Tex.

The diagram is shown in Fig. 421. Louder signals are obtainable by the so-called tuned impedance type of input. However, the capacity of the variable condenser tuning this circuit should be relatively large, to insure covering the wave band. This is because the condenser is so connected that it is in parallel with the antenna-ground capacity, hence the ratio between minimum and maximum capacity in the tuned circuit may easily be too low to produce full coverage. The tapping system is resorted to facilitate both loudest response and wave band coverage. No capacity for this tuning condenser should be lower than .0005 mfd. It is possible to tune in the wave band without taps if the tuning condenser is of sufficiently large capacity, at least .001 mfd., but without using shunting capacities to obtain this. As .001 has passed out of vogue, tapping the coil is suggested, for use with a .0005 mfd. condenser. The exact number of turns on the tapped coil can not be given so as to be useful in all installations, since the antenna-ground capacity is a ratable factor, and this varies in different antenna installations, even very considerably. For .0005 tuning try 40 turns on No. 22 double cotton covered wire on a 3" diameter tubing, tapped at the fifth, tenth, fifteenth and twentieth turns from the end which is to be connected to ground. The antenna is joined to the switch arm and contact is made between antenna and coil by means of turning the switch arm to the respective switch points, to which the taps on the coils are connected by carefully soldered leads. Wipe the solder with alcohol when each joint is completed. The radiation of the receiver is reduced to a negligible quantity by the neutralizing condenser, joined from B plus to grid of the RF tube. The variocoupler may consist of 30 turns on a 1¼" diam-

eter, for the rotor, and 50 turns on a 3" diameter for the secondary, if a .0005 mfd. condenser is to tune the secondary. Use the same kind of wire as heretofore prescribed. The variable condenser connected from plate of the detector tube to A plus should be of the midget variety. Use a 201A tube in the first socket, (at left), a 200A as detector, a 201A as first AF and 112 in last socket, the Amperites being employed in their respective places in the audio channel, the two rheostats governing the RF and detector tube filament temperatures. Note that the ultra-audio style of hookup is used in the detector stage and that the grid leak is connected from grid post of the detector tube socket to A minus. If other than the 200A tube is used for detector connect this lead to A plus instead of to A minus. * * *

I HAVE BEEN VEXED by directions, often conflicting, given for the correct negative biasing of tubes. For instance, I have used audio power tubes with a plate voltage of 180 where the data sheet enclosed in the tube box recommended 8 negative volts or so but have found most satisfactory results with 3½ volts. Can you give a chart of the correct voltages for AF and RF circuits for all types of tubes? (2) What effect, if any, has negative bias on RF amplification, and how may it be employed on the radio side of the receiver to best advantage? (3) Is not the C battery's chief asset the economy resulting from the reduced plate current drain?—Edgar C. Sharpley, Nome, Alaska.

We can not give you such a chart, and we doubt if any exists or can exist, because the correct bias depends on a variety of factors, some of them individual with the receiver in which they are used, and with the tubes themselves, and nobody can generalize on these. Obtaining the correct bias is simply a matter of experiment, and it is so easily accomplished that no one need have any worries on this score. Taking the power tube you mention, a good practice is to insert a milliammeter in series with the plate lead and to adjust the bias until the needle fluctuates only slightly. If the quality, as determined by listening to the speaker, is not what you think it should be, reduce the negative bias until you get the kind of tone that suits you best. That dis-

poses of the last audio stage and the test is applicable to all receivers and types of tubes used in this position. The bias on any preceding audio tubes may be determined in the same way, but as it is not so critical the adjustment may be made without reference to any meter. At some step as you increase the intermediate AF bias the volume will decline. Return to the preceding post, usually 1½ volts less negative. Indeed, those who have no milliammeter and no desire to purchase one may rely on their ears for the final stage test, as well. After all, what is best suited for the individual is what he likes best, and too much stress should not be placed on metered tests, despite their high theoretical value. Your experience with a 3½ volt negative bias on a power tube has been duplicated in thousands of homes. These tubes are rather critical on grid bias, and unless the bias is right strange results may follow, for instance even a neutralized set may be cast into over-oscillation, almost uncontrollable. A thought worth considering is that power tubes often require a certain plate drain for most effective operation, and therefore it would seem futile to try to reduce the drain below this. Some manufacturers are considering recommending that a given plate consumption be used for their power tubes. Economized plate drain is a minor consideration, except with tubes like the 171, which, even when suitably biased, may draw 20 milliamperes. Radio has passed out of the stage of strict reckoning of small items of maintenance cost, and quality is the rule of the day, as it should be. (2) As for the negative biasing in radio frequency stages, this differs from the audio rules quite severely, and no chart can be given. One may state the general rule than a much smaller negative bias can be tolerated, due to greater bias causing attenuated amplification, especially at the higher wavelengths. In fact, the plate drain may be reduced to zero by requisite bias, but then you hear no signals. The RF negative bias on the basis used in AF circuits reduces the amplification, and usually more than 1½ volts negative should not be employed. There are exceptions, including when extra-high plate potential (DC) is used, wherein, for instance, the RF plates are tied to the B plus AF lead for reduction of leads. Then the negative RF bias may be increased, say, if 180 plate volts are used, to 6 volts or so, even more. But a certain amount of plate current must flow and you will find the suitable negative biasing of the grids for adequate response in high plate voltage RF circuits is extremely ticklish. The 1½-volt variations afforded by C batteries are not close enough, mere fractions of a volt being necessary gradations, difficult to obtain. A way out, however, is to have a variable resistance in the B battery lead, suitably bypassed, so that the adjustment may be made more conveniently by slight reduction in the B battery voltage, instead of the grid bias, after the approximately right bias has been found. (3) No, the chief asset is the higher degree of qualitative efficiency obtained, and this alone would justify the use of the C battery. The reduced plate drain, while important in power tubes, for example, because the drain there is heavy, is unimportant in the rest of the circuit, and generally speaking can not be called the foremost advantage of the bias. * * *

I HAVE trouble in soldering. I use self-fluxing solder with a rosin core. One of my troubles is that the solder runs off the iron tip. I would like to carry the molten solder on the tip to the proposed joint. Also, sometimes when the solder gives way when I give the joint a slight tug. Whenever I solder I splash the baseboard with the solder drippings

and when I shake these on the floor, which is hardened, they fall with a tinkle like the dropping of coins. Please set me straight on these nuisances.—Jerry Farley, Poughkeepsie, N. Y.

Any one who uses self-fluxing solder, as you do, likely will run into the difficulty of having the solder run off the tip and drop in embarrassing places, unless the core is acid. The flux greases the tip and hence the slippery path for the solder is inevitable. You may use plain solder, and flux it independently. This is the practice followed by many professional set wirers. The tip of the iron should be thoroughly cleansed before the iron is heated. You may file off the accumulation, and be careful to have the tip smooth, not full of pits. Your complaint indirectly describes the functioning of a poor soldering iron, one which will not stand up properly under sustained use. It is a fact that professional solderers inevitably use good irons, and these cost a few dollars, and are worth it. Your iron, when used for a while in a continued condition of heating, varies in temperature, which falls off say after 15 minutes of continued heating. Then, though the solder will melt, the heat is not sufficient to insure the solder "sticking" and you have a joint made of what is called "cold solder." That gives to a slight tug. Get a good iron, plunge it into the flux when the iron is beginning to heat, then "tin" the tip by having molten solder cover each surface. Shake the iron and let the excess solder be discarded. Then, to solder a joint, apply a speck of flux to the joint, get a very little solder on your iron, and make the joint. Sometimes it is advisable to hold the iron against the stationary section of the joint, like a condenser frame, to heat it slightly, so that contact with the other member will not reduce the general temperature about the joint too much. Use alcohol to wipe off each joint made. Following these directions you will not have baseboards dotted with solder splashes nor hear tinkles that annoy you.

MY SET seems to work better when the radiator is connected by a wire lead to the ground post of the set than when the lead from the cold water pipe is so connected. How can I get best results with the proper ground connection?—Edward Francis Breaker, Tampa, Fla.

The ground clamp connection probably is faulty. Give it a close inspection. It is almost impossible for you to solder to the cold water pipe, because the pipe is so cold you can not effect a joint. Moreover, if you have an iron that is hot and large enough, you might injure the pipe, even spring a leak, so don't try it. Tighten down on the ground clamp and use a new wire lead from there to your set. Solder the wire connection to the ground clasp. If you find that you still got better results from the radiator connection it may be that the cold water pipe is not really grounded, in the sense that it leads into earth. A suggestion that many have followed with profit is to connect both the radiator and the cold water pipe to a common lead that goes to the ground post of the set. Your receiver may be of a type wherein it is important to connect ground to the proper post, that is, if actual ground goes aerial post of set and aerial goes to ground post, results are poor. You may not have made the connections the same way in both instances, as any tests made informally are not genuine tests, but experimental error. Check this up first and if you don't notice any difference follow the other suggestions.

I WOULD LIKE directions for making a 36 in. cone speaker to be placed on a pedestal in my home. I am a metal

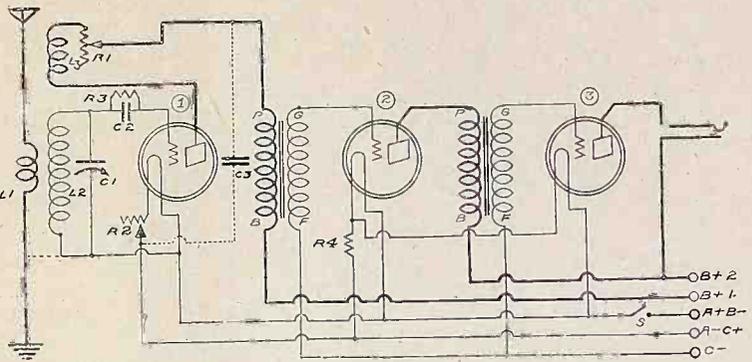


FIG. 422

A 3-tube set consisting of a regenerative detector, wherein a variable resistance is used for feedback control, and two stages of transformer coupled audio frequency amplification

worker by trade and can make my own pedestal.—Jim Moore, Paterson, N. J.

See the August 28 issue of RADIO WORLD. An article by James H. Carroll discussed this subject.

MY SET was running fine until a day ago, when it suddenly stopped, and I have been unable to get a peep out of it since. Please advise remedy.—Sol Ulfolk, Bangor, Me.

The facts you give are too indefinite to enable any one to give a valuable answer. How to attack a problem of this sort was discussed theoretically in the first installment of a trouble shooting article by Lee Manley and W. E. Garity, August 28 issue. This is the greatest trouble shooting article ever published. The second installment appears in the present issue. All technical fans and all broadcast listeners should study this article carefully, as it is in a way the biography of the trouble shooting experiences of two of the greatest experts on this subject in the whole field of radio.

IS IT practical to control regeneration with a variable high resistance? If so I would like to have the diagram of the most economical receiver that will do this and yet work a speaker.—James Hapgood Fellows, Detroit, Mich.

Yes. The most economical set is one employing three tubes, as it is hardly possible to get satisfactory speaker volume on less. The circuit diagram of such a receiver is shown in Fig. 422. This circuit is standard. The coil system L1 L2 L3 may consist of a commercial 3-circuit

tuning coil, the capacity of the tuning condenser matching the secondary for broadcast tuning. This condenser in commercial coils to-day is usually .0005 mfd., although two specific exceptions that come to mind are the Aero 3-circuit coil, designed for .00035 mfd., and the National Company's B1D2 coil, designed for .00025 mfd. As small outlay is your goal you may use three 99 tubes, fed by three 4½-volt C batteries, connected in parallel and used as the A battery. If you care to wind your own coils you may use a 10-turn primary for L1, a 50-turn secondary for L2, both on a 3" diameter tubing, and separated ¼" from each other, side by side. The wire is No. 22 double cotton. The tickler coil L3 would consist of 35 turns wound next to the free end of the secondary on the same tubing. R1 may be a 120 Amperite for the two 99 tubes in the audio channel, and R2 a 30-ohm rheostat. The grid leak R1 is 5 megohms for the 99 tube, the grid condenser C2 is .00025 mfd., and the optional by-pass condenser, C3, is .00025 mfd. The detector tube (1) takes a positive grid return, the other tubes (2 and 3) a negative grid return, in fact to C minus. It is perhaps better practice, if transformers of different ratios are used, to employ the lower ratio in the first stage, although this is contrary to stock advice. The reason is that a closer approximation to the tube impedance is offered by the greater inductance, since the higher the ratio of the transformer the smaller the number of turns on the primary. The object is to have as large a number as is practical.

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UNIT ACTION BY STATIONS HELD VITAL

**Lack of Teamwork
Blamed for Failure to
Convince that New Radio
Law Was Imperative—
Strength of Industry
Depends on Broadcasts.**

By Thomas Stevenson

WASHINGTON.

Amazing as have been the developments which have brought broadcasting to its present state of near-perfection, even more astounding is the situation existing in the radio industry today. Government experts, who are viewing events without rose-colored glasses, say it has no parallel in history.

Broadcasting is the life blood of the radio industry. Without broadcasting, the giant new industry would shrink away almost overnight. With broadcasting, it has been possible to attain total annual sales close to \$500,000,000.

Yet, the entire broadcasting structure is in serious danger of collapse and people who are in a position to know say that the radio industry and the broadcasters themselves are chiefly to blame.

Explanation Offered

The breakdown of radio regulation is generally blamed on the failure of Congress to pass a radio bill to make the place of the 1912 Act.

At the Fourth National Radio conference, convened by Secretary Hoover last November, most of the broadcasters were represented. A complete legislative program was drawn up and formally approved by the broadcasters and the industry as a whole.

When hearings began in the House Merchant Marine and Fisheries Committee on the White Radio bill only a few of the broadcasters were present.

During the hearings in the Senate Interstate Commerce Committee on the Dill bill the broadcasters were again conspicuous by their absence.

Unity Recommended

Government experts familiar with the efforts of most industries to have a hand in the framing of legislation affecting their business are at loss to explain the apparent indifference of the broadcaster on such an important matter.

Secretary Hoover has expressed the belief that the only way the broadcasters can prevent chaos in the present situation is for them to get together on a working arrangement to be embodied in a legislative program and give it active support. (Copyright 1926 by Stevenson Radio Syndicate)

SAO PAULO TO FORE

Sao Paulo now has one of the most modern and powerful broadcasting stations in South America, according to reports to the Department of Commerce. It is owned and operated by the Sociedade Radio Educadora Paulista. Increased sales of radio materials are resulting.

Wave Crisis Over Soon, Says Hoover

Chaos Fast Becoming a Fact, Secretary Insists, But Asserts That Seriousness of Situation Will Move Congress Into Action

"Fortunately for the public and the radio industry, chaos of the ether, which is fast becoming a fact, cannot last more than a few months. The seriousness of the situation is bound to make the problem of radio legislation one of the most important when Congress convenes in September."

This statement by Secretary Hoover was given to Arthur Spear, radio editor of "The St. Paul Pioneer Press and Dispatch" when Mr. Hoover was in the Twin Cities to speak before the civic organizations on waterway transportation.

In the interview Mr. Hoover was quoted as explaining his stand on the control of the radio to the effect that the judiciary authority should be vested in an independent commission, and the administrative work left to the Department of Com-

merce. The judiciary work, he said, is composed of the decisions as to who shall be permitted to broadcast. After this is determined it should be left to the Commerce department to administer the regulations of the commission, as this can be done by the department more economically and with greater efficiency.

AERONAUTICS AIDED

WASHINGTON.

Keeping abreast with the progress on the civil aeronautics program, the Bureau of Standards is making every effort to improve radio aids for aircraft. At present the Bureau is engaged in the installation of an equi-signal radio beacon at College Park, Md., and improvements on the present beacon system.

16 New Stations Licensed in Rush

**Ten Increase Wavelengths With Bureau's Sanction—
KOMO Call Changed to KTCL—Five Owner-
ship Transfers Authorized**

WASHINGTON.

A rushing business was done by the Radio Bureau of the Department of Commerce. Licenses were granted to sixteen new stations; 10 stations changed their wavelengths; one station changed its call signal; one station changed its location, and five stations changed ownership.

NEW STATIONS

WKBD, Frank V. Bremer, Jersey City, N. J. 1276 K.C. 235 meters.

WKBH, Callaway Music Co., LaCrosse, Wisc. 1200 K.C. 249.9 meters.

WFCI, Frank Crook, Inc., Pawtucket, R. I. 1309 K.C. 229 meters.

WKDR, Edward A. Date, Kenosha, Wisc. 700 K.C. 428.3 meters.

WCBS, Harold L. Downing (portable) Providence, R. I. 1239 K.C. 242 meters.

KGBY, Albert C. Dunning, Shelby, Nebr. 1480 K.C. 202.6 meters.

KGBZ, Federal Live Stock Remedy Co., York, Nebr. 900 K.C. 333.1 meters.

WHFC, Hotel Flanders, Chicago, Ill. 1160 K.C. 258.5 meters.

WKBj, Gospel Tabernacle, St. Petersburg, Fla. 1071 K.C. 280 meters.

KGCA, Charles W. Greenley, Decorah, Iowa. 1070 K.C. 280.2 meters.

WRAH, Stanley N. Read, Providence, R. I. 1276 K.C. 235 meters.

WKBI, Fred L. Schoenwolf, Chicago, Ill. 1360 K.C. 220.4 meters.

WBRS, Universal Radio Mfg. Co., Brooklyn, N. Y. 761 K.C. 394 meters.

KGCB, Wallace Radio Institute, Oklahoma, Okla. 905.8 K.C. 331 meters.

WKBF, Noble B. Watson, Indianapolis, Ind. 1229 K.C. 244 meters.

WWRL, Woodside Radio Laboratories, Woodside, N. Y. 1160 K.C. 258.5 meters.

STATION CHANGES

WSBC, World Battery Co., Chicago, Ill. from 209.7 meters to 288.3 meters.

WIBX, WIBX Inc., Utica, N. Y. from 205.4 to 234.2 meters.

WODA, Odea Temple of Music, Paterson, N. J. from 223.7 to 390.9 meters.

KQW, First Baptist Church, San Jose, Calif. from 231 to 333.1 meters.

KFDY, S. D. State College, Brookings, S. D. from 273 to 305.9 meters.

WEAN, The Shepard Co., Providence, R. I. from 270.1 to 367 meters.

WKBB, Sanders Bros. Joliet, Ill. from 214.2 meters to 282.6 meters.

WKBE, K & B Elec. Co., Webster, Mass. From 231 to 270.1 meters.

KOWW, Blue Mountain Radio Ass'n, Walla Walla, Wash., ownership changed to Frank A. Moore, wavelength changed from 256.3 to 285 meters.

KFBU, Bishop N. S. Thomas, Laramie, Wyo., ownership changed to St. Matthews Cathedral, wavelength changed from 270 to 374.8 meters.

KFWH, F. Wellington Morse Jr., location changed from Chicago to Eureka, Calif.

WGCP, D. W. May, Inc., ownership changed to May Radio Broadcast Corp., Newark, N. J.

KOMO, Seattle, Wash., call changed to KTCL, ownership changed to Bert F. Fisher.

KFRW, G. and G. Radio & Elec. Shop, Olympia, Wash., ownership changed to Western Broadcasting Co.

KFJI, Liberty Theatre, Astoria, Oregon, ownership changed to E. E. Marsh.

TELEVISION IN 10 YEARS, HE PREDICTS

**British Wireless Authority
Returning Home, Ex-
pects to See Across the
Atlantic in Next Decade
—Tells of European Con-
ditions**

"Radio eyes" are only a decade off, in the opinion of K. L. Allerdycce Arnott, of London, British wireless authority, who sailed from New York for home recently.

"I expect to see what is going on in Europe and America as I cross the Atlantic ten years hence," he stated. "Television is close at hand."

Mr. Arnott will have a unique experience in being the first man to test a new type of radio receiver just out of the research laboratory, and will listen in for half the world in midocean, using an 8-tube set entirely encased in solid copper and steel shielding, an electrical cage built under the supervision of Joseph D. R. Freed.

Mr. Arnott said:

"European broadcast programs have been much improved within the past year. I am quite certain that the radio enthusiasm which we have in England and which you have in America to even a greater degree, will be repeated quite soon throughout the Continent, especially by virtue of better broadcasting and finer receiving apparatus."

It was Mr. Arnott, who, on his arrival two weeks ago, pronounced Bude in Cornwall, England, the "radio paradise" because of the clarity with which American and Continental stations are received there. He explained that there are many "dead spots" in England, too, which phenomenon English scientists are now studying.

Tenor Started Career Singing from Counter

CHICAGO.

Though small in stature, Peter Grosso, lyric tenor of KYW, is the possessor of a massive and rich musical voice.

Mr. Grosso is of Italian parentage and from the days of his early youth grew to be a singer in a most natural manner. While a child he frequently was placed on the counter of his father's store to sing for the customers and salesmen. At the age of 18, the tenor had received \$1,500 given to him for his singing.

Mr. Grosso is a well-known figure among musical organizations, having appeared in solo and group singing in varied musical events.

Singing was not his only fad. He was quarterback on the football team of his school, and in all games had the prestige of being the smallest member. He was a 10-second man in the 100-yard dash. He also served in the World War. Mr. Grosso is a cornetist, as well as player of all other valve instruments, and to top off the balance is a keen nimrod and piscatorial enthusiast.

FIRST TELEVISION STATION



International Newsreel

THE WORLD'S first television station is now in operation. Call letters have been assigned by the Government to G. L. Baird. Photo shows the interior of the receiving station showing the transmitting studio at left.

Despite Hand Burns Artist Faces Microphone

Andy Sanella, one of the feature artists from station WJZ was injured just before he was scheduled to broadcast recently, and while it did not interrupt the performance, the accident caused a hasty change to be made in the program. Andy plays two instruments, the saxophone and guitar, and was scheduled to play both of them on the night of the mishap.

Before facing Mike, Andy decided he wanted a cigarette, and as he lit the match with his right hand, a spark flew into the matchbox, which he held in his left. The matches flared up, burning his hand severely. In spite of the pain, Sanella went on with his saxophone numbers but the pain was too great when he tried to use the guitar.

Wheat Farmers Sell On Broadcast Prices

**Their Sets Enable Them to Gain Fine Profits, as
Radioed Quotations Outrace Prices
Wired to Elevators**

Farmers of the great wheat belt owning radio receivers have the drop on the grain elevators in outlying territory, reports R. M. Klein, on his return recently from that section of the country to the Fada plant in New York.

This advantage, explains Mr. Klein, is obtained by reason of the fact that farmers sell to the local elevators on the basis of the prior day's closing quotations, up to the time the board of trade posts the current day's quotations. Of course, the moment these quotations make their appearance the elevators in the farming districts are notified.

How It Works Out

But the race is to the swift, in this instance at least. While these outlying elevators are being notified by wire and in some cases, by telephone such stations as WCCO, in St. Paul, Minn., are broadcasting the quotations. The farmer, listening in, gets word of the latest quotations some little time before the elevators are informed of the changes in prices.

If the current day's quotations are under those of the day before what does the farmer do? Foolish question. He sells, of course, and at the higher price of the day before, losing not a second in getting in touch with the elevator officials.

Selling Gauged

Naturally and per contra, if the radio brings tidings of a rise in the market you could not reasonably expect the farmer to hurry along his selling and dispose of his wheat at the price prevailing at the close of the yesterday's market quotations.

He gives the elevator plenty of time to get the good news and then steps up and does the selling act. All of which marks the wheat farmer as a pretty shrewd citizen and, needless to say, entirely within his rights.

Why aren't the elevators equipped with radio sets? That's just what Mr. Klein asked, too. The answer is they are certainly going to be.

He said it will happen soon, too.

WEATHER MAPS TRANSMITTED



Harris and Ewing

FOR the first time in the history of the United States weather maps have been broadcast. The United States weather bureau is contemplating a daily weather map service by radio to ships at sea. C. Francis Jenkins (above) is the inventor of the device. The maps are being broadcast through NAA, the Naval station at Arlington.

WASHINGTON.

A public demonstration of the process devised by C. Francis Jenkins for the transmission by radio weather maps for the use of mariners was given by the United States Weather Bureau in the presence of many Government officials.

The radio map machine is of simple construction. The original map made at the Weather Bureau is coiled on a glass cylinder with a strong light within the cylinder. This light shining through the rotating map falls on a sensitive cell.

The function of this arrangement is to change the lights and shadows of the picture map into electric currents. The highlights represent strong electrical current and the absence of light no current at all. In this process there are no half-tones in the map.

The transmitting machine, according to Mr. Jenkins, is partly a photographic process, but the reception is recorded

with an ink stylus attached to a specially devised cylindrical drum which traces the lines of the map on a blank sheet of paper.

The pen-and-ink stylus process does away with the necessity for installation aboard ship of dark rooms and other photographic paraphernalia. Once the receiving instrument is started it works automatically. At present ships get weather observations by radio, but have to make their own maps.

Officials say that if the Jenkins machine works out aboard ships as in tests, mariners will be in a position to chart their course to avoid storms or run to safety when the Weather Bureau advises them of threatened danger.

Mr. Jenkins emphasized the value of the process to many ships which do not carry officers skilled in the making of weather maps.

Experts agreed with him.

An SOS for Blood Saves Woman's Life

Fifty-three Persons Respond With Offer in Transfusion Operation—WRVA Sends Message and Wins Plaudits As Do Volunteers

Radio played an important factor in saving a woman's life at the Johnston-Willis Hospital in Richmond, Va. She was suffering from pernicious anaemia and was on the brink of death when an SOS call for volunteers in blood transfusion was broadcast from WRVA.

Fifty-three persons responded and Manley Betts was selected to give of his blood. Telephone messages continued to

arrive after the transfusion had been over. The woman will live by reason of the transfusion, it was announced from the hospital.

Dr. Graham of the hospital publicly expressed his appreciation for the ready response to the broadcast call, and radio added another mark to its record of service to humanity. The volunteers, Betts particularly, and the station were praised.

MATRONS WIN N



MRS. LOTTA HARRAUFF, of Princeton, shown tuning a set. With her

Search for a "M" Le

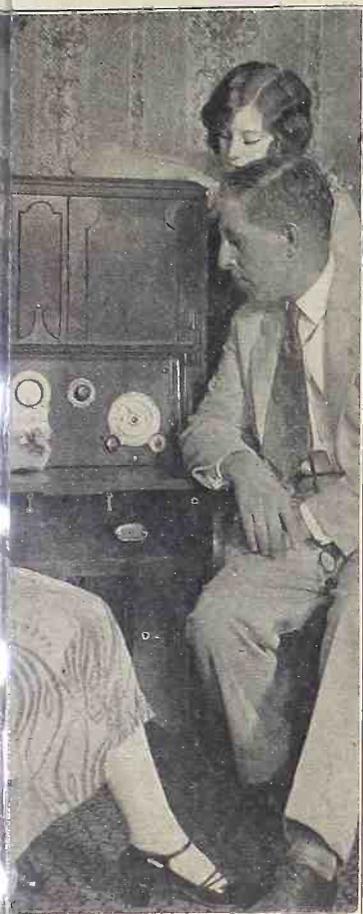
Radio's DX Queen is Mrs. Flossie E. Erickson of 812 E. Monroe Street, Bloomington, Ill., according to the official announcement of the Radio Manufacturers' Show Association, through G. Clayton Irwin, Jr., general manager.

Another Illinois woman, Mrs. Lotta Harrauff, now in Princeton, has won the title of "Mrs. Radio" for 1926-7 and will be guest of honor at the Radio World's Fair in New Madison Square Garden, New York City, September 13-18.

Men who boast of their reception records will be amazed to learn of the logs of not only Mrs. Harrauff and Mrs. Erickson but scores of other women who sent in reports.

Mrs. Erickson's record is summarized as follows: 326 stations, in 178 cities, 55 states and provinces, and 9 countries, including four stations in Mexico, three in Cuba, one in Porto Rico, one France, one in England, one in Peru, and one in Spain. She has heard 17 stations in California, 6 in Washington, and one in Oregon. At 250 miles distance she has recorded 172 stations, 66 at over 1000 miles range, 3 over 4,000, 4 over 3,000, and 5 over 2,000. There are only 5 stations in the United States operating on 280 meters

NATIONAL TESTS



... N. J., "Mrs. Radio" for 1926-27, is her husband and a daughter.

ss"
nds to a "Mrs."

... or over which she has not heard—WQAO, New York; KOIN, Portland; KOMO, Seattle; KOAC, Cornwallis, and KFQA, St. Louis.

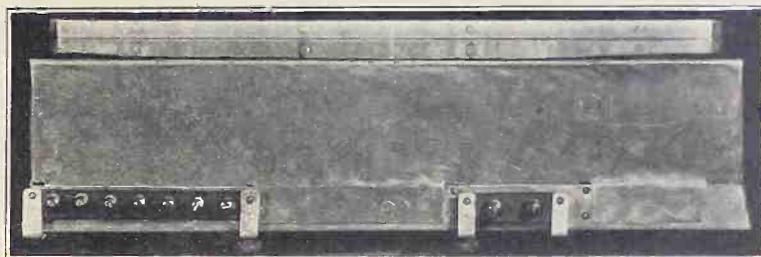
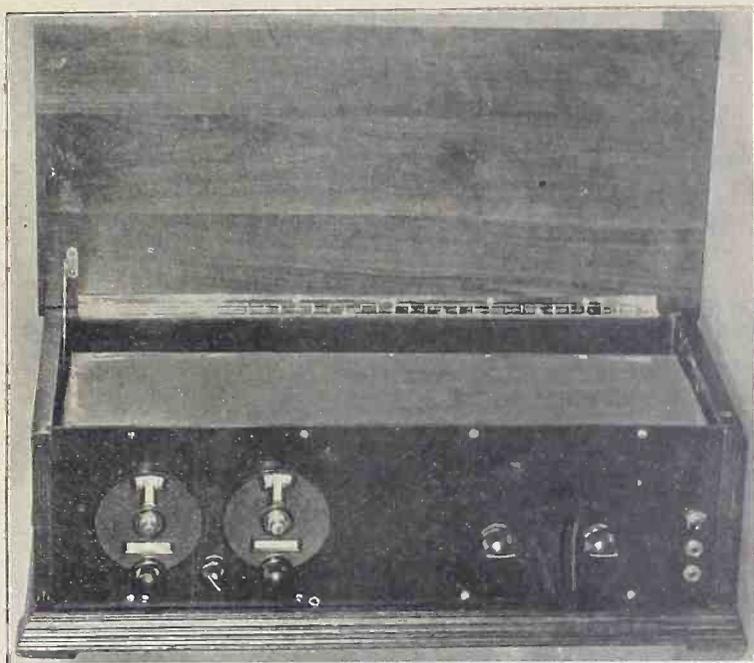
Mrs. J. Nelson Barger of Albany, Missouri, has 339 stations to her credit—a larger total than Mrs. Erickson but the aggregate distance received is less than Mrs. Erickson's.

Mrs. Erickson uses eight aerials. One is an underground system, consisting of thin copper sheeting, 4" wide and 50 feet long, buried in a trench. There are four layers of copper separated from each other by a pulpy mixture consisting of salt, water, and newspapers mixed together.

One of the most wonderful records was made by Miss Jennie Miller of Oswego, New York, an invalid, who used only a 1-tube set until her remarkable returns made her a prominent figure in radio.

The youngest—and one of the most successful—competitors in the "Miss Radio" contest was Dorothy Goedecke of 6347 Maryland Avenue, Chicago, who is twelve. She is a pupil in the eighth grade of the John Fiske School and is very bright in her lessons.

TOTAL SHIELDING IN A SUPER



(Photos by Gabor Eder, 630 Fifth Avenue, N. Y. City)

REAR VIEW of a Super-Heterodyne shows how one constructor shielded his set. The shield served as a total container. Also a reinforcing panel was of metal. How the set looks in its wooden cabinet is shown also.

Midnight Curfew Set in Court Decree

DX Fan Must Not Run Speaker After That Hour, Magistrate Rules, Acting on Complaint of Sleep-robbed Woman Neighbor

Midnight is the radio curfew hour by court decree.

A magistrate in New York City fixed it after due deliberation. It applies to speaker operation only. Earphones are O. K. the clock around.

John Covitt, 28 years old, was in court on the complaint of Mrs. Elizabeth Carroll, who lives in the same house as he does.

Mrs. Carroll charged that Covitt, an ardent radio fan, was in the habit of playing his radio at all hours and that neigh-

bors were constantly awakened by his experiments with long distance stations after midnight. Magistrate Brodsky told Covitt that he must not play his radio after midnight.

"That is a reasonable curfew hour," the magistrate said, "and people are entitled to rest after that without being disturbed."

Covitt promised that he either would desist from experimenting with late programs or would use ear phones in the future. Sentence was suspended by the magistrate.

Honors Showered On Shrinking Steinmetz

This Week's Installment of His Biography Tells of Invention of New Arc Light and Transmission Improvements

[Earlier chapters of the life of Charles P. Steinmetz were published in the four preceding issues.]

By John W. Hammond

Arc lights had been manufactured by General Electric from the very beginning of its history, but the engineers were continually trying to devise a better kind of arc lamp. They wanted one which would give more light and consume less current or in other words, a "more efficient" arc lamp.

Steinmetz had been giving some attention to this subject, and he made the suggestion that a better material for producing the light of the arc lamp might be discovered.

In the lamps as they were then made, two thin sticks of carbon, somewhat resembling lead pencils, were connected in the electrical circuit and then their points were brought to within a short distance of each other. The electric current, leaping over the space between the points of the carbons produced an intense blue arc.

Steinmetz, in 1901, thought he could find some better light source than carbon. He began by making a study of the effect of metallic salts upon the arc produced by the carbon electrodes.

Practically all of this investigation took place in his new laboratory. He kept at it both day and night, as was his practice when absorbed in a particular line of work. Sometimes, long after persons in neighboring houses had gone to bed, Steinmetz would still be working in his laboratory, through the windows of which would be visible the gleaming blue light of the arc lamp.

Makes Best Street Light

After several months of work, he found that magnetite, which is an oxide of iron, was a brilliant source of illumination if molded into electrodes and used as the carbon electrodes were used in arc lamps. The final outcome was the magnetite arc lamp of the present day, the best street light in America.

It has, of course, two electrodes, between which the electric arc shines out. But only the lower, or negative electrode, contains magnetite. The upper, or positive, electrode consists of copper enclosed in a steel casing, or shell, to prevent the rapid consumption of the copper by oxidation. The negative electrode contains, in addition to the magnetite, a certain proportion of other substances which increase the intensity of the illumination.

Satisfying himself, from his own experiments, that a magnetite arc lamp was practicable, Steinmetz then asked the General Electric laboratory to continue the experiments. During a large part of 1901, this work continued in the General Electric laboratory, while Steinmetz was also busy at the task in his own laboratory, especially at night. The lamp was finally developed to a commercial stage and was then ready to be demonstrated.

Steinmetz at once thought it would be a good plan to have a number of the new lights placed on poles around his property on Wendell Avenue, and on other streets nearby. This was accordingly done; twenty-five of the arc lamps were mounted on poles and located

around the laboratory and out along Wendell Avenue. A few were also placed on adjoining streets.

Steinmetz himself closed the switch on the night of the first test, causing the lights to shine out brilliantly, while all the spectators applauded. The magnetite arc lamp for street lighting circuits was soon afterward put into use in American cities and towns.

Awarded by the Franklin Institute

In recognition of his work with the magnetite arc lamp, Steinmetz, in 1908, was awarded a certificate of merit by the Franklin Institute of Philadelphia. This was only one of several certificates and medals which Steinmetz received at different times.

It was during the year of 1901 that Steinmetz and Hayden began to associate together in electrical engineering work. Since his first meeting with Steinmetz at Liberty Hall and his visits to Steinmetz's camp on Viele's Creek, Hayden had spent a year at Lynn. While there he took up street lighting engineering, and after he returned to Schenectady he worked in the testing room.

From this year throughout the rest of Steinmetz's life, he and Hayden were always together. Only for a few months, after Hayden married did they live in separate homes.

In 1901 Steinmetz received a high honor. It was his election as president of the American Institute of Electrical Engineers, the national organization of electrical engineers in the United States.

This was only the first of a number of honors which Steinmetz now began to receive. Just a year later, in June, 1902, he stood before Dr. Charles W. Eliot, president of Harvard University, and was awarded the degree of Master of Arts. As he handed Steinmetz the diploma, Dr. Eliot said to him: "I confer this degree upon you as the foremost electrical engineer in the United States, and therefore the world."

A year later, in 1903, Union College, in his home city of Schenectady, conferred upon him the degree which he had expected to receive from the University of Breslau—doctor of philosophy. This made him a doctor of learning, and from that time throughout the rest of his life he was known everywhere simply as "Doctor Steinmetz."

Steinmetz as Professor

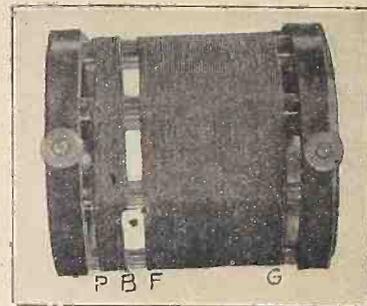
Immediately after this he had an opportunity to enter a new and most interesting field of work. He was invited to become a professor on the faculty of Union College.

Up to 1902, Union College did not have a very complete course in electrical engineering. The president of Union at that time, Dr. Andrew Van Vranken Raymond, wanted to see electrical engineering developed into one of the big subjects.

He realized how rapid electrical progress in this country had been, and he wanted to keep up-to-date by offering students of Union the best possible course in this subject.

The professorship was promptly accepted by Dr. Steinmetz. It gave him an excellent chance to employ his qualities

CONNECTIONS



(Radio World Staff Photo)

IN almost every circuit design where a tunable radio frequency transformer is used the correct connections are P to plate, B to B+, F to A battery and G to grid. If the coil is in the aerial circuit P goes to aerial, B to ground.

as a teacher—qualities which he had in rich abundance.

For ten years he was an active professor at Union College. In all that time he was very friendly with the students. He supported their athletic teams, joined one of their fraternities, and gave Sunday afternoon lectures at the college Y. M. C. A., on his early experiences in Germany.

Distribution Problem

He now gave all his time, when not lecturing at the college, to special investigations, made necessary by the growth of electrical systems.

In such work as this he continued to be of immense use to the electrical profession, and so to the world at large. He took up at once the biggest of the problems which electrical engineers were then facing—that of transmission.

This was the problem of sending electric currents over long distances without unreasonably high cost, or unreasonably great losses of current in transit. The problem of distribution, or of sending electric current to a large number of places in a certain area where it was to be used, was connected with the problem of transmission.

The systems today are much larger, more spread out and take in more territory in consequence. They supply many more houses and stores than did those of 1902. They are more complicated and the voltages are much higher. In one or two systems in California, the voltage is as high as 220,000 volts on the great transmission cables—the highest in the world.

The systems of today are different in one other way. They are being connected together—inter-connected, as electrical engineers call it—so that the end of one system is simply the beginning of the next.

7,000 Volts High Then

This is most useful in preventing interruptions to the electric service furnished to customers of the power companies, because if anything becomes seriously out of order on a power company's system, it can, if connected with other systems, draw electric current from these other systems in a very few minutes.

But all this was not in existence twenty-five years ago. When Steinmetz became a consulting engineer and began to work on transmission and distribution problems, the highest transmission voltages known were not over 7,000 volts.

Broadcast from WGY.

[In next week's issue, the big Show Number, another fine installment of Steinmetz's life will be published.]

SETS WIN PLACE IN OFFICES AND ON TRAINS



(Keystone View)

THE BUSINESS MAN at his desk in the United States is beginning to adopt radio for a few minutes' relaxation from the pressure of commercial life. And in England some trains have radio sets in the diner, for instance the Cornish-Riviera express, on which the woman is about to eat breakfast. The train set is factory made, but Robert M. Catts built the set he uses in his office. Note how the set fits in a drawer.

LISTENING AUDIENCE SENSITIVE

Expert Finds the Radio Hearers Quick to Resent Poor Presentations But Slow to Commend Excellent Work.

There is no audience more sensitive than that of the average radio station, in the opinion of Major Wilfred E. Boughton, vice-president of the Commercial Broadcasting Corporation, 331 Madison Ave., New York City.

His conclusion regarding the sensitiveness of the radio audience was reached as a result of having received, read and analyzed more than 10,000 letters from members of the listening audience stating their reactions to broadcasting periods conducted under his supervision.

"The average listeners may not know just what they want on the air," states Boughton, "but they most decidedly are aware of what they do not want. For instance, where 500 letters were received requesting operatic presentations, there were in addition 575 letters received requesting jazz music. It is really surprising to find how balanced are the tastes of an audience possessed by the average radio station.

"The attitude of a radio audience and that of an attendance in a theatre is markedly different in this respect specifically: an audience watching a theatrical performance will applaud generously every bit of good acting which it witnesses, but will charitably refrain from hissing or booing any part of the play which may be poorly done. The radio audience is not nearly so profuse in its letters of applause, while an overwhelming amount of mail will be forthcoming immediately after an air presentation of any feature so poorly done as to warrant criticism."

College Executives Unite for Broadcasts

WEEI Series Will Open October 19—Presidents and Deans to Talk in Courses Outside the Regular Curriculum—Alumni to Hear "Prexy"

New England college presidents will take part in a new radio series to be heard weekly during the fall and winter from WEEI, Boston.

Already 26 presidents of important New England colleges and universities have accepted invitations to join WEEI in broadcasting this Intercollegiate Series.

The new educational series is the result of an experiment tried at WEEI last year in a brief series by presidents, deans and representatives of six prominent women's colleges. This experiment became so popular that Arthur F. Edes, program director, decided to enlarge on the plan, and the present schedule for this year is the result.

Women's Colleges Aid

The women's colleges that cooperated with WEEI last year in this experiment, and were largely responsible for the expansion of this educational campaign, included Mount Holyoke, Wellesley, Radcliffe, Smith, Vassar and Bryn Mawr.

The talks to be given by these college and university presidents, deans and representatives will be on special departments and courses outside the regular academic curriculum and will appeal especially to the alumni of the various colleges, many of whom will hear for the first time since their graduation the voice of "Prexy."

List of Co-operators

The following New England institutions will be represented during this intercollegiate series: Amherst, Bates, Boston College, Boston University, Bowdoin, Brown, Clark, Connecticut, Massachusetts Agricultural College, Massachusetts Institute of Technology, Middlebury, Mount Holyoke, Norwich, Radcliffe, Simmons, Smith, Trinity, Tufts, University of Maine, University of New Hampshire, University of Vermont, Wellesley Col-

lege, Wesleyan University, Wheaton, Williams and Worcester Polytechnic.

The first program in this series will be given on Tuesday, October 19, from 7:30 to 7:45 P. M., and there will be another broadcast, at the same time each Tuesday evening, throughout the series.

Cat Nearly Kills Broadcasting Bird

One of WGY's popular entertainers lingered between life and death for a few days recently, as a result of a murderous attack by a marauding cat.

Pete Van Curler, is probably the youngest and the smallest radio performer appearing regularly on a program. He is a Hartz mountain canary with a throat that emits golden music. He has appeared as concert artist with the Hotel Van Curler Orchestra every Thursday afternoon and many letters have been sent the bird from appreciative listeners. Pete's cage is placed along side of Porter Potts, the director of the orchestra, and when the violin begins to sigh Pete just lets go with everything he has.

A few evenings ago, while Pete was perched high for the night, a tramp cat, one of the kind that nobody loves, sprang at the cage and before anyone could intervene he had reached through the wires and had dealt Pete one wicked blow with his clawed paw. Pete was in a pretty sorry state for days and it was thought he might lose an eye, if not his life. However, Pete is getting better and has thrilled his friends by chirping brightly when he hears the distant music of the orchestra. He hasn't sung yet and in a few days his cage will be carried to its place beside the orchestra and he will be invited to again take part on the program.

A THOUGHT FOR THE WEEK

RADIO will never reach the point when the world will press a button and get all it wants. The spirit of adventure still springs eternal in the human breast.

RADIO WORLD

REG. U.S. PAT. OFF.

The First and Only National Radio Weekly

Radio World's Slogan: "A radio set for every home."

TELEPHONE BRYANT 0558, 0559

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(Dated Saturday of same week)

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SEPTEMBER 4, 1926

The Tinkerer

THERE is no better man in radio than the tinkerer. He does his building and experimenting through the sheer enjoyment of it. He seeks, expects and receives no financial gain. It even costs him money to carry on his pleasant work of testing various hookups as fast as they are published, indeed, if he is enterprising, even faster. He lets his supper get cold while he continues to a desperate conclusion the soldering of the last joint of the ultimate receiver. He it is who exercises his mind all the while his busy fingers pursue the mechanical formation that results in the electrical marvel we call a receiver. His mother may berate him for the late hours he keeps, at his toolbox and workbench, or his wife may lament the radio widowhood in which she grieves in glorious colors, and his neighborhood friends may gibe over his being a radio shut-in. But he weathers it all—half-humorous criticism and serious praise for his neat accomplishments alike.

He is not always an adult, this type that we call the tinkerer. He may be a school-boy, but that makes him none the less a devotee, indeed, more so, if parents alone may vote on the subject.

It is not to be wondered at that the

PENNSYLVANIA RR. ENTERTAINERS



ENTERTAINERS heard during the Pennsylvania Railroad Hour, broadcast each Tuesday evening from WJZ, WGY and WRC. At left is Eddie Smalle, pianist and comedian. Next comes a quartet consisting of Franklyn Bauer, tenor; Elliott Shaw, baritone; Lewis James, tenor; Wilfred Glenn, bass. Following the quartette is Norman Brokenshire, announcer, holding the cord of the locomotive bell which is used to give a realistic touch to the "travelogues" around which the musical programs are arranged. The others, in order, are Frank Banta, pianist; Andy Senella, saxophone and guitar; Sam Herman, xylophone, and Alvin Simons, porter in the studio, who, when occasion requires, supplies further touches of realism by blowing on the locomotive whistle.

tinkerer is found in that admired class known as our best citizens. He is not a loafer or he would not have such an assiduous hobby. He is not a roustabout nor a philanderer, because his hobby is of the happy sort that keeps him at home. He may concentrate too much, once in a while, on the side lines of joy, forgetting perhaps some real business in the bigger game of life, but if so it is an error on the preferable side. What he is doing is wholesome, and if he becomes a trifle too deeply absorbed in it, why that is merely additional proof of the fascination of his hobby. He rides it with spurs in flanks—and spurs are symbols of earnestness. It is by accomplishment we win them, remember.

You do not find the tinkerer among the foremost inventors, for tinkerers lack that technical foundation which paves the path toward radio inventions. On the other hand, you do not find him in the lineup at Police Headquarters, nor slinking down some obscure alley with a hapless woman on his arm. You can judge a man by his hobbies, and the radio tinkerer, as such, is a wholesome individual and a man you can trust.

The personnel executives of large corporations are particularly alert to ascertain what are the sports and hobbies followed most keenly by applicants for positions. They know that by these you can well judge the man or woman. Soon these executives will begin including on their questionnaires the query whether the applicant experiments with radio. And if the answer is yes, it will be a great point in one's favor. Think that over.

Indited Dislike

SOME station managers complain that they get too many program complaints. You might suggest offhand that they improve their programs. While this is nearly always good advice, it is hard to follow, because broadcasting has no economic foundation, except advertising programs, and if you are too quick to suggest program improvement it would be in keeping for the manager to ask you where the money is to come from.

However, the complaint about the abundance of complaints arises rather from a feeling that the radio listening

public is becoming ungrateful, since it showers adverse criticism on stations, by mail and by telephone, if some mediocre presentation is "aired," yet is strangely reluctant to send in commendation and thanks when something beautiful is broadcast. In months gone by, the public, say these managers, was quick to respond in friendly spirit, but now it shows scarcely any sign of life, unless to express disgust, often accompanied by dark suggestions about the advisability of the offending station relinquishing its duties as a means of making life more bearable.

The stations should not look forward to enormous quantities of flattering letters and exultant telephone calls and should be content not to stir up the public at all, rather than to expect constant enthusiasm, for the station that just rolls sweetly along is doing more than fairly well.

One illustrated the so-called ingratitude of the radio listeners by contrasting them to the audience at a theatre. Some fine piece of acting can not possibly escape applause, while hisses do not resound when some faux pas is made. Yet, he laments, radio playing or singing of comparable merit will produce scarcely an assenting gurgle, while mistakes evoke what amount to hisses. The comparison is a misfit. Radio is something we have going in our home almost nightly. We listen in about as often as we sleep. We do not go to the theatre that often. Human nature being what it is, and having been so even before broadcasting, continued approving comment on anything that is a part of daily human life cannot be expected.

The butcher, the baker, the man that manufacturers candlesticks for a living, all applaud what they like at the theatre. But when the dramatic critic goes to the theatre he never applauds.

List of Stations Out Next Week

The revised and corrected list of broadcasting stations, usually published in the first issue of each month, is omitted this week, because it will be published next week, in the Show Number, dated September 11.

Revolutionized By Radio, Women Admit

Report its Influence Far-reaching in all Classes—
Treated Sceptically at First, the Receiver Won
Its Place as Fortifier of Home

By Eric H. Palmer

Radio has revolutionized the women of America! It must be so—the women say so themselves in their essays on the general topic of "What Radio is Doing for Women," submitted in the annual Radio World's Fair test to determine the queens of DX.

To derive the benefit of the hints on household economics, health, beauty and all the other topic that appeal to the fair sex, radio clubs have been formed by women living away from the cities. Radio tea parties are the rule. The old-fashioned country woman is fast disappearing. She no longer specializes on neighborhood gossip nor the price of chickens, butter, and eggs, but can discuss the latest fashions, play bridge, and narrate all that is going on in the field of politics, music and drama, not to mention baseball, football, and prize-fights; and she finds the French lessons very interesting too!

These are some of the statements made by the women radio enthusiasts:

Caroline Lee, Clearwater, Florida.—"Radio, thy better name is Opportunity! As invisible, as omnipresent, as sure, as powerful, and as helpful as Opportunity itself. Radio does not stop to knock, but enters millions of homes each night as an invited guest of honor. Women of America, at first inclined to be skeptical, are now finding it their friend. They are trusting more and more to Radio. It has curbed to a remarkable degree the fast disintegrating family circle. It has kept the husband at his own hearthstone in the evenings, and the children as well. It has served as a companion to lonely women and isolated families, talking, singing, entertaining through hours which could otherwise be filled only with loneliness. Minus the famed "hickory stick" it has served as one of the most popular and perhaps the greatest public educator. With the fleetness of Mercury it has carried signals of distress and the news of the world over miles of land and sea. It has reached its ethereal fingers to mountain cabins, hemmed in by snow and ice, blocked roads, and ships in tropic zones, instantly. Where the elements have reeked havoc with traffic and all other lines of communication, Radio, has leaped the gaps and served humanity. Radio is a Magic Word, an Open Sesame to many things, a new order for the world!"

Mrs. J. N. Barger, Albany, Mo.—"Radio has offered new occupations to women. Now that this new door to knowledge has been so unexpectedly opened to womankind I hope it will never be closed again. I hope the time is near when under its instructions, our knowledge will be more equal, so far as our minds are capable of understanding. Every day opens up to us new views, not merely on one, but many subjects, and we are all students. It seems the whole world is revolutionized. Scientific riches have been poured out to us with an unstinted hand. It has gone far beyond the dreams of our greatest thinkers. I know of no

field which educational agencies have entered that offers keener competition than that of radio. The day has passed when the mediocre speaker can hold a radio audience. The lecture of long difficult words and sentences must give way to the more friendly, natural dialogue, presented by effective radio voices. Millions thrill beneath the spell of radio, drawing from the ether inspiration and information, entertainment and education, recreation and relaxation. The Radio fills a need in the home that nothing seems to replace. It is the nucleus about which the whole family meets on common ground. Radio is that indescribable touch that makes a home—a home. Upon the broadcasting stations rests a deep responsibility to discharge with integrity and intelligence the public trust which rests inherently in each. Women once were slaves, amusing slave toys for the rich; miserable overworked slaves and chattel for the poor. King Solomon could have a thousand wives and be eminently respectable. He couldn't do it now. Knowledge, invention, and intellectual courage, the great driving forces of civilization, slowly and surely smooth out the problems of human life. Ignorance and superstition say—"Wait, hold back, don't forget the good old days." But the engines of progress move forward rolling up the darkness of ancient times to the light of today toward the brighter light of tomorrow, gradually making smooth the road that we must travel."

Edith Amelia Smith, Baltimore, Md.—"What infinite joy the radio must be to the country woman and girls! So far away from the music centers, so far away from social gatherings where housewives gather to discuss recipes and other news so dear to them, yet with the radio, how near to sources of information! Lectures on dressmaking, preserving, household duties, medical advice, horticultures, fowl-raising, millinery, can help to keep the country and city housewife up to date. Current events alone can educate the public more than anything else. Not that the newspapers will ever be eliminated, but the radio is proving itself the most valuable of its adjuncts. It exactly fills the need for those special items that everyone, particularly the women, must have in a hurry. Just to think that pictures of women's hats are being sent by radio from Paris to America. The radio is a blessing in hygienic matters. How many fat women have been able to thank the wonderful exercises broadcasted. These exercises are not only for the fat women, but for the lean as well."

Inez Weaver, Hebron, Ill.—"From grandfather and grandmother down to the wee kiddies, each and every one of us find pleasure. Mother has concocted mighty and wonderful combinations of food, brother has learned to jabber French and Spanish, and the smile on Dad's face when he listens to a barn dance broadcasted is worth a hundred times the price of the set."

Mrs. J. F. Foster, Hammond, Ind.—"Another thing which would interest a

lot of women, I think, would be to hear the actual experiences from, or about women who are engaged in doing the unusual. I have heard of women steple-jacks, deep sea divers, garage mechanics, forest rangers and so forth. It seems as though the field for women is unlimited. Some are making their "pin money" raising butterflies, water lilies, silver foxes, and such a lot of other things. I think it would be very interesting to hear how and why they have chosen these professions, and the advantages and drawbacks connected with them. It might help other women with the problem of self-support to consider. I must mention the great favor radio is doing and can even enlarge upon in future, in the talks to children. Children are always impressed with what they hear others say. Radio is a great help to mothers in aiding them to raise their children."

Mrs. Flossie E. Erickson, Bloomington, Ill.—"We, the women of America, are witnessing the birth of a new era. Some of us have practically lived with and by radio for the last few years, but instead of it becoming a commonplace with us, it grows more marvellous each day. Soon we shall have radio television and when we do we will have reached the golden age of radio, for it will not only be possible to hear the speaker or entertainers but will be able to see them as well. I sincerely believe that I shall live to see this wonderful thing worked out so that everyone may live and enjoy life as never before. Think of the many wonderful trips we will take by means of this invention. The possibilities are absolutely limitless. The surprises are not over nor are the dramatic episodes—the thrills, these are not over but just starting for us all. The radio has raised the standard of mental culture, giving us a lot of mighty good food for thought. Retrospection broadens our various viewpoints, extends our horizon, enlarges our vision, and has brought us in much closer contact with the world. Remember that radio has come to most of us women more like an explosion than a growth. We realize that we are seeing the birth of a new era in human intercourse."

Helen C. Cheeseman, Clarkston, Mich.—"When I sit with the headphones clamped to my ears and hear the friendly voice of the announcer, I never mind being alone—in fact, it does not seem as though I am alone at all, with the myriad voices of the air to keep me company."

Viola Statler, Brooklyn, N. Y.—"Every woman and girl in the age, I am sure, should take an interest in politics. Radio above all gives a great inspiration. Many women who took no interest in politics have become ardent politicians when they learned by radio what it was all about and how much it meant to them and other women, as well as children. The women's political meetings are radiocast from the different halls where women meet and this acts as an incentive to women. There are not many people who would be fortunate enough to hear the President's speeches, as it takes time and money, yet radio, our old standby solves the problem. Every person in the United States can hear the speeches, and thereby feel more acquainted with our President and his ideals. Radio has brought back many missing persons, as I have heard people asked for and later have read of father and daughter being re-united. Interior decorating is another important subject for every woman's consideration and this too when radiocast has many new and unique ideas to offer."

PERU CO. SELLS SETS

The Peruvian Broadcasting Company has reduced the price of radio sets and is offered complete sets cheaply.

THE RADIO TRADE

De Forest Sues Over His Company's Losses

Charges Waste and Cites Loss of \$1,250,000 and Resulting Receivership—Lanphear, Weagant, McKinnon and Luce Defendants—Restitution Asked

Mismanagement, squandering, and distribution of high salaries among those who had the payroll authority are charged by Dr. Lee De Forest in a suit filed in Federal Court, New York, by him as plaintiff against the De Forest Radio Company. He says that the concern lost more than \$1,250,000 between October 1, 1924, and May 11, 1926.

In August, 1923, Dr. De Forest sold control of the concern, the price paid to him being reported as \$1,000,000, although he retained some stock ownership. It is as a continuing stockholder, and as representative of others so circumstanced, that he wages the present action, which is one for an accounting and restitution, on the ground of waste.

He names as defendants the De Forest Radio Company, Hiram L. Lanphear, vice-president, director, assistant to treasurer and chief of sales; Roy A. Weagant, vice-president, director and chief engineer (designer of the Weagant split circuit); John H. McKinnon, director, treasurer and secretary, and Theodore Luce, president and director.

Not only were the assets of the company squandered and excessive salaries paid during the incumbency of the defendants, Dr. De Forest charges, but the general manner of inefficiently conducting the business caused the concern to be

petitioned in bankruptcy, Arthur D. Lord being appointed receiver.

In early October, 1924, says the plaintiff, the company, which was incorporated in Delaware and has a manufacturing plant in New Jersey, had ample working capital. This capital and open bank credits, according to a statement by Mr. Luce, the plaintiff says, amounted to \$1,128,873; cash on hand, accounts and notes receivable to \$73,500; inventories, to \$750,000; accounts payable, to \$172,439 and agents' deposits in its keeping, to \$439,135.

Mr. De Forest alleges that Mr. Luce at that time reported that the engineering department of the company was in splendid shape, that its sales department was well handled and well organized, that its productive capacity had been trebled and that there was a demand for its products in excess of its ability to fill orders.

On May 11, 1926, it is alleged, the company's cash on hand amounted to \$24,445.13; its current assets, to \$149,196.63; its inventories, to \$250,000, and its current liabilities to \$253,965.68.

SOUTH AMERICA HAS NEW KEENNESS FOR RADIO

Increasing interest is being manifested throughout South America in radio broadcasting, particularly on the part of the governments themselves. The Uruguayan government has given to The Compania Standard Electric Argentina, an order for a 1-KW radio broadcaster, including additional speech input equipment which makes possible the location of the broadcasting studio at a distance from the station. The equipment will be installed in Montevideo and will serve as the official government broadcasting station. The Compania Standard Electric Argentina is associated with The International Standard Electric Corporation, formerly the International Western Electric Company, which was bought last year by the International Telephone and Telegraph Corporation.

Business Opportunities Radio and Electrical

Rates 10c per word; Minimum \$1.00; Cash with order

STOCK CERTIFICATES, bonds, seal presses, minute books, stock transfer ledgers, supplied quickly. All States. J. Meyers Co., Inc., Security Printers, 301 Broadway, New York.

BATTERY SHOP, good proposition; price reasonable. Box AX, Radio World.

ELECTRICAL and mechanical manufacturing work wanted; complete facilities; also light drilling, assembling. Robertson, 540 West 22d St., New York City. Phone Watkins 6471.

BROADCASTING STATION, SUPERPOWER, 5,000 watt, licensed A. T. and T., and department includes Western Electric amplifiers and tubes, for sale, lease or hire; offers wanted immediately. Address: Box 927, San Antonio, Texas. Business address 101 West Pecan St.

COMING EVENTS

Sept. 5-11. Los Angeles Radio Exposition, Ambassador Auditorium. Auspices Radio Trades Association of Southern California. A. G. Faruharson, Secretary, 515 Commercial Exchange Building, Los Angeles, Cal.

Sept. 6-11. Omaha Radio Exposition. City Auditorium. Auspices Omaha Radio Trade Association, F. R. King, Secretary, Hotel Fontenelle, Omaha, Neb.

Sept. 13-18. Third Annual Radio World's Fair, New Madison Square Garden, New York City. Radio Manufacturers' Show Association, 1800 Times Building, New York City.

Sept. 15-18. Akron Radio Show. Auspices Radio Dealers Association and "Times-Press." George Misag, Secretary, "Times-Press," Akron, O.

Sept. 20-25. Pacific Northwest Radio Exposition. Public Auditorium. George J. Thompson, Jr., Secretary, 411 Journal Building, Portland, Ore.

Sept. 20-26. Cleveland Second Annual Radio Exposition. Public Auditorium. G. B. Boden-hoff, Manager, 511 Guarantee Title Building, Cleveland, O., Room 817.

Sept. 25-29. Fourth Wisconsin Radio Exposition. Municipal Auditorium, Milwaukee, N. C. Beerend, Manager, Box 1005, Milwaukee, Wis.

Sept. 27-Oct. 2. Second Allied Radio Congress and National Radio Exposition, Exposition Hall, Hotel Sherman, Chicago. Milo E. Westbrooke, Manager, 608 South Dearborn Street, Chicago, Ill.

Sept. 27-Oct. 2. Boston Radio Exposition, Mechanics Building. Sheldon Fairbanks, Manager, 209 Massachusetts Avenue, Boston, Mass.

Sept. 27-Oct. 2. Northwest Radio Exposition. Kenwood Armory and Coliseum, Minneapolis. Harry H. Cory, Executive Secretary, 301 Tribune Annex, Minneapolis, Minn.

Sept. 28-Oct. 1. Utica Radio Show. State Armory. Auspices Utica Radio Association. H. Benner, Manager, "Observer-Dispatch," Utica, N. Y.

Oct. 2-9. Salt Lake Radio Exposition. Manufacturers Building, State Fair Grounds. Auspices Mountain States Radio Trades Association. H. S. Jennings, Secretary, 221 South West Temple, Salt Lake City, Utah.

Oct. 4-9. Pittsburgh Radio Show. James A. Simpson, Managing Director, 420 Bessemer Building, Pittsburgh, Pa.

Oct. 11-16. Rochester Radio Show. Convention Hall. Auspices Rochester Radio Dealers Association, Rochester, N. Y.

Oct. 11-17. Fifth Annual Chicago Radio Show, Coliseum. Radio Manufacturers Show Association, 127 North Dearborn Street, Chicago, Ill.

Oct. 18-23. Second Southwest National Radio Show, New Coliseum, St. Louis. Auspices St. Louis Radio Trades Association. William P. Mackie, Executive Secretary, 1207 Syndicate Trust Building, St. Louis, Mo.

Oct. 25-30. Second Annual Indianapolis Radio Exposition, State Fair Grounds. Auspices Broadcast Listeners' Association. A. J. Allen, Secretary, 1406 Merchants' Bank, Indianapolis, Ind.

Oct. 25-31. Detroit Radio Show, Convention Hall. Sponsored by the Radio Trade Association of Michigan. A. M. Edwards, Secretary, 4464 Cass Avenue, Detroit, Mich.

Oct. 25-30. New Orleans Radio Exposition. Auspices Radio Trade Association and "The States." P. K. Ewing, Manager, States Building, New Orleans, La.

Oct. 26-29. Sioux Falls Radio Show. Coliseum. Auspices Civic Club. Roger S. Brown, Secretary, care "Argus-Leader," Sioux Falls, S. D.

Oct. 30-Nov. 6. Third annual Brooklyn Radio Exposition, 23rd Regiment Armory, Stephen T. Rogers, Managing Director. Suite 513, Albee Building, Brooklyn, N. Y.

Conventions

Sept. 21-22. Cleveland First Annual Radio Convention. Hollenden Hotel. Jobbers and Dealers. Warren Cox, Chairman. Radio Apparatus Co., Cleveland, O.

Sept. 27-28. Wisconsin Radio Trade Convention. Auditorium, Milwaukee. N. C. Beerend, Manager, Box 1005, Milwaukee, Wis.

Oct. 18-23. Jobbers and Dealers Convention. Southwestern states. Auspices St. Louis Radio Trades Association. William P. Mackie, Executive Secretary, 1207 Syndicate Trust Building, St. Louis, Mo.

Oct. 25-31. State Radio Dealer Convention. Auspices Radio Trade Association of Michigan, Convention Hall, Detroit. A. M. Edwards, secretary, 4464 Cass Avenue, Detroit, Mich.

Canadian Trade Shows

Sept. 13-18. Winnipeg Radio Show, Royal Alexandra Hotel. Auspices Canadian Exhibition Co., 204 King Street East, Toronto, Canada.

Oct. 4-9. Montreal Radio Show, Windsor Hotel. Auspices Canadian Exhibition Co., 204 East King Street, Toronto, Canada.

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Perhaps you haven't heard the latest news! Something big is on the air—so let you in on it you will drop us a line. Simply address Fenway for DX, 890 Eighth Avenue, New York City.

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Special Hard Rubber Parts Made to Order
**RADION HARD RUBBER
PANELS**
ANY SIZE

Send for Price List

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NEW YORK HARD RUBBER TURNING CO.
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NATIONAL

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There is not a small corner of this United States in which NATIONAL Browning-Drake Radio Frequency Transformers, NATIONAL Velvet Vernier Dials and NATIONAL Variable Condensers are not known and appreciated. This really applies to the whole world.

You can draw your own conclusions about the popularity of NATIONAL Radio Set Essentials. Ask anyone that uses them. Send for Bulletin 116-RW. Be sure you get genuine NATIONAL products.

NATIONAL COMPANY, INC.

Engineers and Manufacturers

W. A. READY, President

110 Brookline Street Cambridge, Mass.

Czar for Industry Vetoed By Board

Directors of Radio Manufacturers' Association Reject Proposal—Talk of Chaos Due to Wave Jumping Called Scarehead Publicity

The Board of Directors of the Radio Manufacturers' Association gave a definite "no" to the proposal that a czar be appointed for the radio industry.

A. T. Haugh, president of the association, characterized recent published reports of chaos in broadcasting as the work of publicity seekers and expressed the opinion that the situation is well in hand.

The Board of Directors issued the following statement:

"The association, which is representative of the leading manufacturers of radio apparatus in the United States, believes that the future of the radio industry is entirely in the hands of the listening public. Recent attempts to gain publicity by scarehead articles regarding chaotic conditions are wholly unwarranted.

"There is only one thing in which the listening public is interested, and that is

what they get over the air.

"Reports reaching the National Association of Broadcasters show that, while a few stations may have jumped their wavelength or changed their power, the effect on the listening public has not been noticeable, nor has it made any material change in receiving conditions or in the worth of radio to the listener.

"Practically all the stations have agreed to stay put until such time as suitable regulation has been provided."

The board voted disapproval of International Radio Week. The association, it was explained, will no longer sponsor or support the overseas radio tests, because of poor results.

"It was felt," said a board member, "that the tests have done more harm than good in leading radio set owners to expect too much of their sets and too much of the broadcasters."

Book Type Speaker



The photo shows the new "Book" Speaker manufactured by the Utah Radio Products Company of Salt Lake City, Utah.

This speaker is rich and artistic in appearance, resembling a beautiful open book with hand tinted pages done in sepia, finished in gold and brown morocco leatherette. It can be held in an upright position on an easel furnished with the speaker or hung on the wall as a picture.

It employs new principles in sound reproduction obtained when an electromagnetic unit is applied tangentially to the edge of a properly curved membrane thus differing from other speakers where the diaphragms are moved by a piston-like action at right angles to the surface.

The size is 17½" wide by 13½" high.

Prominent in Trade



FRANK REICHMANN, president of the Reichmann Company of Chicago and acoustical engineer. Mr. Reichmann is famous for the many inventions he has contributed to the loud speaker field. He is prominent in radio trade circles and a member of the Mayor's Radio Commission of Chicago.



When you see this trade-mark on a condenser or resistor, you know that all the questions were taken out of it before it was put on sale.

Used by The Browning-Drake Corporation and National Companies as standard.

Tobe Deutschmann Co.

Engineers and Manufacturers

Cambridge, Mass.

Literature Wanted

THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers are published in RADIO WORLD on request of the reader. The blank below may be used, or a post card or letter will do instead.

Trade Service Editor,

RADIO WORLD,

145 West 45th St., N. Y. City.

I desire to receive radio literature.

Name

Address

City or town

State

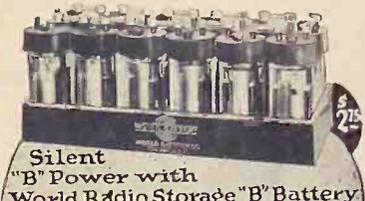
- The Pathfinder Systems, 1234 South Clinton St., Trenton, N. J.
 E. E. Baker, The Evergreens, Chestnut Hill, Pa.
 Robert Danhon, 600 Pardee St., Easton, Pa.
 Lewis R. Sutton, 217 E. 9th St., Ashland, Ohio.
 M. A. Norieger, 919 5th Ave., Tampa, Fla.
 George Leaning, California Sanitarium, Belmont, Calif.
 Modern Radio Service, 748 E. Kingston St., Philadelphia, Pa. (Dealer).
 W. S. Ramsey, Pine Crest, Salisbury Center, N. J.
 H. S. Cockell, 23 Heppinstall St., So. Charleston, West Va.
 Harold S. Doekan, Res. 8-4-2, Dickman St., Augusta, Me. (Dealer).
 Robert Foote, 34, Helfin, Ala.
 Elmer Huey, 218 Cook Ave., Evansville, Ind.
 BM-BRIL, London W. C. 1, England.
 J. P. Vojnick, 120 Linden Ave., East Linden, N. J.
 Wm. M. Eastwood, 3220 Colgate St., Baltimore, Md.
 L. O. Braden, 2122 Jackson St., Dallas, Tex.
 A. L. Tucker, 1290 Vancouver Ave., Portland, Ore.
 S. A. Tucker, 232 Fremont St., Portland, Ore.
 E. F. Fannir, 226 Elm St., New Castle, Pa.

NEW CORPORATIONS

- Heina Radio Corp., N. Y. C., \$5,000, J. M. Morrison, W. M. Heina, (Atty., J. B. Rogalsky, 346 Broadway, N. Y. C.)
 Astar Electric Co., N. Y. C., \$10,000, (Atty., J. Jacobson, 276 5th Ave.)
 Greenberg Automotive and Radio Co., Brooklyn, N. Y., \$40,000, (Atty., Lazarus and Elias, 145 Broadway, N. Y. C.)
 Twin Coupler Co., Poughkeepsie, N. Y., \$100,000, G. M. Heinzelman, T. F. Leahy, (Atty., J. E. Carroll, Poughkeepsie, N. Y.)

New and Improved FRESHMAN MASTERPIECE

AT AUTHORIZED FRESHMAN DEALERS ONLY



Silent "B" Power with World Radio Storage "B" Battery

12 Cells 24 Volts

Lasts Indefinitely - Pays for Itself

Dependable. Quiet "B" power, clear without "hum." Economy you have never before thought possible. Convenience. Outstanding performance. Recharged for almost nothing. Solid rubber case. Insures against leakage or acid. Extra heavy glass jars. Heavy rugged plates. Approved and listed as standard by Pop. Radio Laboratories, Pop. Tel. Inst. Standards, Radio News Lab., Leifax, Inc., and other Radio authorities.

Extra Offer: 4 Batteries in series 96 Volts \$10.80.

SEND NO MONEY! Just state number of batteries wanted and we will ship same day order is received. Pay expressman after examining batteries. 2 per cent discount for cash with order. Send your order today—NOW!

WORLD BATTERY COMPANY
 1219 So. Wabash Ave. Dept. 82 Chicago, Ill.
 Makers of the Famous World Radio "A" Storage Battery
 Prices: 8-volt, 100 Amp. \$12.50; 110 Amp. \$13.50; 140 Amp. \$15.45.
 All equipped with Solid Rubber Cases.

World STORAGE BATTERIES
 KKA-KWAF-WGN-WJS-KHU-KGO-KFAF-WUY-KKO

THE BERNARD PORTABLE SUPER-HET-ERODYNE appeared in RADIO WORLD dated April 3, 10, 17 and 24. Sent on receipt of 60c, or start your subscription with April 3 issue. RADIO WORLD, 145 West 45th St., N. Y. City.

LOOK UP DOWN

RADIO SERVICE

Radiola Super-Heterodyne Specialist
 Designing - Building - Wiring - Repairs

FENWAY PARTS

FREE Handsome Leatherette Log and Data Book.
 Send Ten Cents in Cover Mailing Cost.

CHAS. W. DOWN, M. E.

2050 Broadway New York City
 PHONE: TRAFALGAR 5979

INSTALL THE BRETWOOD GRID LEAK and thus avoid scratchy signals. Send \$1.50 for this famous grid leak. North American Bretwood Co., 145 W. 45th St., N. Y. C.

Proves Radio Press Pays the Advertiser

Arthur H. Lynch Uses That Medium Exclusively, Hence Must Enlarge Factory and Sales Force—General Circulation Unsuitable for Sale of Specialties Like Radio Parts

At a meeting of the Radio Magazine Publishers Association held in the Advertising Club on Madison Avenue in New York City, Arthur H. Lynch, who has incorporated a new manufacturing company, was invited to express to the members of the Magazine Publishers Association his views on radio sales. Among other things Lynch said:

"From time to time our organization is approached as are similar organizations by some cub advertising man associated with a large advertising agency which has completed a survey of the radio industry and who presents us with a high powered campaign for the real way to spend our money. As a rule the young gentleman who proposes the plan knows absolutely nothing of our business and knows nothing whatever of our market but he does know how to put on high pressure and how to use a lot of charts and how to introduce the advertising agents' 'heavy wind man' who usually presents himself attired in the latest fashion, carrying a cane and adorned by a pair of huge glasses at the end of a very broad silk string.

General Run Not Proper

"In almost every instance where a campaign of this kind has been outlined to us, the representative of the agency has assured us that the real way to reach

our market is not to pay any attention to the radio publications but to use advertising space in some of the general media, having very much larger circulation.

"Now I am not opposed to general media and they certainly are particularly attractive avenues for advertising of certain products, even certain radio products, but they are not the proper advertising media for radio specialties such as ours. This is not only true of our organization but it is also true of most of the organizations we represent in the metropolitan district.

"During the four years I was editor of 'Radio Broadcast' magazine, I came in contact with almost every large radio manufacturer in the country. In many instances these manufacturers came to me for advice concerning the proper means of advertising the products they wished to sell. It was always my advice that even though they wanted to go into general media that they should not overlook the influence of the radio periodicals.

Has Courage

"Some of these manufacturers went so far as to suggest that my views on this subject were biased because of my association with a radio periodical. That I have the courage of my own convictions is well borne out by the fact that advertising of our corporation now appears in almost every radio periodical and it does not appear in any of the general media.

"Our business was started at the slowest season of the year and we are at present doing more business than our organization is capable of handling and it is necessary for us to increase our factory and sales force right now. We believe that we have laid the foundation for this business, which is rapidly grow-

TO KEEP YOUR FILES COMPLETE, you can order your newsdealer to put a copy aside for you each week while on your vacation. Or, send \$1.00 for RADIO WORLD from now until the end of August, and in this way you will not miss any copies. SUBSCRIPTION DEPT., RADIO WORLD, 145 W. 45th St., N. Y. C.

ing, because we have adhered to the policy of using radio magazines exclusively.

"Under the category of radio magazines, we of course include the radio sections of the newspapers and those scientific magazines which have radio sections."

2/3 Horns, 1/3 Cones, Says Distributor

Cone loudspeakers comprise considerably more than two thirds of the loudspeakers sold with new radio sets today, according to a national survey of the radio business conducted by the Farrand Manufacturing Company, pioneers in cone speaker manufacture which was received by D. F. Goldman, general manager of the North American Radio Corporation, jobbers of Farrand speakers in the New York territory.

In some localities, the survey showed, cone speakers were standard equipment with over 95 per cent of the radio sets sold. Indications were that the coming year would see that the percentage of cone speakers as compared to other types considerably increased.

"In this section," Mr. Goldman said, "sales of cone speakers have shown radical increases over the same period last year, with every indication that cones would outsell all other types two or three for one."

Reception This Winter To Be the Best Ever

With the advent of the new type amplifier tubes and circuit improvements there is no reason that reception the coming winter should not be the best ever had.

The present type of receiver is a decided departure from the old circuits and practically prevent radiation.

Radio frequency receivers are the vogue at present and are expected to continue to be so for some time to come.

Horns Being Bought

While the newer cone type loudspeakers have become most popular of late, nevertheless there will always be a large horn speaker market, is the opinion of Edward Reidel, sales manager of the Reichmann Company, makers of the Thorola line of radio sets and accessories.

"Although there has been much talk of the superior advantages offered by the cone type speaker, the public for the last five or six years has become used to the horn type, and for some time to come will undoubtedly remain true to its first acquaintance," said Mr. Reidel. "We are meeting both contingencies by keeping on the market loudspeakers of both types."

**SEE SEPTEMBER, 1926,
"RADIO NEWS"
ON THE NEW
"IMPROVED DIAMOND
OF THE AIR"**

Send in for Bulletin 702

**B. C. L. Radio Service, Inc.
223 FULTON ST. NEW YORK CITY**

FILL OUT AND MAIL NOW

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

145 West 45th Street, New York City
(Just East of Broadway)

Please send me RADIO WORLD for months, for which

please find enclosed

SUBSCRIPTION RATES:

Single Copy.....\$.15
Three Months..... 1.50
Six Months..... 3.00
One Year, 52 Issues..... 6.00
Add \$1.00 a Year for Foreign
Postage; 50c for Canadian Post-
age.

Free Mailing Lists
Will help you increase sales
Send for FREE catalog giving
costs and prices on classified names
of your best prospective customers—
National, State, Local—Individuals,
Professions, Business Firms.
99% Guaranteed 5¢ each
By refund of
ROSS-GOULD CO. 513 N. 10th St. St. Louis

MEMBER
RMA
LYNCH
METALLIZED
FIXED RESISTORS

Our Dance Music And Ads Stir Briton

Capt. A. G. D. West, of B. B. C., Comments on High Percentage, But Finds Much to Admire in Our Selective Receivers—Returns Home After Visit

In the opinion of Captain A. G. D. West, assistant chief engineer of the British Broadcasting Company, the radio laboratory of the General Electric Company near Schenectady is the largest development plant in the world devoted to the problems of high power transmission. Captain West sailed for England after a two weeks' visit to the United States for the purpose of studying the work of engineers and scientists in this country in high power. He also studied the American broadcasting studio with particular reference to acoustical engineering.

Captain West visited the high power station of the Radio Corporation of America at Bound Brook, N. J., and also spent considerable time at the South Schenectady laboratory of the General Electric Company where investigations are being carried on in radio transmission on short and long waves, with low and high power utilizing a large variety of antenna systems.

Comments on Three Things

Asked his impressions of American broadcasting Captain West referred to three things:

1. The great amount of dance music broadcast nightly.
2. The large percentage of advertising on the air.
3. The facility with which a large number of stations can be tuned in without interference. While in the Van Cortlandt Park section of New York City he was able to tune in twelve different stations fractionally separated on the dial.

As assistant chief engineer of the B. B. C., Captain West, next to Captain P. P. Eckersley, the chief engineer, is in technical charge of the operation of the twenty-one stations which make up the B. B. C. system in the British Isles. Eleven of the twenty-one are relay stations which broadcast, on low power, programs fed to them direct from London. The other ten stations have their own programs supplemented at times during

the day by special features from London. News items, for example, are fed to all stations of the system from London.

Boost Crystal Sets

From the first the B. B. C. system has been built with the idea of encouraging the owner of crystal sets and an effort has been made to place every Englishman, in the British Isles, within crystal set distance of at least one station. Two years ago about 75 of every 100 listener-operated crystal sets. Today the percentage is 50-50 with a steady increase of tube set owners. According to Captain West, interest in listening to Continental stations as well as the thrill of hearing American stations has caused growing dissatisfaction with the limitations of the simpler sets. Sets are made to tune from 2600 meters, the wavelength of Eiffel Tower in France, to 216 meters.

Radio listeners in the United States are not the only ones to suffer interference and program interruption.

Captain West states that the English and German stations may both be depended upon to hold close to their wavelengths. In both these countries measurements are taken frequently and master oscillators are used to preserve constancy of frequency. However, stations in other Continental countries act up pretty badly at times.

Spark Interference

In addition there is a great deal of interference from spark sets aboard ships and while an international, unofficial commission of broadcasters is endeavoring to secure co-operative suppression of this nuisance there has been little success thus far.

The programs of the English and German stations are the best, as to variety and quality of material, as well as quality of signal. The French programs are largely devoted to trios, duets and solos, vocal and instrumental, Spanish stations favor, overmuch, tango music. Germany offers many fine operas and concerts by large orchestral groups.

B. B. C. engineers are working with high power at the higher wavelengths. Daventry, for example, uses about eighteen kilowatts in the antennas on a wavelength of 1600 meters. It is hoped that

more power may be used with the approval of the government.

Short Wave Interest

There is a great deal of interest in short waves but as yet little experimenting has been done on the higher frequencies in broadcasting. Under Captain West's supervision WGY's programs were picked up on 3279 meters and on two or three occasions programs were rebroadcast over the entire B. B. C. system with great success.

Captain West hopes that the Belfast, Me., station of the Radio Corporation will be successful this winter in picking up the 1600 meters broadcast programs from England.

Radio broadcasting in England to stay, in the opinion of Captain West. With the suspension of newspapers during the general strike this spring radio was depended upon by the people throughout the British Isles for news. Receiver owners pay a license of ten shillings a year and there are today 2,000,000 licenses and probably thousands who have neglected to secure licenses.

AERIALS FOR DX WEATHER

Now is the time to look over your aerial installation and see that everything is right up to the mark to prepare for DX signals that will soon be floating around. Selectivity often requires a short aerial but not without sacrificing a certain amount of volume. Good wire to use is stranded enamel as it is less susceptible to corrosion and the strands in the wire help create a better conductor for the high frequency currents. The aerial must be able to withstand the tension impressed on it when stormy weather comes along and for that reason it is necessary to employ strong supports for the aerial, using high-grade insulators and heavy size wire.

"RAMBLER-SIX"

THE ONLY REAL PORTABLE

\$90

Satisfaction Guaranteed

WRITE FOR KIT PRICES

Approved by Radio World Laboratories

American Interstate Radio Service
183 Greenwich Street, New York City
Distributors, Jobbers, Dealers, or for special trade terms

USE HALF A MILE OF WIRE FOR AERIAL!

It affords Greater Volume, More DX and Richer Tone, without Reducing Selectivity!

The Race Braided Copper Radio Aerials consists of a 100-foot length of No. 25 annealed copper ribbon. If this single strand were placed end on end they would reach half a mile. The enamel protects the surface against losses due to moisture, dust and dirt. Corrosion and scaling absolutely prevented.

Indorsed by HERMAN BERNARD

No. 25 RACO ANTENNA. \$1.50
Shipped you direct from factory same day on receipt of \$1.50.
(If your nearest dealer cannot supply you)

ROSS WIRE CO.

Dept. R. W.
60 BATH ST. PROVIDENCE, R. I.
DEALERS! WRITE US!

THE BRETWOOD GRID LEAK will aid you to get DX even in the summer. Send on receipt of \$1.50. North American Bretwood Co., 145 W. 45th St., N. Y. C.

IN "B" ELIMINATORS



A CLAROSTAT is absolutely indispensable for voltage. CLAROSTATS are used by practically every eliminator manufacturer.

American Mechanical Laboratories, Inc.
285 N. 6th St. Brooklyn, N. Y.
Dept. R.W.

1926 DIAMOND OF THE AIR BOOKLET, containing complete constructional data and diagrams, with blue print, 50c. Guaranty Radio Goods Co., 145 West 45th Street, New York City.

S. HAMMER RADIO CO.
303 Atkins Avenue, Brooklyn, N. Y.
Please send me FREE, Your NEW RADIO CATALOG

Name _____
Address _____
City _____ State _____
FILL OUT AND MAIL

FREE BOOKLET FOR INVENTORS

IF YOUR INVENTION is new and useful it is patentable. Send me your sketch.

Z. H. POLACHEK, 79 Wall St., New York
Reg. Patent Attorney-Engineer

NEW 1927 FREE RADIO GUIDE

Lowest Edition Ready

Shows the latest circuits, the newest developments in radio at startlingly low prices. Get the parts you want here and save money! The best in parts, kits, sets and supplies. Orders filled same day received. Write for free copy NOW! Also please send names of one or more radio fans

BARAWIK COMPANY, 102-140 So. Canal St., Chicago.

Music Men's Legal Monopoly Attacked

Klugh, For Broadcasters, Says That Unless Congress Legislates, Stations Will Find Themselves Throttled By a World Combine—Hints Trust Exoneration is a Whitewash

That there is a monopoly on music as affecting broadcasting stations was charged by Paul B. Klugh, executive chairman, National Association of Broadcasters, following exoneration by the Department of Justice of the American Society of Composers, Authors and Publishers, under the anti-trust law, in regard to all other phases except broadcasting. Mr. Klugh said:

"There is nothing startling or new in the announcement stating that the Department of Justice found that the American Society of Composers, Authors and Publishers is not a monopoly, and I sincerely hope that no one will be misled by this latest attempt of the society to 'whitewash' their activities. It was clearly pointed out by our attorney, Charles H. Tuttle, at the time of the hearings on the Dill-Vestal bills in April that in the eyes of the present State and Federal monopoly laws the American society deals in no tangible commodity or necessity of life and therefore cannot be prosecuted under any of the existing statutes.

"What is even worse is the fact that unless Congress legislates advisedly in regard to this phase of copyright, broadcasters will soon find themselves throttled by a world music monopoly.

"I have recently had occasion to talk with broadcasters from Australia, Canada, France and England, and find that the 'modus operandi' of the societies in these countries corresponding to the American society here in the States are practically without exception duplicates of one another. This explains why the American society appeared in Washington in support of the so-called Authors' League bill, which has as its prime purpose entry in the Berne Convention. With the automatic copyright and the free exchange of the rights in which they deal between all countries in the Berne Convention, the world monopoly would be complete and the highest ambitions of the music publishers satisfied."

A BATTERY POLARITY IMPORTANT

Often to make changes in a radio set the battery leads have to be removed. After these changes have been made and battery leads are re-attached to the set it refuses to function. If the changes were important they are likely to come in for the most examination and very often the battery connections are overlooked. A reversed A battery is one of the most common causes of rendering a set inoperable.

Radio Music Trust Inquiry Continued

WASHINGTON.

The Department of Justice has dropped the case against the American Society of Composers, Authors and Publishers, investigated under the anti-trust law, so far as the inquiry concerned other than broadcasting stations. The department issued the following:

"The only question for consideration by the department was whether the operations of the American Society, in receiving assignments from its members of the rights to the public performance of their copyrighted music, and the issuance by the society to many places of amusement throughout the country of the right to publicly perform for profit all the copyrighted music of its members, constituted a combination which restrained trade and commerce within the prohibitions of the Sherman act.

"It was found, however, that the American Society has nothing whatsoever to do with the published music or with any physical objects which enter into the course of interstate commerce, and that it has been held repeatedly by the courts that acts similar to the granting of licenses for the local performance of music in a place of amusement do not constitute interstate commerce, even when the contracts are entered into in a different state from that where the performance may take place.

"No decision has been reached in reference to the licensing of radio broadcasting stations because of the unsettled state of the law relating to radio and the possibilities of legislation by Congress at the next session."

Paulist Choristers Will Resume Soon

The Famous Paulist Choristers, heard last season over station WLWL in New York, will again be heard by radio listeners in the east beginning early this month when WLWL in New York and stations WNAC in Boston and WEAN in Providence will broadcast the programs of the famous musical unit.

The Choristers will be heard over the WLWL chain throughout the winter season.

THE DIAMOND A BADGE OF MERIT

Join the Happy Thousands Who
Triumphantly Built This 5-Tube Set!

Real
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Quality!

A Great Summer
Receiver

Easy to
Tune, Easy
to Build!

Herman Bernard, designer of this wonder circuit, has written an illustrated booklet on "How to Build RADIO WORLD'S 1926 Model Diamond of the Air." Send 50c and get this booklet, including a full-sized wiring blueprint and free nameplate.

Outstanding Features of Set: (1) Fans, charmed by tone quality, sensitivity and selectivity, report speaker reception of far-distant stations with great volume. (2) A 2-tube earphone set, a 5-tube speaker set, and a separate 3-stage audio-amplifier for immediate use with any tuner, are combined in one. (3) No rheostats are used. (4) The set is inexpensive to construct and maintain. (5) The set works from outdoor aerial or loop, hence no aerial problems present themselves, in city or country.

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How KDKA Solves Program Allotment

5-Part Balance Devised for Fall and Winter Broadcasts—Engineers Have Some New Technical Improvement But Its Nature Is Kept Secret

PITTSBURGH.

Diversity is to be the keynote of programs of Westinghouse Radio Station KDKA during the coming fall and winter. The aim of the station is to give the radio auditor a balanced offering of entertainment and education, information and inspiration.

Its programs, broadly classified, will fall under the following heads:

1. Entertainment—music, drama, comedy, etc.
2. Features—National news, games and sporting events of outstanding interest.
3. Church Services—a regular Sunday feature.
4. Science—Popular lectures by eminent instructors and research authorities.
5. Agricultural programs.

It is the purpose to offer a cross-section of the principal things that carry a universal appeal.

Part of a Chain

The Westinghouse station also has made arrangements to tie up with other cities for the broadcasting of such programs as the Victor Hour.

Dinner concerts will have a daily place on the schedule and the programs worked out by Victor Saudek will consist of classical and popular selections.

Lectures on modern physics, chemistry, zoology and kindred subjects will reach auditors via the microphone of KDKA's studio at the University of Pittsburgh. The programs under the direction of Mary Frances Philput, studio manager, were a success last season. The University's radio activities are to be resumed on a more comprehensive scale before winter comes.

Secret Improvement

Meanwhile Westinghouse radio engineers are carrying on experiments which when completed, will be of immense benefit of the art of radio.

Because of the nature of these engineering activities no announcement of their technical scope can be made until a later date, according to C. W. Horn, Superintendent of radio operations at KDKA.

New equipment, he announces, is going to all Westinghouse stations with particular attention being paid to station apparatus governing the quality of transmissions.

Every Westinghouse station now has its wave length directly controlled by the piezo crystal. This crystal controls the frequency itself and is not used as a checking device.

DX Fans Oppose Station in Yonkers

Some members of the Yonkers (N. Y.) Board of Aldermen announced that they would ask Benjamin Fairchild of Pelham, Congressman from the Southern Westchester County District, to try to block the opening of a broadcasting station in Yonkers.

Dr. Edward Burchart and other residents of Yonkers have been trying to

have a station erected in Yonkers. Alderman John S. Davis, representing the Third Ward, has said that he believed no station should be set up in Yonkers, because the owners of small sets will have difficulty in tuning in on out-of-town stations. Mr. Davis says other Aldermen agree with him that efforts should be made to try to prevent a license being issued to the proposed station.

Home Decorated To Match Speaker In Appearance

The woman with artistic leanings looked at the cone speaker her husband had just brought home. "It's beautiful," she said, "I shall redecorate the living room to match it."

"And," declared C. L. Farrand, inventor of the cone type radio loudspeakers and president of the Farrand Manufacturing Company, makers of cone type speakers, "those were the actual words of the wife of one of my acquaintances."

"Her statement has led me to believe that more and more the choice in radio apparatus is tending to the beautiful. The woman in question as well as others throughout the land can now enjoy their radio programs without having the enjoyment tempered by unbeautiful accessories."

"The loudspeaker in the home can now repose at some well chosen point of vantage in harmony with the other decorative bits of furniture that go to make up a home."

Considerable in the decorative is offered in new model loudspeakers that are appearing on the shelves of radio stores throughout the country—and most of the speakers exhibited seem to have been designed with the idea of harmonizing with home furnishing wherever possible.



UX POWER TUBES installed in any set without rewiring by Na-Ald Adapters and Connectors. For full information write Alden Manufacturing Co., Dept. S-21, Springfield, Mass.

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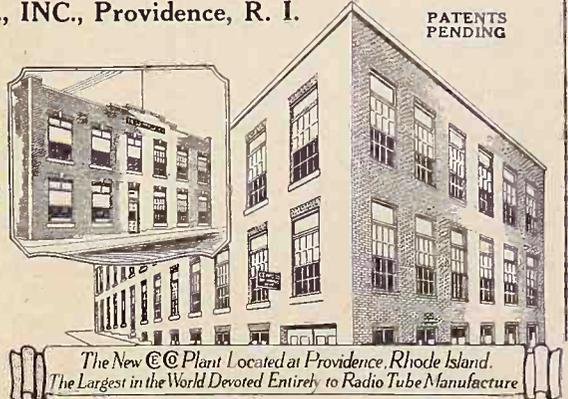
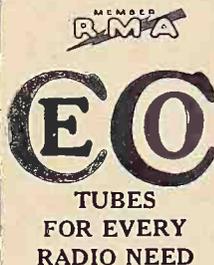
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The New C.E. Plant Located at Providence, Rhode Island.
The Largest in the World Devoted Entirely to Radio Tube Manufacture

Variable Condensers Give Most Trouble

So Say Two R. C. A. Experts—Oil or Grease to Reduce Bearing Friction Causes Dirt to Accumulate Poor Contacts Result

(Continued from page 7)

subject to electrical failures. They may be connected into the circuit improperly, but as a unit are not subject to difficulties. Trouble is sometimes experienced with transformers of this type that have no supporting tubing, due to mechanical collapse. In some cases the windings may be wound on cardboard or fibre tubing, which has not been made impervious to moisture, and during the periods of humid weather these absorb enough moisture to cause high resistance short circuits of the winding.

Inspect Movable Parts

Variocouplers and variometers are constructed along the same lines, and are subject to similar defects. However, because of the fact that a variocoupler or variometer has a moving element in it, some form of flexible connection is generally employed to bring out the connections of the moving coil. These flexible connections, because of mechanical movement, are subject to fracture. If no flexible connection is employed, and the contact is made through the friction of the rotor to a bushing on the stator, after long periods of use the friction may decrease, and reduce the effectiveness of the connection. These movable parts should be inspected for mechanical failure. The primary or fixed coil of the coupler is sometimes tapped, and leads taken off. Check to see that these leads are properly soldered, and not short-circuited or open.

A second type of radio frequency transformer used is the so-called untuned transformer. This consists of a core of either iron or air around which is placed

a bobbin with two inductively-coupled windings wound on it; one is primary and one is secondary. Because of the relatively low potentials and weak currents present in the radio-frequency circuits, they are not subject to failure to any great degree. Occasionally one will find a winding of one of these transformers burned out, but the percentage of such failures is rather small.

Audio frequency transformers are similar in their general construction to radio-frequency transformers. The resistance of the primary winding is about 1,000 ohms, and the resistance of the secondary is from 2,000 to 6,000 ohms. In order to get the required turns in a limited space the wire used is very fine. Because of the relatively high currents passing through these windings, they are more subject to failure than is the case with the radio frequency transformers. Failures generally occur at the point where the lead wire is soldered to the end of the winding. This is particularly true when a corrosive flux is used in soldering.

AF Transformer Tests

Transformers may be tested by measuring the resistance of the individual windings. A quick check may be had by connecting a 22½-volt battery to the windings and noting by the spark at the contact whether or not the circuit is continuous. Because of the high resistance of these windings a short circuit of the B battery will rarely cause a burn-out.

Variable condensers are, to our mind, the principal cause of trouble in a radio set. In this case it is particularly true that the troubles increase as the quality decreases. We have covered a good

many points of possible failure and for that reason we will make but one addition. Most condensers use an oil or grease to reduce the friction in the bearings. This oil or grease, as the case may be, accumulates dirt and dust very rapidly and in condensers where the electrical contact is made through the friction of this bushing, these dirt and dust accumulations cause poor contact. Any moving part in a condenser that is not making a firm, clean contact will cause the set to be noisy when the circuits are in resonance.

In order to test for a short circuit in a variable condenser it is necessary to disconnect it from the circuit. The quickest test and the most satisfactory is to connect a source of 110 volts in a series with an electric lamp across the condenser. Rotate the condenser to its entire range and note the points of contact. Any short circuit will cause the lamp to light, and the exact point of short will be indicated by sparking.

Should the rotor assembly for any reason get out of alignment so much as to cause the rotor plates to touch the stator plates, it will be necessary to adjust the end thrust bushings so as to re-align the rotor assembly.

Fixed Condensers

Fixed condensers of good quality rarely go bad or break down as the potentials generated in a radio receiver are as a rule far below the breakdown potential of the condensers. Cheap, fixed condensers, particularly those using fibre in their construction, are subject to climatic conditions and absorb moisture very readily. This causes high losses in the circuits in which the condenser is used. To test a fixed condenser it is generally necessary to free it from the circuit, then connect a 90-volt B battery in series with a pair of head phones and make a contact across the terminals of the condenser. The first contact should cause a loud click to be heard. Remove the contact and count

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HOW TO USE AERIALS IN GROUND AND WATER, by Lewis Winner, appeared in RADIO WORLD, dated May 29. Sent on receipt of 15c, or start subscription with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

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A BUILT-IN SPEAKER SET, by Herbert E. Hayden, **POWERTONE IN OPERATION**, by Capt. P. V. O'Rourke, **THE NOVICES NOOK** by James B. Scully, appeared in RADIO WORLD dated May 22. Sent on receipt of 15c, or start sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

THE BRETWOOD GRID LEAK will aid you to get DX even in the summer. Sent on receipt of \$1.50. North American Bretwood Co., 145 W. 45th St., N. Y. C.

A DISCUSSION ON SELECTIVITY, by J. E. Anderson, appeared in RADIO WORLD, dated June 19. Sent on receipt of 15c, or start subscription with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

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HERMAN BERNARD, managing editor of RADIO WORLD, broadcasts every Friday at 7 P. M. from WGBS, Gimbel Bros., N. Y. City, 315.6 meters. He discusses "What's Your Radio Problem?" Listen in!

GETTING MAXIMUM RESULTS with Super-Heterodynes by Herman Bernard appeared in RADIO WORLD dated May 15th. 15c per copy, or start your subscription with that issue. RADIO WORLD, 145 West 45th St., N. Y. City.

DESIGN DATA FOR RADIO TRANSMITTERS AND RECEIVERS, by M. B. Sleeper, sent on receipt of 75c. Guaranty Radio Goods Co., 145 West 45th Street, New York City.

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How to Test Sets For Faulty Jacks

Bend Spring Down or Up if it Does Not Make Proper Contact—Brighten Points With Fine Emery Cloth—Reflex Crystals Weak

ten slowly, and make a second contact. If, on the second contact, little or no click is heard in the phones, such a condenser may be considered as perfect. If the second contact gives the same volume of click as the first contact, there is a high leakage in this condenser and it should be replaced. We might say in this connection that the contactors of the test just outlined should be properly insulated so that they do not come in contact with the hands or any part of the circuit. In testing a grid condenser it is necessary to remove the grid leak, as in most cases the grid leak is connected directly across the condenser, forming a permanent leakage path. The foregoing test is applicable to the testing of variable condensers and the same procedure may be followed. In making such a test the variable condenser should be set at maximum capacity.

Grid leaks are difficult to test without the necessary laboratory equipment and we would suggest that if there be any doubt in the service man's mind he should replace these.

Multi-point switches very seldom give electrical trouble, except when the tension of the contact spring weakens; this may cause a high-resistance contact. If the

shaft of the switch is pigtailed, check the pigtail, making certain that it is intact.

Check also the soldered connections to the contact points of the switch, making sure that the contact connections are firm and clean.

Faulty Jack Tests

Telephone jacks, filament control jacks, and battery switches constructed along the lines of a telephone jack are often sources of trouble. The contact springs may become weakened and dust and dirt accumulate on the contact points causing the failure of the jacks or switch, as the case may be, to close the necessary circuits. Faulty jacks are the cause of a large percentage of the failure of amplifiers to operate properly. To check these, plug the telephones in and out of the jack very slowly and observe just how the springs should function. If the springs do not close the circuits as they should, bend the offending spring down or up as required to insure firm contact. It would be well to draw a fine piece of emery cloth across the contact points to brighten them up.

The principal difficulty which may be experienced with rheostats is that due to a faulty contact between the contact and the resistance winding. Burn-outs of the rheostat are very rare.

Potentiometers are subject to the same difficulty in the matter of contact as is the rheostat. In making any adjustments on receivers in which a potentiometer is used, it is well to set the potentiometer at the half-way mark while making these

adjustments. Potentiometers are subject to burn-outs. To check for a burn-out, place a pair of headphones in series with a battery and connect one side of this test lead to the center terminal to the potentiometer which is generally connected to the contact arm. Place the contact arm at the center of the winding and make contact to each of the other binding posts in turn.

Binding posts sometimes cause trouble due to loosening of the screws. All binding-post screws should therefore be tried and if found loose, should be firmly seated.

Crystal detectors, which are used principally today in the so-called reflex type of circuit, sometimes fail because of dirt accumulations on the surface of the crystal. Occasionally the crystal may be burned out by an accidental short circuit. To restore a dirty crystal, use a non-alkaline soap and a tooth brush. Scrub the surface of the crystal thoroughly and rinse in cold water removing all traces of soap.

In this connection we might say that considerable service is experienced on reflex sets that fail to give results, and the crystal is generally found to be the cause. Fixed crystals are not entirely satisfactory.

The foregoing is a brief review of some of the most frequent troubles that may occur in the radio receiver. There may be a few troubles that apply to a single type of receiver which have been omitted, but such will be characteristic of that particular type. In conclusion, we would repeat: Test all sets before sale and be truthful in the matter of results that may be expected. Do not lead the customer to believe that he will be able to receive California any time he desires. Advise him also of the probable length of life of his batteries. To the service man: ask questions and analyze the defects before you commence operations. A few judicious questions will oftentimes save considerable work and create a more favorable impression with the customer.

212,000 SETS IN JAPAN

On July 1, 1926, there were 212,000 radio receiving sets owned by subscribers of the Tokyo broadcasting stations, according to a report to the Department of Commerce.

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Name
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Distance Is Vital To Many Owners

Station Distribution Centers Strongly on Cities, Making It Necessary for Many in Midwest and Elsewhere to Cover 1,000 Miles to Get Anything at All

By R. M. Klein

From a recent trip through the Rocky Mountain slope states, the Twin Cities and the Northwest, I have gathered considerable information to sustain my opinion that distance is still a very important factor in connection with the sale of a radio set.

We in the metropolitan centers, such as New York, Chicago and Philadelphia, do not realize the extent to which we are blessed by superior broadcasting conditions.

Too Many Stations

We have any one of a number of stations that can be received at will; in fact, in many cases there are too many stations and only sets with superior qualities on selectivity can properly meet these metropolitan center conditions.

Think, however, of what is perhaps the broadest market through the United States, and what covers far and away the largest area throughout the United States.

Talking with a very large number of dealers, I was impressed with their unanimity of opinion that the principal question asked by a prospective purchaser is "What distance can I get?" It is not inspired by curiosity, nor by the lure of distance, but is inspired purely by downright necessity.

Variety Valuable

The value of radio lies not only in receiving a good broadcasting program but in having a variety of programs to select from. Analyze the locations in the United States which carry high powered stations, and make a fair assumption as regards the average reliable distance over which a receiver will operate. Then you will understand why there is a major portion of the country and to a lesser extent a high percentage of the prospective purchasers that must rely on distance for satisfactory enjoyment.

Cites Instances

Analyze the conditions surrounding St. Paul and Minneapolis, and the population center of several million people which these distributing points serve. There is really but one adjacent power station; namely WCCO. It is true the Iowa and Nebraska stations give nighttime coverage, but only with the better grades of sets, and the same comment is applicable to the stations at Winnipeg and Calgary.

The entire inter-mountain district from Idaho down through Arizona must pull on the average 1,000 miles to get satisfactory broadcasting. They must reach Denver on the East and the Pacific Coast stations on the West, and unless a purchaser can be assured of satisfactory distance reception he cannot be interested in purchasing a radio set.

Many portions of Texas, likewise the Gulf and the South Atlantic states, are in a similar position, and the industry can be assured that distance is still a vital factor in radio.

Kennedy at Work In New Position

PITTSBURGH,

T. R. Kennedy, Jr., recently radio editor of "The Pittsburgh Post," has taken a position in the radio department of "The Public Ledger," Philadelphia. He will devote a large portion of his time to technical subjects.

Mr. Kennedy received his training in electrical engineering at Carnegie Institute of Technology. During the war he did experimental work at the United States Naval Radio school at Harvard University. Later he was appointed Ensign, U. S. N. R. F., and transferred to the Boston Navy yard as assistant to the Radio Compass Officer of the First Naval District. Since the close of the war he has maintained a private radio laboratory.

James W. H. Weir, former manager of the Farmer-Stockman studio of KDKA, has succeeded Mr. Kennedy as editor of "The Post's" radio department.

Down In New Location

Chas. W. Down, radio dealer noted for his complete line of parts, has moved from 711 Eighth Avenue, to 2050 Broadway, New York City. The store will be known as the Alamac Radio Shop.

Mr. Down, it will be remembered, is a Super-Heterodyne expert.

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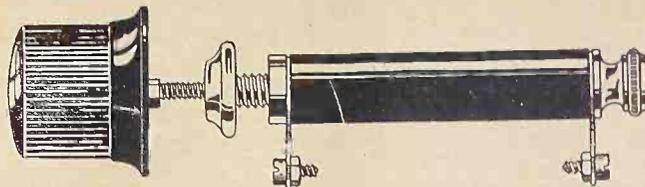
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Good Back Numbers of RADIO WORLD

The following illustrated articles have appeared in recent issues of RADIO WORLD:

- 1926:
- Jan. 2—The 2-C Set for Simplicity, by Capt. P. V. O'Rourke.
- Jan. 9—The 4-Tube DX Symphony Set, by A. Irving Witz. A Skillfully Made 1-Dial Set, by Herman Bernard.
- Jan. 16—Anderson's 5-Tube Quality Receiver. The Haytheon B Eliminator, by Lewis Winner.
- Jan. 30—An Individual AF Amplifier, by H. E. Hayden. Trapping Out Super-Power in New Jersey, by Capt. P. V. O'Rourke.
- Feb. 27—The 4-Tube DX Dandy, by Herbert E. Hayden. Umbrella Aerial for DX, by Hugo Gernsback.
- Mar. 6—The 1-Tube Set, by Capt. O'Rourke. The Chemistry of Batteries, by A. R. Reid.
- Mar. 13—The Non-Regenerative Browning-Drake Set (Part 1), by M. B. Sleeper. The Tectron Eliminator, by Lewis Winner.
- Mar. 20—The Super-Heterodyne, by J. E. Anderson. A 2-Tube Speaker Set, by Percy Warren. The Browning-Drake Set (Part 2), by M. B. Sleeper.
- Mar. 27—An Economical 4-Tube Set, by Edgar T. Collins. A Practical B Battery, by Capt. P. V. O'Rourke. Tectron Trouble Shooting, by Lewis Winner.
- April 3—How to Get DX, by Capt. P. V. O'Rourke. A Compact B Supply, by Lewis Winner.
- April 17—The New 1-Dial Power-tone, by Capt. P. V. O'Rourke. The Action of Transformers, by Lewis Winner.
- May 1—New Multiple Tube, by Herman Bernard. The Aero All-Wave Set, by Capt. O'Rourke. Kilocycle-Meter Chart. An Analysis of Detection, by J. E. Anderson (Part 1).
- May 8—A Study of Detection, by J. E. Anderson (Part 2). To Wind a Loop on a Card-board Frame. How to Reflex Resistance AF, by Theo. Kerr.
- May 15—Super-Heterodyne Results Brought Up to Maximum, by Herman Bernard. The Truth About Coll Fields, by J. E. Anderson.
- May 22—A Built-in Speaker Set, by Herbert E. Hayden. The Power-tone in Operation, by Capt. P. V. O'Rourke.
- May 29—Aerials in Ground and Water, by Lewis Winner. Economized Filaments, by J. E. Anderson. How to Get DX, by John F. Rider.
- June 5—Five-Tube Compact Receiver, by J. E. Anderson. A Tester for Tube Circuits, by Spencer Hood. Problems of Portables, by Hugo Gernsback.
- June 12—The Light 5-Tube Portable, by Herman Bernard (Part 1). The Rogers-Schudt Receiver, by Wm. A. Schudt, Jr. (Part 1). The Freshman Masterpiece, by A. W. Franklin.
- June 19—Selectivity's Amazing Toll, by J. E. Anderson. The Light 3-Tube Portable Set, by Herman Bernard (Part 2). The 4-Tube Rogers-Schudt, by Wm. A. Schudt, Jr. (Part 2).
- June 26—The Victoreen Portable, by Herman Bernard (Part 1). The Manufacture of a Tube, by F. C. Kalley. The Light 6-Tube Portable, by Herman Bernard (Part 3). The Rogers-Schudt Circuit (Part 2 concluded), by Wm. A. Schudt.
- July 3—Set with a 1-Turn Primary, by Herman Bernard. Part 2 of the Victoreen Portable, by H. Bernard. Trouble Shooting Article for The Light 5-Tube Portable.
- July 10—A Rub in Single Control, by Herman Bernard. A DX Double Regenerator, by Capt. P. V. O'Rourke. A 2-Tube Dry Cell Receiver, by Samuel Schmalz.
- July 17—A Double Duty Loop Aerial, by J. E. Anderson. How to Measure Coupling, by John Rider. The 1-Control Crystal Set, by Smedley Lyons.
- July 24—Why the Super-Heterodyne Is the Best Set, by Herman Bernard. A 1-Tube Redox Receiver, by H. A. Reed.
- July 31—What's Best in an AF Amplifier, by Herman Bernard. A 6-Tube Reversed Feedback Set, by K. B. Humphrey.
- Aug. 7—The 5-Tube Tabletop, by A. Irving Witz. The Wiring of Double Jack, by Samuel Lager.
- Aug. 14—The Improved Browning-Drake, by Herman Bernard (Part 1). Storage Batteries, by John A. White.
- Aug. 21—A New Stabilized Circuit, by E. H. Loflin and S. Y. White (Part 1). The Browning-Drake, by Herman Bernard (Part 2).
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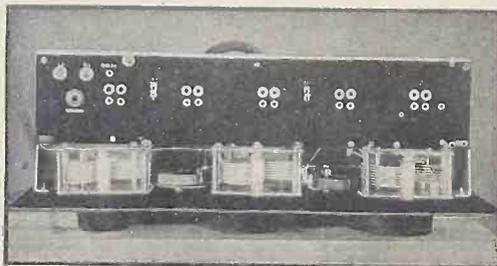
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New model cabinet base 21" long by 8" wide, height 9½", top 21" by 6".

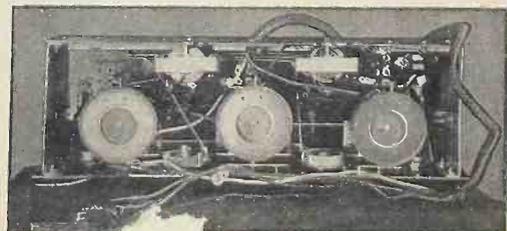
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