THE RADIO EXPERIMENTER'S MAGAZINE

HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

December

WORLD'S LARGEST SHORT WAVE CIRCULATION

Build This "MIDGET" A.C.-D.C. Receiver

See Page 458

25¢
IN CANADA 30¢

NEW WORLD GLOBES
for Short Wave Enthusiasts—
at New Low Prices - - -

THESE remarkable, new globes printed in a variety of popular colors are indispensable to short-wave fans. Notable among the many features of these world globes, is that they give life-time service.

Short-wave fans are enabled to determine correct time in various centers of the world with the aid of these globes; distances from city to city can be accurately established.

There is a graduated "Meridian" scale on each globe. Another feature is the movable hour scale found at the north pole—this facilitates determining the hour in any part of the world.

You will be thrilled when you put the globe to actual use—measuring distances from New York to Moscow; from Cape Town to Tokio; from Los Angeles to Rio de Janeiro; etc. A flat map is deceptive for measuring, but take a small string and stretch it across the globe, from city to city, and you have the correct distances.

Each globe contains a listing of several thousand cities in nations all over the world—spellings conform to international geographic standards—all globes are of 1935 production. They contain such important features as traces of Admiral Byrd's recent voyage to Little America; Lindbergh's Paris flight; the new Japanese Empire; principal railroads; principal international short-wave radio stations and call letters; steamship routes; and other equally important data.

The colors on our fine handmade or Library globe maps are refined and delicate. Nevertheless, the two types have an essential characteristic in common—their rich color harmony, in which each color of equal strength bleeds into a harmonious color unit.

The map surface of all models is protected by a high, glazed, water and scratch proof finish which can easily be kept fresh and new with a damp cloth. This finish will not fade, crack or become yellow with age. The colors are sun proof.

These globes add dignity to home, office, studio or laboratory—they are globes that everyone will be proud to own.

World Globe No. R-16

De Luxe World Globe No. R-16

This large, de luxe, 16" library globe is designed for those who prefer a globe of real distinction. It is the most comprehensive globe map published. It contains over 9,000 place names, new countries, geographic information, and other useful data. It is extremely easy to read—and can be used for accurate reference. Its distinctive mounting and beautiful coloring harmonize well.

POLITICAL INFORMATION

9,000 name places—Latest political changes (Saar, Manchukuo)—Railroads—Steamship routes with distances—Caravan routes—Ancient ruins (Maya Persepolis)—Important sites (Boulder Dam, National Parks, Little America)—82 Shortwave radio stations and call letters listed—Submarine cable lines—Canals (Suez, Kiel)—Country and state capitals.

PHYSICAL INFORMATION

Mountain ranges—Mountain peaks, volcanos—Plateaus, steppes—Glaciers, shelf ice—Swamps—Deserts, oases—Ocean currents in white—Rivers and river systems—Important lakes—Cataracts (Nile)—Depressions (Death Valley)—Unexplored areas in white.

CONSTRUCTION

The ball is strongly made of three plies of composition board, reinforced within. The map is hand-mounted on a special prepared plaster surface which gives added strength and permits a glass-smooth finish. Water proof and scratch proof lacquer seals the map and preserves its fine colors.

MOUNTING

Substantial, completely reversible meridian, antique brass plated with rim, numbers and degree marks brightly burnished. Revolves at a touch on ball bearings in a beautiful, solid walnut floor cradle stand of authentic Duncan Phyfe design. Heavy brass claw feet.

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An inch on this globe's surface is equivalent to 500 miles on the earth's surface. Because of this convenient scale, the 16" globe is specified equipment in the schools of many states.

With this beautiful globe is included the 32-page illustrated booklet entitled, "The Story of the Globe."

The World Globe No. R-16 is moderately priced. Height—39¼". Shipping weight (ball and globe) 30 lbs. PRICE **$31.75**

World Globe No. L-7

This combination globe-lamp, in addition to its decorative value can be used as a reading lamp. The 7" ball, featuring 55 short-wave stations, has a full meridian, and rotates. The 16" diameter shade is parchment, handsomely wrapped in cellophane for protection. Nautical designs in harmonizing colors add to the attractiveness of the lamp shade. The metal parts are antique bronze striped with gold. Complete with plug and cord. Height—19". Shipping weight—5½ lbs. PRICE **$2.60**

Gentlemen:

I received the World Globe and am well pleased with its completeness, appearance and usefulness.

Short-wave listening has become a hobby with me, and this World Globe is a necessary accuracy to any short wave listener or, for that matter, to any home.

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Laboratory, 19th and Campbell Sts.
Kansas City, Missouri

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World Globe-Atlas No. R-12

This globe-atlas combination is one of the finest pieces that could be placed in any home or office. The 12" library ball, with its brass-plated meridian, fits snugly into the finely constructed solid walnut stand. Provision is made below for the 1935 383-page atlas which accompanies each globe, at no extra charge. 67 Shortwave stations listed. Height—16½". Shipping weight—12 lbs. PRICE **$6.85**

World Globe-Atlas No. R-12

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99 Hudson Street, New York, N. Y.

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( ) World Globe No. R-12 @ $6.85

Name.....
Address.....
City..... State.....

Send remittance in check or money order—register letter if it contains cash, stamps or currency. GLOBES ARE SHIPPED FROM OUR WAREHOUSE IN CHICAGO—F. O. B. FROM THAT CITY.

All globes are carefully packed in original, corrugated protected, cartons, assuring safe delivery. ORDER BY NUMBER. Send check or money order, plus sufficient postage for delivery by parcel post. Globes are shipped from our Chicago warehouse. Register letter if it contains cash, currency or stamps. Specify if shipment is to be sent express collect. ALL ORDERS ARE FILLED PROMPTLY.

SHORT WAVE CRAFT 99 HUDSON STREET, NEW YORK, N. Y.

IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Doerle • Townsend • Llewellyn • Cisin • Shuart • Stokely

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

GEORGE W. SHUART, W2AMN
Associate Editor

Contents for December, 1935

Features in the January Issue

5-Meter Transceiver with new "Midget" tubes, by George W. Shuart, W2AMN.

Fractional Meter Transmitter and Receiver—A Brand New Departure, by Art. Gregor.

New Short-Wave Sets at the German Radio Show.

A Good Amplifier and Power Supply Unit for S.-W Receivers.

A Transmitter made from "Receiver" Parts.

Latest Television News.

Certified Circuits

● SHORT WAVE CRAFT goes to a large expense in verifying new circuits. When you see this seal it is your guarantee that such sets have been tested in our laboratories, as well as privately, in different parts of the country. Only "Constructional-Experimental" circuits are certified by us.

When you see our certified seal on any set described, you need not hesitate to spend money for parts, because you are assured in advance that the set and circuit are bona fide and that this magazine stands behind them.

SHORT WAVE CRAFT is the only magazine that certifies circuits and sets.

OUR COVER

This month our cover artist has illustrated in color the "Midget A.C.-D.C. Receiver" illustrated and described on Pages 458 and 459, by H. G. Cisin. This is a dandy set for the beginner or for use where a particularly small set is desired.

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SHIP RADIO OPERATOR
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Name.....*Age*....

Address.....

City.....*State*.....

• • • SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE • • •

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 12-35
99-101 Hudson Street, New York, N. Y.

I, the undersigned, herewith desire to apply for membership in the SHORT WAVE LEAGUE. In joining the LEAGUE I understand that I am not assessed for membership and that there are no dues and no fees of any kind. I pledge myself to abide by all the rules and regulations of the SHORT WAVE LEAGUE, which rules you are to send to me on receipt of this application.

I consider myself belonging to the following class (put an X in correct space): Short Wave Experimenter ☐ Short Wave Fan ☐ Radio Engineer ☐ Student ☐

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

I enclose 10c for postage and handling for my Membership Certificate.

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

The SHORT WAVE LEAGUE was founded in 1930. Honorary Directors are as follows: Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

The SHORT WAVE LEAGUE is a scientific membership organization for the promotion of the short wave art. There are no dues, no fees, no initiations, in connection with the LEAGUE. No one makes any money from it; no one derives any salary. The only income which the LEAGUE has is from its short wave essentials. A pamphlet setting forth the LEAGUE'S numerous aspirations and purposes will be sent to anyone on receipt of a 3c stamp to cover postage.

FREE MEMBERSHIP CERTIFICATE

As soon as you are enrolled as a member, a beautiful certificate with the LEAGUE'S seal will be sent to you, providing 10c in stamps or coin is sent for mailing charges.

Members are entitled to preferential discounts when buying radio merchandise from numerous firms who have agreed to allow lower prices to all SHORT WAVE LEAGUE members.

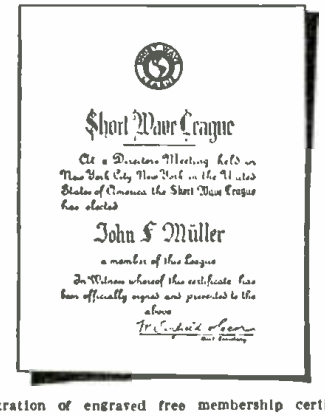


Illustration of engraved free membership certificate

SHORT WAVE ESSENTIALS LISTED HERE SOLD ONLY TO SHORT WAVE LEAGUE MEMBERS

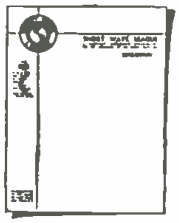
They cannot be bought by anyone unless he has already enrolled as one of the members of the SHORT WAVE LEAGUE or signs the blank on this page (which automatically enrolls him as a member, always provided that he is a short wave experimenter, a short wave fan, radio engineer, radio student, etc.).

Inasmuch as the LEAGUE is international, it makes no difference whether you are a citizen of the United States or any other country. The LEAGUE is open to all.

SHORT WAVE LEAGUE LETTERHEADS

A beautiful letterhead has been designed for members' correspondence. It is the official letterhead for all members. The letterhead is invaluable when it becomes necessary to deal with the radio industry, mail order houses, radio manufacturers, and the like; as many houses have offered to give members who write on the LEAGUE'S letterhead a preferential discount. The letterhead is also absolutely essential when writing for verification to radio stations either here or abroad. It automatically gives you a professional standing.

A—SHORT WAVE LEAGUE letterheads, per 100 ..... **50c**



A—50c per 100

OFFICIAL SHORT WAVE LISTENER MAGAZINE

The finest magazine of its kind ever published—totally different in get-up and contents from any other. Contains the largest listing of short wave stations in the world, up-to-the-minute, including "Police," "Television" and short-wave stations, as well as a special list of the star short-wave stations with their frequencies and call letters. Also contains photos and descriptions of short-wave broadcasting stations in various parts of the world with photos of short wave studio artists—How to locate "weak" distance stations, and other hints for the "short-wave listener"—Question and Answer Department for the "listener"—Silver Cup Trophy for best photo of readers' listening "Posts," etc

B—Official Short Wave Listener Magazine ..... Prepaid **25c**

B—25c per copy

RADIO MAP OF THE WORLD AND STATION FINDER

The finest device of its kind published. The world's map on heavy board is divided into 23 sections, while the rotary disc shows you immediately the exact time in any foreign country. Invaluable in logging foreign stations. Also gives call letters assigned to all nations. Size 11"x22".

C—Radio Map of the World and Station Finder ..... Prepaid **25c**

GLOBE OF THE WORLD AND MAGNETIC COMPASS

This highly important essential is an ornament for every den or study. It is a globe, 6 in. in diameter, printed in fifteen colors, glazed in such a way that it can be washed. This globe helps you to intelligently log your foreign stations. Frame is of metal. Entire device substantially made, and will give an attractive appearance to every station, emphasizing the long-distance work of the operator.

D—Globe of the World ..... Prepaid **$1.25**

SHORT WAVE LEAGUE LAPEL BUTTON

This beautiful button is made in hard enamel in four colors, red, white, blue and gold. It measures three quarters of an inch in diameter. By wearing this button, other members will recognize you and it will give you a professional air. Made in bronze, gold filled, *not plated*. Must be seen to be appreciated.

E—SHORT WAVE LEAGUE lapel button ..... Prepaid **35c**

EE—SHORT WAVE LEAGUE lapel button, like the one described above but in solid gold ..... Prepaid **$2.00**

SHORT WAVE LEAGUE SEALS

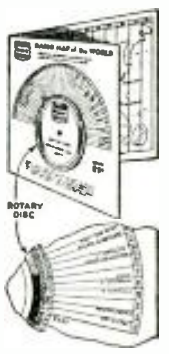
These seals or stickers are executed in three colors and measure 1¼ in. in diameter, and are gummed on one side. They are used by members to affix to stationery, letterheads, envelopes, postal cards and the like. The seal signifies that you are a member of the SHORT WAVE LEAGUE. Sold in 25 lots or multiples only.

G—SHORT WAVE LEAGUE seals ..... per 25, Prepaid **15c**

SHORT WAVE MAP OF THE WORLD

This beautiful map, measuring 18x26 in. and printed in 18 colors is indispensable when hung in sight or placed "under the glass" on the table or wall of the short wave enthusiast. It contains a wealth of information such as distances to all parts of the world, political nature of the country in which a broadcast station is located, etc., and from the manner in which the map is blocked off gives the time in different parts of the world at a glance.

F—SHORT WAVE Map of the World ..... Prepaid **25c**



C—25c each

PLEASE NOTE THAT ABOVE ESSENTIALS ARE SOLD ONLY TO MEMBERS OF THE LEAGUE—NOT TO NON-MEMBERS WITH EXCEPTION OF ITEM B.

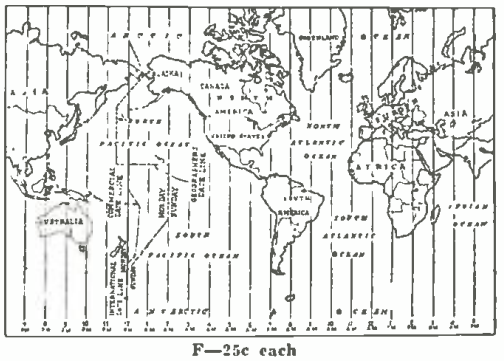
Send all orders for short wave essentials to SHORT WAVE LEAGUE, 99-101 Hudson Street, New York City.

If you do not wish to mutilate the magazine, you may copy either or both coupons on a sheet of paper.

SHORT WAVE LEAGUE 99-101 Hudson St., New York, N. Y.

D—$1.25 each

G—15c for 25



F—25c each

E—35c each

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SHORT WAVE LEAGUE, 99-101 Hudson Street, New York, N. Y.

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I am a new member and attach my application to this coupon ☐
Please send me the following short wave essentials as listed in this advertisement:

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for which I enclose $ ..... herewith.

(The LEAGUE accepts money order, cash or new U. S. Stamps in any denomination. Register cash and stamps.)

Name .....
Address .....
City and State .....
Country .....

12-35

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Stunts With Short Waves

An Editorial By HUGO GERNSBACK

● SHORT waves have so many ramifications nowadays that it is difficult for the expert to keep track of all the uses to which short waves can be put. New discoveries are made every day and new uses are found for these waves. A catalog listing all the applications of short waves would make quite a formidable list.

There are, however, a number of uses to which short waves may be put which may not be known to the average reader, and for their benefit this has been written:

The particular ones of which I am speaking are properly classified under stunts, although some of them are of a commercial nature. Let me say at this point that to transmit short waves of any type, a radio license, which is assigned to you by the Federal Communications Commission, is required. It should be noted that no one can send or broadcast signals, the effect of which may make itself felt across state borders. This is a peculiarity of the law, but there are even certain exceptions to this. For instance, when you are a service man and you operate a service oscillator, which is not shielded, on the east bank of the Hudson in New York City, you probably *break the law* because it is almost certain that the effect of this transmission will reach the other side of the Hudson in the state of New Jersey. The power of such a service oscillator is, however, very minute, and the service man does not bother his head about breaking laws, although he is at all times undoubtedly aware that whenever he operates the oscillator, the signals will probably reach to the other state. Of course he will probably own no transmitting license either.

There are also many experimenters who, in various states, often communicate with each other with very minute power, usually for experimental purposes, on short waves. Quite a few of these experimenters are not licensed and they think that as long as their signals do not reach into another state they, therefore, would not be breaking any law. This is not true, however, because you cannot operate a transmitter unless you are licensed by the government.

Recently, the New York Stock Exchange tried a new stunt in short waves, whereby boys on the floor communicate *via short waves* with an office in the Stock Exchange. This has been done in order to effect immediate and quick transmission of information. The New York Stock Exchange also tried a similar system where, by means of short waves, operators who put the quotations on the board received such information, by short waves, the operator before the board wearing a set of head-receivers through which the information came. The Stock Exchange had arranged for a transmitting station license from the Federal Communications Commission.

For stage purposes, short waves of exceedingly small power have often been used. This is particularly the case where so-called "mind-reading" stunts were made use of. Here, the operator on the stage, who may be a woman, wears a pair of concealed earphones, small enough to fit inside the ear, with flesh-colored wire running through the hair to the back where the set is concealed. The set, which is, of course, very minute, is then located under the dress. The other operator, who walks about in the audience, usually has a concealed radio transmitter of microscopic power and he uses a certain code which is transmitted to the operator on the stage. The code key can be operated by foot or by hand. In the former case the operator merely has to move his foot in a certain way to tap out the dots and dashes; the same thing can be done by means of a concealed contact in one hand. In this manner, the information is conveyed to the person on the stage without the audience knowing what is going on.

Not so many years ago, quite an original stunt in short waves was used in connection with a horse race. A certain horse actually ran in a race without its jockey. Instead of a jockey, it had a dummy attached to the saddle. This dummy was equipped with a loudspeaker, the set being a short-wave 5-tube affair of a rather rugged construction, built and made in such a manner that the jarring of the running horse was not likely to make the set inoperative. This particular horse had been coached for many weeks to listen to the jockey's voice and had time to familiarize itself not only with the voice, but with certain commands which would spur the horse on. The set was then tried out before the race a number of times, the jockey speaking into the microphone in the grandstand and watching the action of the horse by means of binoculars. At certain times, specific orders were given to the horse by the jockey in order to spur it on, the orders coming out of the loudspeaker with sufficient strength to be heard by the race horse. The stunt worked well in the actual race, and while the horse was not officially entered in the race, it made a good showing, particularly if it is borne in mind that *no human being was actually riding the horse!*

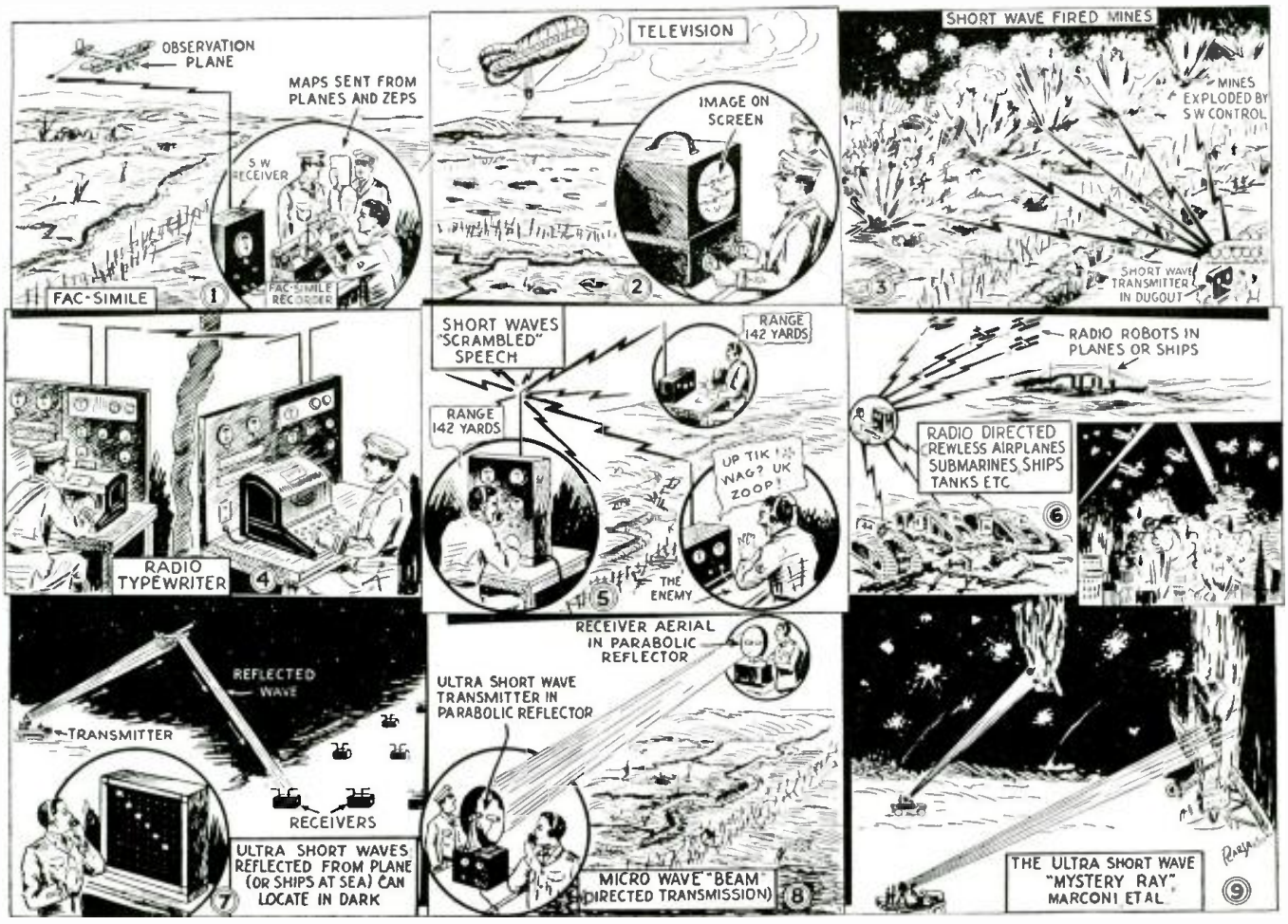
And then, of course, every experimenter and amateur knows that practically all receiving sets, under certain conditions, become transmitters. When the set is made to oscillate by placing it in an oscillating condition, it is a simple matter to make a fairly powerful transmitter of almost any receiver. While, as a rule, no one wishes to do so on account of, first, its illegality, and second, the interference it is likely to create, such receiving sets have frequently been put into service in emergencies during fires, floods, robberies, etc., where technically-minded operators found it expedient to send out a distress message. In order to do so, the operator must be sufficiently versed with the intricacies of radio, otherwise his efforts will probably go for naught. He must know on what wavelength to transmit, because if he sends out an SOS or other distress call on the wrong wavelength, no one will know what it is all about. If, for instance, it was done on the broadcast wavelength, where people unaccustomed to the code were listening in to the message, the chances are that even if they heard it, they would not know what it meant. If, on the other hand, the operator in an emergency would know how to calculate the wavelength by the length of the aerial and other adjustments to the set, he would then be able to make himself heard in one or more of the amateur bands or on the 600-meter commercial band, and usually some operator would hear the message and rush assistance immediately.

SHORT WAVE CRAFT IS PUBLISHED ON THE 1st OF EVERY MONTH

This is the December 1935 Issue—Vol. VI, No. 8. The Next Issue Comes Out December 1.

Editorial and Advertising Offices, 99-101 Hudson Street, New York City

Military Uses For Short Waves



The pictures above provide some idea of the part which short waves will play in the next war. Short waves will transmit maps of enemy trenches and gun positions "as seen from the air"—mines will be detonated by short waves—"scrambled" speech waves will carry phone conversations which cannot be tapped by the enemy—enemy planes will be detected by ultra-short waves and planes may even be put out of commission by short waves.

By H. W. Secor

Short waves will surely play many important roles in the next war, and some of these applications are shown in the accompanying picture. Maps will flash through the air from plane to ground; mines will be fired by short waves, and even Television will find its place in the battle of tomorrow.

● AS the accompanying picture shows, short waves will have plenty to do in the next war, whether it be between Italy and Ethiopia or other powers. By means of the improved high-speed *facsimile* apparatus, observation planes will be enabled to flash photos or hand-drawn sketches and maps to short-wave pick-up stations located on the ground. Maps of enemy positions including trenches, gun emplacements, ammunition dumps, etc., will be flashed quickly to artillery commanders, and the important enemy locations shelled.

The *radio typewriter* will transmit and receive many of the important military messages in the war of tomorrow, the typewritten reproductions at the receiving stations coming out of the machine on a continuous roll of paper. The so-called *telegraph typewriter* is now in daily use, and it can be operated over a two-wire electric circuit, or else by radio waves, and as it operates at fairly high speed, it will prove very useful for transmitting important military messages.

Television will undoubtedly find an application in the war of tomorrow, and by carrying a television transmitter, an observation balloon for example, as shown in Fig. 2, officers on the ground can see the exact appearance of the enemy trenches and artillery positions as they are viewed from the air by the observers in the balloon.

By means of clever electro-mechanical devices which operate on a prearranged code, it is now possible to plant a series of mines between trenches or in any other desired location, so that when the enemy charges over the prepared ground, the mines can be exploded by a series of properly coded short wave signals. Some of the selective relays in use even now for this type of control work, are almost human and really uncanny. For instance, one of the selective relays works so cleverly that it will only respond to a series of code signals corresponding to a letter combination such as SOS. From this it will be seen that it is a very easy matter to provide hundreds of different codes, with a very slight chance that the enemy would learn the proper combination of signals.

"Scrambled" speech is being hurled across the broad Atlantic daily, and if the important piece of information—"Range 142 yards"—was being transmitted by "scrambled" speech in the vicinity of the front lines, an enemy "listener-in" would only hear an unintelligible jargon of sounds as our artist has ably shown in Fig. 5. While radio experts in the enemy camp might set up an "unscrambling" apparatus to correct the broken-up words as they are now scrambled for transatlantic transmission, for military purposes the

(Continued on page 498)

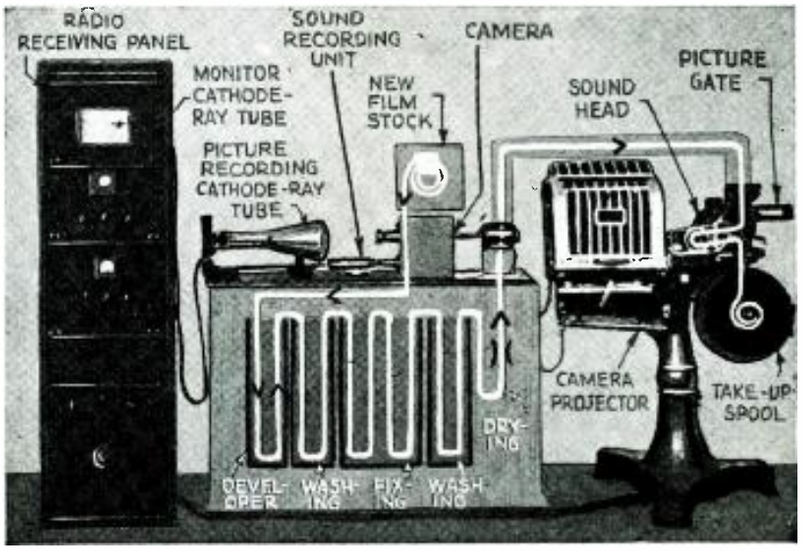
BIG IMAGE TELEVISION For Use In Theaters

Television for theater or other large screen projection has been stepping forward rapidly in Europe. The accompanying article explains how the image is photographed on film, instantly developed and dried, transmitted by short waves to the receiving station, and there projected onto a large screen.

By H. F. Townsend

● TELEVISION inventors in Europe have been very busy of late devising new schemes for picking up *television* scenes such as those out-of-doors, street scenes, etc., and also devising means for showing these televised scenes in public places such as theaters. The principal scheme so far developed in Europe involves what is known as the *intermediate film* method, which is shown in the accompanying pictures.

The first diagram shows the *Fernseh* A.G. intermediate film method of transmitting television images by short waves. The scene or image is picked up or photographed by a motion picture camera as shown, the film then passing through a special *high-speed* developing tank, where the film is also fixed and washed, all in about one minute!



Here is an actual setup of "Intermediate film" apparatus for projecting large-size television images.

The film then passes through a scanning system and the fluctuations and the light transmitted by the various light and dark portions of the image on the film are caused to affect a photo-electric (light-sensitive cell) cell, the fluctuating current from which is, in turn, caused to modulate a short-wave transmitter. After the film has passed through the scanner in the transmitter it then goes through a special *emulsion-removing* bath, and then proceeds to the *emulsion-coating* chamber shown, and from here it goes into the *drying chamber*. In this way a loop of film about 100 feet in length can be used over and over.

At the receiving station any one of several different systems may be used to reconstruct the television image. One plan is shown in the second diagram and this involves the *intermediate film* system again.

The television images transmitted by short waves are picked up on a short-wave receiver and caused to act on a Kerr cell or *light valve*. This acts to modulate the light from another source such as an arc, which is optically focused by lenses onto the moving film as shown in the diagram. The film then passes on out into the developing, fixing, and washing tank of the new high-speed type and emerges from the drier; all of which occurs in a period of something less than *two minutes!*

The film, containing regular movie images on it now, together with the *sound-track* is then passed through a regular theater film projector and the scenes are flashed on the screen in the usual manner.

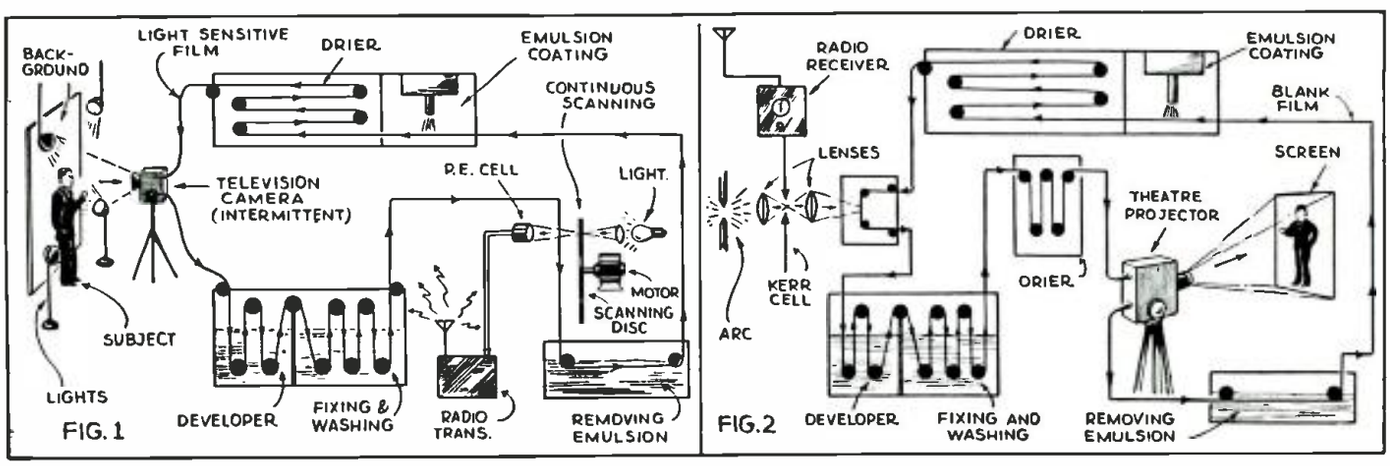
If the continuous loop plan is used, then the film passes through an emulsion-removing solution, passes back into an emulsion-coating chamber, and then into the drier.

In some cases continuous supplies of new film are used instead of the loop method, the latter requiring only about 100 feet of film however, and recommended from the economy angle where records of the scenes are not desired for "repeat" performances.

One of the excellent features of this *intermediate film* idea in television is that the sound can be picked up *simultaneously* with the pictures. When the television images are picked up at the receiving station, all on a single wave-length, the sound-track as well as the picture image is recorded on the film and, when the film emerges from the developing, fixing, and drying system, we have a *complete* "talkie" film, ready to shoot through the projector and onto the theater screen.

The development work accomplished to perfect this *intermediate film* system

(*Continued on page* 497)

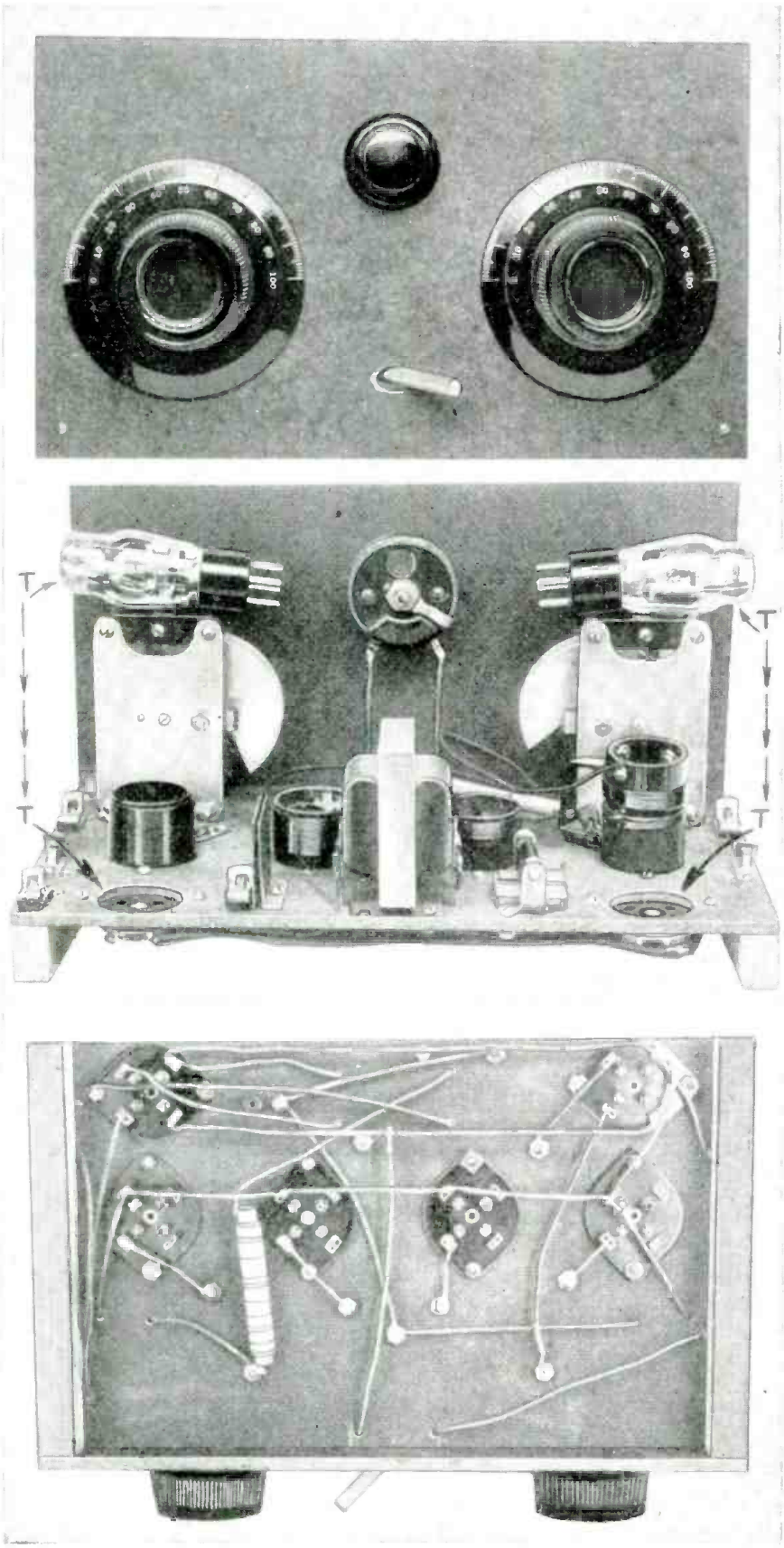


Diagrams above show clearly the method followed in transmitting (Fernseh A.G. system) and receiving television images by means of the intermediate film method, in which the image is photographed on film, rapidly developed, fixed, and dried, then projected onto a screen the same as a regular movie.

The Periphone Master

By Walter C. Doerle

Inventor of the famous "original Doerle" Circuit.



● THE outstanding fact in our various fields of knowledge is that compromise must be made between what the professor prescribes and what the layman uses. And if you venture even ankle-deep in short-wave radio, you too will find the teeter-board effect playing in your affairs—if something goes up, something else comes down. Remember your old physics of the common lever? The same applies to short waves. And coming more closely to a well-known fact, do you remember how in the old days of radio, everyone was trying to gain great volume and split-hair selectivity?

But we must continue in a more delightful vein and give you the real dope on this short-wave receiver. And we might as well be frank with you for the name of this set will make you master of the various fields of short-wave listening—that is, as "periscope" means "seeing all around," "periphone" in short waves will enable you to "listen all around."

And now that the author has seen the Short Wave Scout Trophy add much beauty to a modest living room, certainly it behooves you to make the set which will reward you with short-wave stations, and the award of this highly coveted prize.

Procedure of Construction

This *2-tube battery set*, which in all respects combines efficiency, good appearance, inexpensive construction and operation, easy availability of the parts, simplicity of construction, exceptional ease of operation and change of wavelengths (from 15-210 meters), will prove to you the greatest short-wave receiver of any of its kind in any of the above-mentioned facts.

As an old philosopher framed the adage "procedure is a process modified by human intentions," and so we use the word "procedure" here very wisely in that you are not making the short-wave set as a matter of course, but as a material thing by which your short-wave pleasure may be greatly increased. Therefore you are intent upon getting this set going.

Front View of the Set

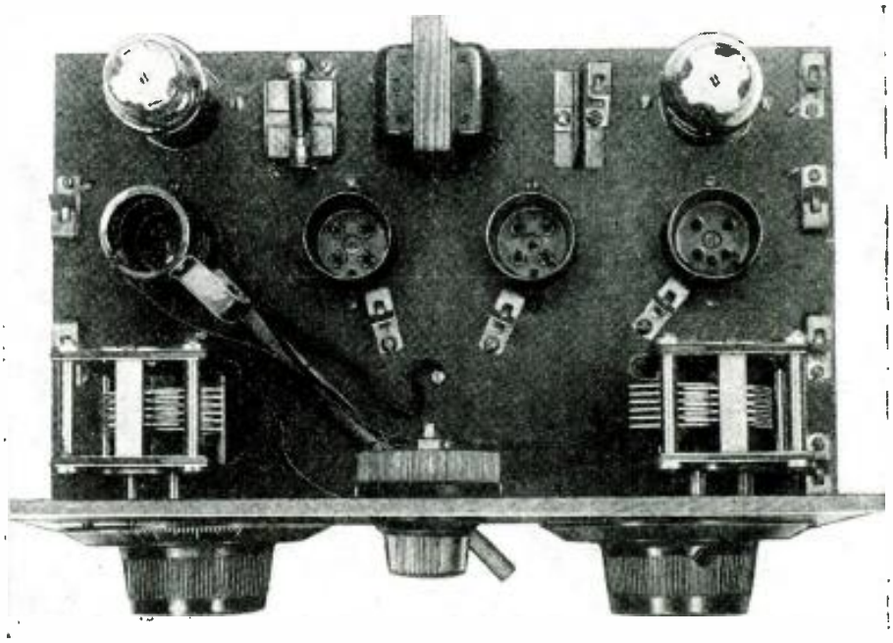
Like the many pictures you see of radio sets in general, the real but only apparent view of the set is represented by the photo of the control panel and in many cases this makes the basis of sales. So to be in line with modern tendencies, the panel view is shown and it has been arranged to feature the ease of operation.

The large dials were especially used because the torque required for *tuning*

Three photos at left show—top to bottom—front, rear, and bottom views respectively of the newest Doerle creation—the "Periphone Master"—a 2-tube battery receiver.

2-Tube Battery Set

Mr. Doerle, already well-known to our readers, here presents his latest brain-child—the "Periphone Master." This is a simple, easily constructed 2-tube battery-operated receiver. It has 4 coils to cover all the usual short-wave bands, from 15 to 210 meters. Two dry cells or 1 cell of storage battery supplies the "A" current; the plate current can be taken from a 90-volt "B" battery or a good "B" eliminator.



Top view of the "Periphone Master"—just the receiver for the beginner. A switch connects any one of the different hand coils into circuit.

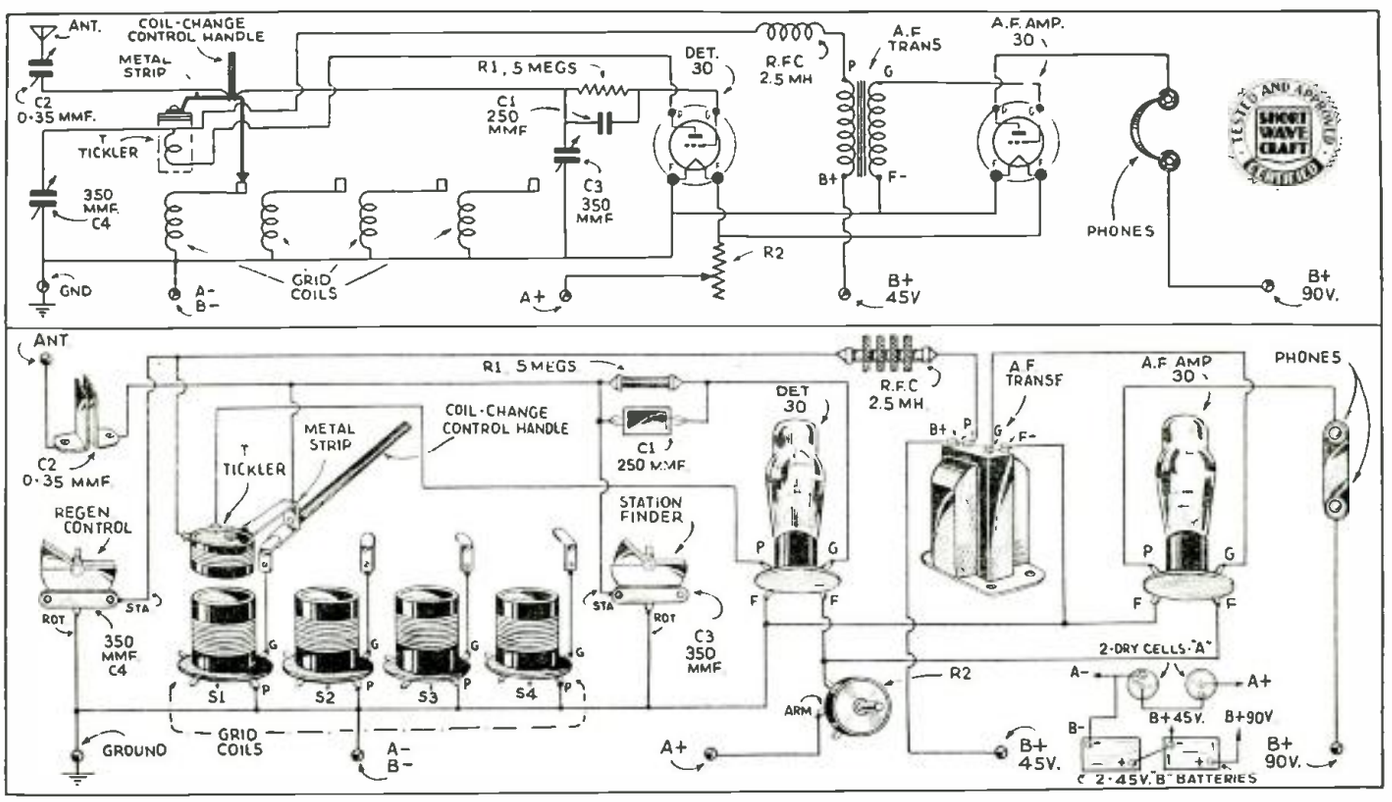
in the stations by means of the left-hand control, and securing the proper amount of *regeneration* by means of the right-hand control, is considerably small as you are exerting a twisting force at a greater lever-arm distance. This automatically does away with expensive micro-dials.

The top knob is the *control for the filaments* and represents a 10-ohm rheostat, the movable arm of which is advanced a small amount as your two dry-cell batteries get weaker with use. You will find by actual operation, the best place of setting the rheostat when you are enjoying the short-wave programs coming in on the set.

The small ¼" dia. dowel projecting toward you through the slot in the panel is the simplified switching arrangement (coil-change control handle in the circuit diagram) for changing wavelength, moving of tickler coil T, and connecting the antenna condenser C2 to the proper secondary coil. As seen in another photo, we have four such secondary coils (S1, S2, S3, and S4) varying from each other in the number of turns of wire on old tube bases, but portrayed in the wiring diagram by using various number of "loops."

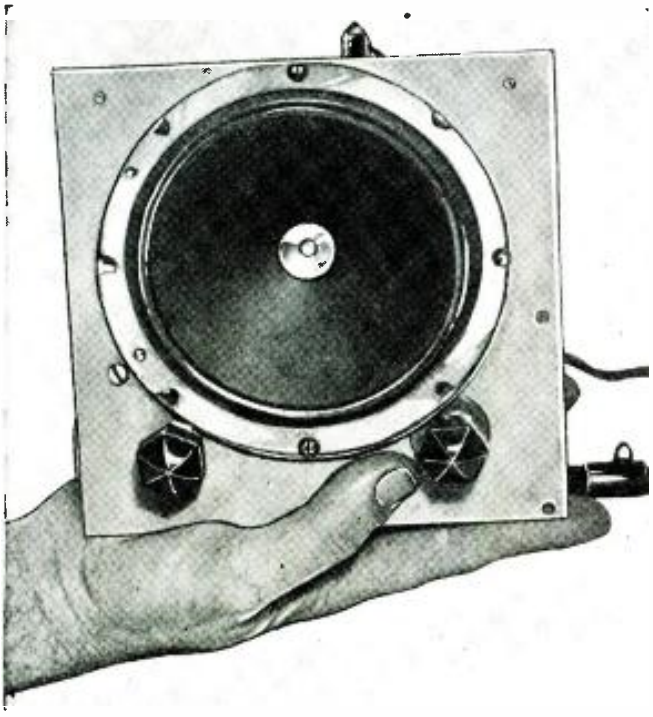
The four controls are mounted on or through the panel which is 7"x12"

(*Continued on page* 490)



It's easy to wire up the "Periphoce Master"—with the aid of these simplified wiring diagrams. The circuit involves the use of a regenerative detector and a transformer-coupled audio amplifier stage. The tubes are of the 2-volt type.

MIDGET A.C.



Front view of the "3 tube = 4" receiver illustrated on the front cover. Note small size compared to hand.

● HERE is an interesting little set for the set builder who believes that good things come in small packages. The entire set is only 6" x 6" x 4" deep, but nevertheless, it is equipped with a magnetic speaker, earphone connections, antenna control, regeneration control, and switch and practically all of the other refinements incorporated in sets twice its size. The set is also very light in weight and can be fitted into a very small carrying case. It employs Hammarlund plug-in coils, which permit it to be tuned over a range from 17 to 560 meters through the use of five coils.

Works Loudspeaker or Phones

Among the set's special features may be mentioned the new 12A7 tube, whereby the second audio stage and rectifier are combined in the one tube. Naturally with two stages of audio amplification, this set will operate a loudspeaker very well on strong stations. The earphone connections at the top of the speaker are mighty handy for tuning in distant short-wave and foreign stations.

Nothing sensational is claimed for this circuit, its principal features being compactness, light weight and simplicity. For the experimenter who has tired of the conventional 1- and 2-tube circuits, it offers interesting possibilities and still the circuit is straightforward enough to assure a successful job, even with a limited amount of experience.

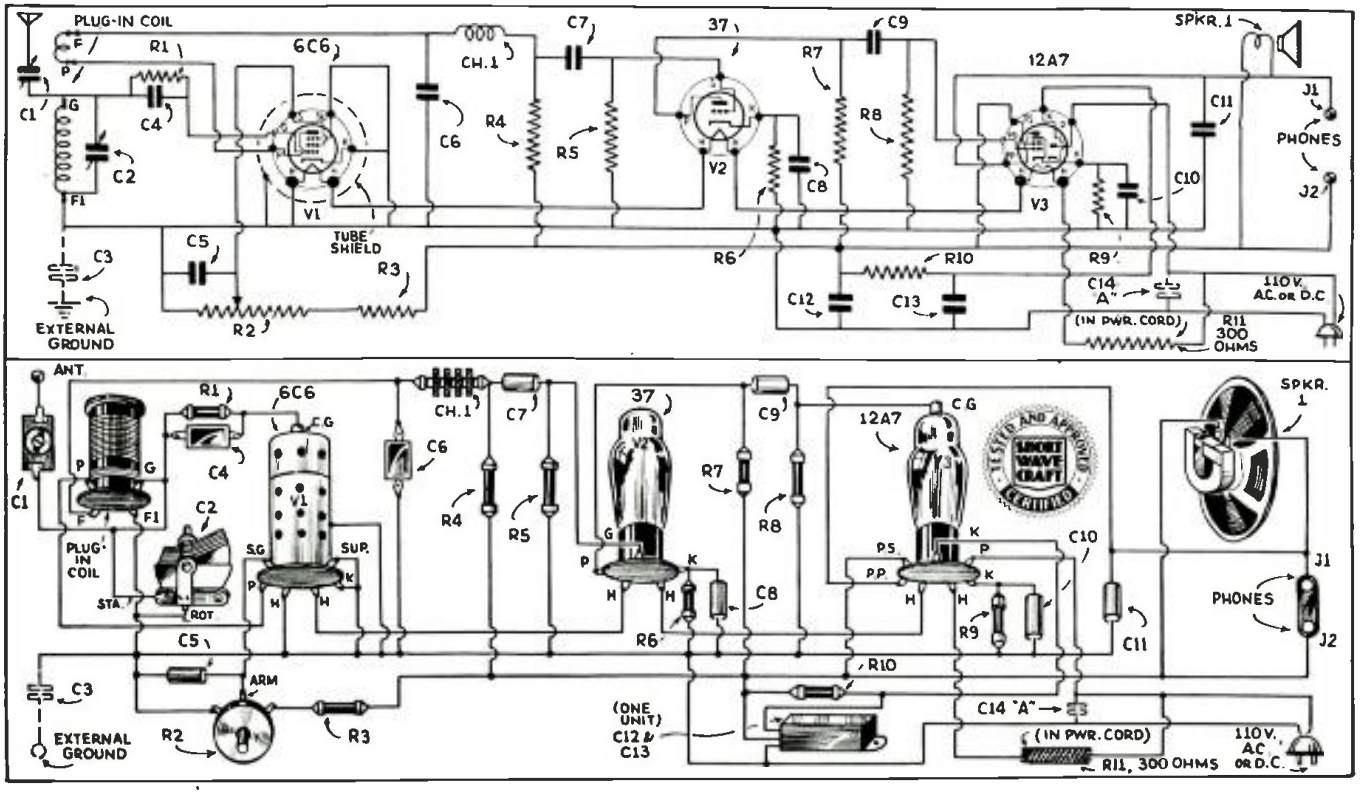
The 6C6 tube is used as a regenerative detector. By varying the 50,000-ohm resistance in the screen-grid circuit of this tube, the regeneration is adequately controlled. A 2½ millihenry R.F. choke by-passed by a .0005 mf. condenser keeps the R.F. currents out of the audio stages. The plug-in coil is tuned by a .00014 mf. Hammarlund condenser of the compact type. A small trimmer condenser in the antenna circuit insures selectivity on the broadcast range and aids in the tuning when the short-wave coils are used.

A 37 tube is used in the first audio stage. This is coupled to the 6C6 tube using resistance coupling. The pentode portion of the 12A7 is used as the second audio stage. This is also resistively coupled to the 37 tube. The diode of the 12A7 serves as the rectifier. This will be made quite clear by referring to the schematic diagram.

Set Works on A.C. or D.C.

Since this set uses the universal A.C.-D.C. circuit, it can be used interchangeably either on *alternating* current or *direct* current. The limiting resistance for bringing the voltage down to the proper value for the filament is contained in the line cord. Filtering is accomplished by means of a 10,000-ohm resistor in the cathode circuit of the 12A7 rectifier, by-passed at either end by sections of a dual electrolytic condenser.

The set is constructed on a small metal chassis with the speaker and two controls mounted on the front panel. The



Wiring diagram for the "3 Tube = 4" All-Electric, All-Wave receiver. It operates on 110-volt A.C. or D.C. circuits, and works a speaker on strong signals.

-D.C. SET Works Speaker

By H. G. Cisin, M.E.

This month's $20.00 Prize Winner.

dual electrolytic condenser is mounted on back of the front panel. All other parts are mounted beneath the chassis, with the exception of the antenna trimmer condenser, which is fastened directly to the flexible antenna wire and also with the exception of the grid condenser and grid leak which are fastened between the grid terminal of the tuning condenser and the grid cap of the 6C6 tube.

Assembly Details

In assembling the set, the sockets are secured to the bottom of the chassis and the parts mentioned above are mounted on the panel. The other fixed condensers and fixed resistors are soldered directly into position beneath the chassis, being placed as close as possible to the socket terminals or other terminals with which they are to function. As a result, very little wiring is necessary, probably less than a foot of wire being used in the entire set.

In most ultra-compact radio sets, the lack of space introduces difficulty in soldering the parts in place. However, in this receiver, this trouble does not arise due to the fact

The receiver illustrated on our front cover is a dandy little set and works a loudspeaker on strong signals; phone terminals are provided also. This set uses three tubes to do four things—a 6C6 serves as a detector; a 37 tube acts as the first audio frequency amplifier and a 12A7 acts in the dual rôle of second audio amplifier and rectifier. It represents an extremely compact set for 110-volt A.C. or D.C. operation. All bands, including the 200-550 meter broadcast, can be covered by choosing the proper plug-in coil.

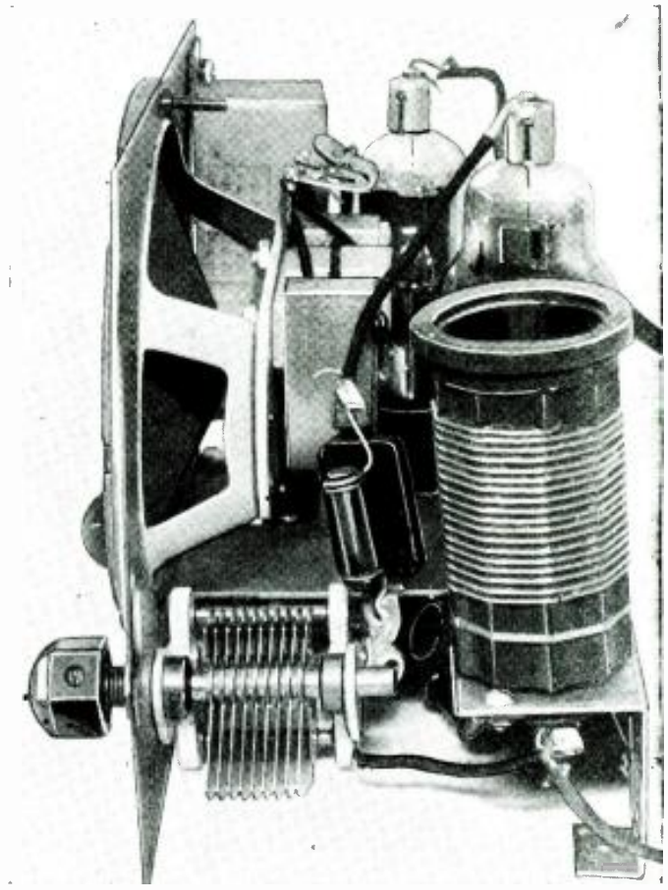
that the wiring is very straightforward and the parts used are limited in number. After the parts have been assembled on the chassis, the filaments are wired in, plates, grids, cathodes, etc., finally fastening on the line cord and the flexible antenna lead. The metal chassis serves as a common negative return and no external ground is necessary. However, if the experimenter insists on using a ground, this must not be allowed to touch the metal chassis directly, but must be attached instead to a .1 mf. cartridge condenser, with the other end of the condenser soldered to the chassis.

Under certain circumstances, it may be found that the set will develop a tunable hum on portions of the short-wave coils—that is, when used on an A.C. source. If this trouble appears, it can usually be eliminated by connecting a .01 mf. cartridge condenser from the switch to the plate side of the line as shown by the dotted lines at "A." In some cases it may even be necessary to experiment with the value of this condenser, reducing its capacity until objectionable tunable hum has entirely been removed.

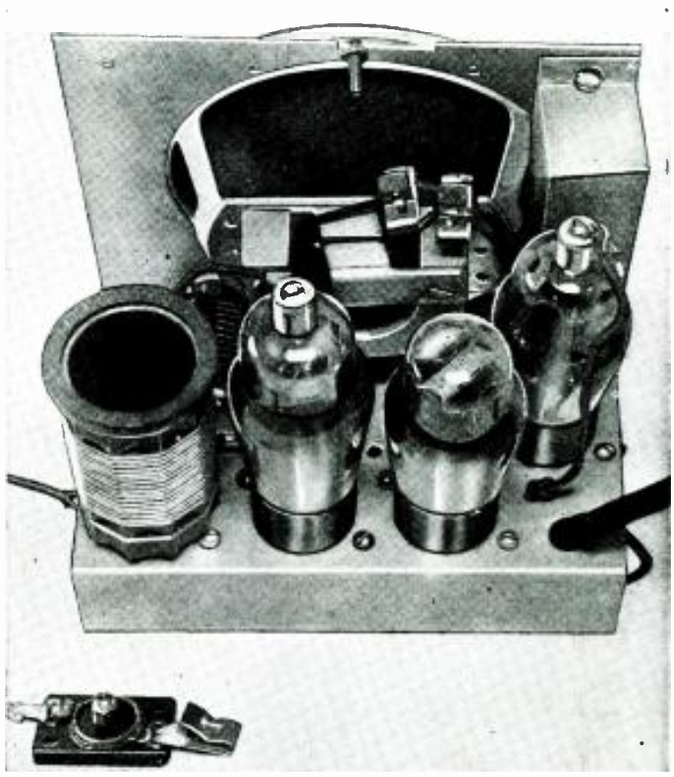
No other troubles should be experienced with this circuit if directions and diagrams are carefully followed. For broadcast reception, almost any type or length of antenna can be used. For short-wave stations, however, it is suggested that the total length of the antenna be limited to from 30 to 50 feet.

One last word of precaution as to the tubes. The 6C6 tube and the 37 tube have been coming through quite uniformly. However, it has been the writer's experience that the 12A7 tubes vary considerably in their performance characteristics. It is suggested therefore, that when this tube is purchased, it be tested with extra care.

(*Continued on page* 489)



End view of All-Electric All-Wave receiver, showing main tuning condenser and plug-in coil.

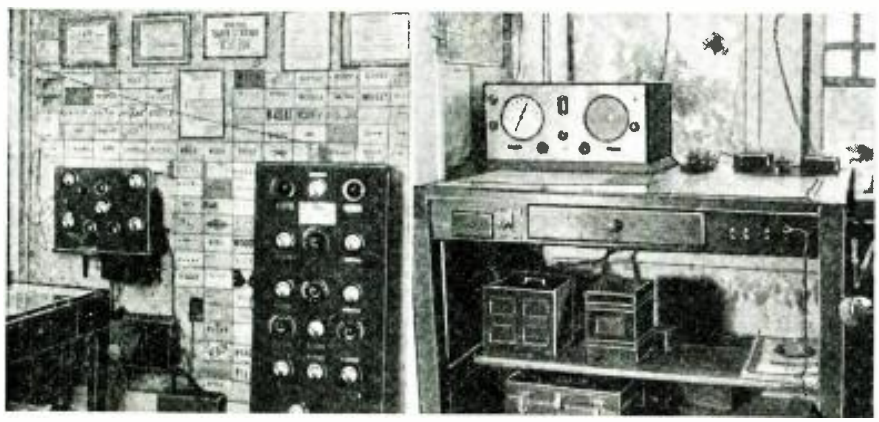


Rear-top view of receiver, showing the three tubes in place. The antenna connects to the small series condenser at the left.

SHORT WAVES and

Hugh Gordon, W5DDW, Has Tip-Top Ham Station

Awarded This Month's Prize



The prize this month goes to Hugh Gordon of Duncan, Okla., for his excellent Ham station.

Editor, SHORT WAVE CRAFT:

Herewith some pictures of my radio station W5DDW, which I would like to enter in your contest.

The transmitter on the left is a crystal-controlled job, using a 47 tube as oscillator, a 47 as a doubler, and a pair of 46's as the final amplifier, with about 20 watts input. This rig has been on the air for about two years and has not given a bit of trouble. It is used on the 80-meter CW band on a frequency of 3603 kilocycles.

The transmitter on the right is a 50-watt job, and uses a 47 crystal, oscillator, a 46 as the first doubler, and a 841 as the second doubler, and a 830 as the final amplifier, with about 130 watts input, and is equipped with the Collins antenna filter system. This "rig" is used on the 40-meter band.

The receiver is a Super Sky-Rider 7-tube with the crystal for single-signal work.

The transmitters are controlled from the operating table by the switches seen on the table. The storage battery is used to operate the keying relay and audio oscillator, and relays for remote control during the wintertime, when it is too cold to go in the radio room, from the owner's bedroom.

The antenna system is a 40-meter Zepp, with masts 40 feet high and is 66 feet long. It is matched in impedance by the Collin's Filter system.

This station is a member of the Army Amateur Radio System and handles lots of traffic during the operating season of the AARS and is also a member of the American Radio Relay League, and is an Official Relay Station. When operating in the Army Net it is on a frequency of 3512.5 kc., which is a spot that several stations work on with a net control station to speed up traffic handling.

Hugh Gordon, W5DDW,
606 North Eighth St.,
Duncan, Okla.

(Congratulations, Hugh, and you certainly have accumulated a fine collection of QSL cards. Your station is very neatly arranged, and it looks like real business. To become a member of the Army Net is certainly a fine honor, and one which all of our amateur operators should strive to attain.—Editor)

GOOD NEWS FROM SOUTH AFRICA

Editor, SHORT WAVE CRAFT:

I must tell you how pleased I am with the *Duo-Amplidyne* circuit which you published in *Short Wave Craft* for June 1934.

I have used this circuit in the first wireless set I have ever made, and I must say that it is successful, far beyond my fondest hopes. When I started on it, my people said that I was wasting my time, and I would be lucky if I got anything on it, and I must say that the very most I expected to obtain was Zeesen or Daventry. Imagine my surprise when last Friday morning I heard an announcer say, "This is KDKA, Short Wave W8XK calling; the time is now twenty-five to eleven."

Why! I nearly fell out of my chair! Daventry, Zeesen, and Paris (FYA), are easy on 25 meters. I can also get Daventry on 31 and 49 meters with ease and Zeesen is also easy on 49 meters.

The local stations, Johannesburg, and Durban come through fine on 49 meters and the amateurs in the 40-meter band are easy as shelling peas. Last Sunday, I logged ten amateurs in an hour and a half from all over South Africa.

I am an ardent reader of *Short Wave Craft* and I can hardly wait a whole month for the next issue. I must say that it is a "hot number," but there is one suggestion I would like to make: Could you please state a price for overseas readers when you advertise your various manuals, such as the *"Official Short-Wave Radio Manual," "Ten Most Popular Receivers,"* etc?

By the way, will you please note that the results obtained with the *Duo-amplidyne* are subject to favorable weather conditions, as you most probably know. Well, I must close now with the best wishes for

(Continued on page 504)

G5ZJ—The Voice of "Television"—London

● THE apparatus is built on commercial lines in rack formation and consists of the following line-up: In the bottom panel a 500-volt power-pack for the C.O. and F.D. stages and a 1,500-volt power pack for the sub-amplifier and push-pull P.A. valves.

In the second rack is the speech amplifier and modulator with separate power packs, one giving 500-volts and the other 1,500-volts. The speech amplifier consists of 11,000-ohm triode valve R.C. coupled to a 5,000-ohm triode, which is in turn transformer-coupled to a pair of medium impedance valves in Class B. These are all fed off the 500-volt power-pack.

The modulator consists of two ES75H's—carbon anode triodes—in Class C, giving just under 100-watts of audio frequency. Oil-immersed condensers are used throughout and are rated at 2,000 volts working.

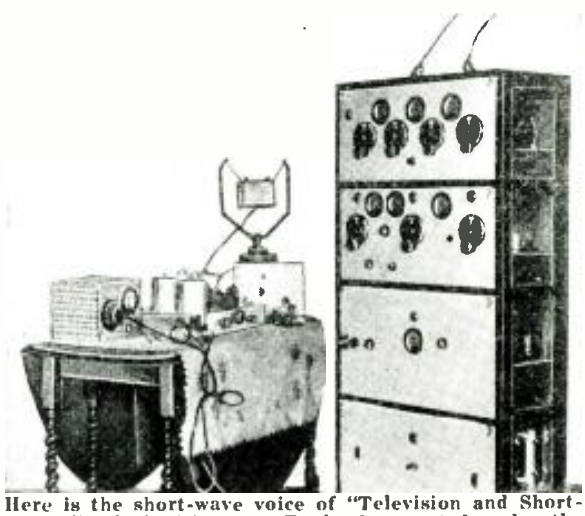
Provision is made for a master volume control of both gramophone and microphone while a dual tone corrector attenuates either bass or treble at will.

In the third rack is the pentode C.O., triode, F.D., and a 75-watt triode sub-amplifier. Capacity coupling is used between the first two stages but the 75-watt amplifier is link-coupled to two carbon anode triodes in push-pull. These are on the top rack and operate between 100 and 230 watts input, being fed into a half- or three-quarter wave Hertz aerial through a Collins coupler. Maximum input with 100 percent modulated phone transmission is 130 watts, rising to 230 on C.W.

Frequencies used are 7135 kc. and 7120 kc., 14,240 kc. and 14,270 kc. A frequency of 1801 is used on 160-meters and 3560 on 80-meters.

Reports on this transmitter will be appreciated and all reports will be acknowledged by card.

Kenneth Jowers, *Short Wave* Editor,
Television and Short Wave World,
Chansitor House, 37-8 Chancery Lane,
London, WC2, England.



Here is the short-wave voice of "Television and Short-Wave World," of London, England, operated under the call letters G5ZJ. If you hear them send in a report to Mr. Jowers.

LONG RAVES . . . OUR READERS' FORUM

OUR "2 TUBER" A WINNER

Editor, SHORT WAVE CRAFT:

I built the Victor "*Easy-Tune*" *2 Tube Band-Spreader* which was described in the June, 1934, issue of your magazine, and I wish to report some of the results that I have had with it. It was the first set that I had ever built, and I had some trouble at first getting the coils to work properly, but after that I really got results! A friend of mine here in town told me that it wouldn't even get Canada. When I told him what I had gotten on it, he wouldn't believe me till I showed him some verifications that I had gotten from Europe.

Some stations that I have received are 2RO, DJ1), GSD, CJRX, CJRO, IIJ4ABA, EAQ, HP5J, HP5B, GSC, DJN, GSB, PRF5, COH, XECR, HC2RL, VE9GW, VE9CA, COC, XEBT, YV5RMO. Numerous transatlantic phone stations have been received. Also many Hams on the 20-meter band from both South America and Mexico. All North American broadcast stations have been received.

I had only 90 volts on the plates and a single wire aerial. The aerial was about 40 feet long.

I have been reading your magazine for about two years and I really do enjoy it.

Charles Emerson Hall,
Box 313, University, Mississipi.

(We are very glad, Charles, that you had such fine success with the "Easy-Tune" 2-Tube Band-Spreader. It is quite surprising, indeed, to see what a good 2-tube set can do as the fine "log" of stations included in your letter testifies.—Editor)

A "LIVE" HAM STATION

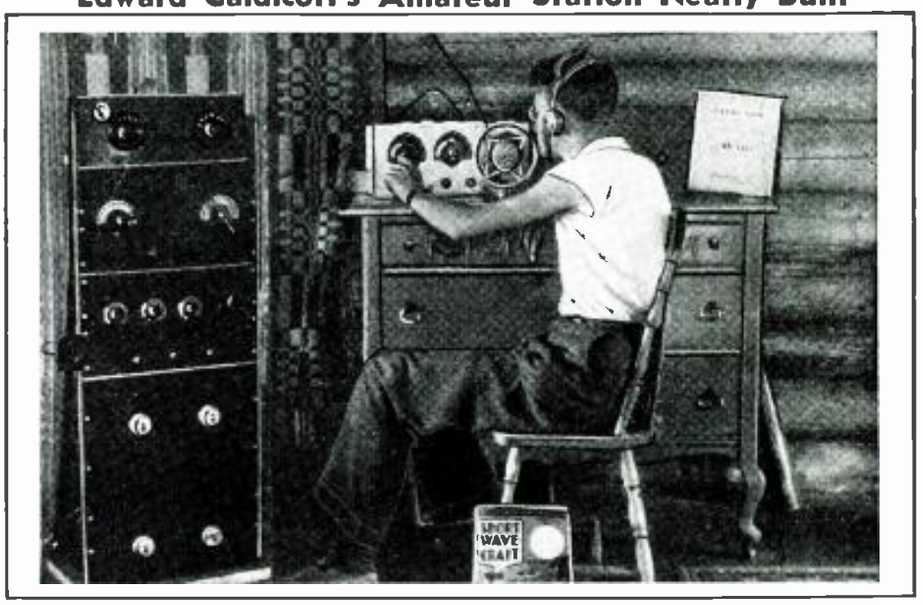
Editor, SHORT WAVE CRAFT:

I just got through reading your wonderful magazine *Short Wave Craft*. After looking over some of the photos of "Ham Rigs" I decided to send you a photo of my *flea-power* rig. The photo shows the "O.M." enjoying a F.B. rag-chew. Hi! Hi! It is a T.N.T. with a single 112A receiver tube, with about 10 watts input. The most unusual thing about my rig is my power supply, which is two Ford coils powered from a 6-volt storage battery and really works very fine business. I get x-tal D.C. reports on all of my x-missions. I have worked all districts on both 40- and 80-meter bands in the past eight months, including a few "VE's." The x-mitter is located on top of my desk built in an old receiver cabinet.

(*Continued on page* 504)

Here is a real live Ham station, W4DEO, through which a pile of traffic is carried regularly. Emmett Smith is the operator.

Edward Caldicott's Amateur Station Neatly Built



Edward Caldicott is a neat constructor, as the photo above of his transmitter and receiver testify.

Editor, SHORT WAVE CRAFT:

When *Short Wave Craft* was published only every two months, I started to read it. Now that I am a "licensed ham," it is about time that I sent in a picture of my "rig."

The present set-up, as shown in the photo, is built on steel relay rack panels and sub-bases, mounted temporarily in a wooden frame. The bottom panel is the high voltage supply, giving 1250 or 1600 volts, as desired. Above that is a low voltage supply, about 550 volts, and the filament supplies. The third panel carries the exciting units, a 59 tri-tet, second 59, and a 210, all unity-coupled. The 210 is link coupled to the final stage, in the top rack. It is a pair of 800's. At the very top is a temporary antenna coupling unit, mounted on a bakelite panel. The meter is an 0-200 milliammeter, with a jack for plugging into any stage desired. Input on 20 and 40 meters is from 200 to 275 watts.

The latest addition is the relay rack panel at the extreme right, on the table. It is a 2-stage audio amplifier, and is used to grid-bias modulate the pair of 800's. The output on 20-meter phone is about 35 watts. Very excellent results have been obtained with this inexpensive phone set-up. In the middle is the receiver, a 7-tube super-het. In front of it is the microphone.

The station is operated during June, July, August, and September in Maine under the call W1ICB, and the rest of the year as W2GVX in New York City.

Any inquiries will be gladly answered.

Edward Caldicott.
Lucerne, Maine.

(Mighty fine construction, Edward. You should obtain very excellent results with this transmitter and receiver. Undoubtedly, you will hear from many other Hams and Fans. We note that you have a home-made 7-tube super-het, and if it contains any new wrinkles, be sure to write an article describing them, together with the circuit, and send it to the editor.—Editor)

He Finds Indoor Aerials Fine!

Editor, SHORT WAVE CRAFT:

I buy your magazine occasionally. I have just been reading the October, 1935, issue. I have no doubt you are trying to be helpful to your subscribers by your editorial "*Don'ts for Short Wave Listeners.*" I would not wish to take the responsibility of denying, or even objecting to, advice so well meant and well stated by an expert. I am merely somewhat puzzled by your positive stand against indoor aerials, without qualification. My success with them is such that I have practically given up the idea of getting an outdoor aerial.

I have tried outdoors from the single-wire type to the R.C.A. double doublet and at heights from about seven to about thirty-five feet from the ground, horizontal, semivertical, and vertical in lengths from about thirty-five feet to about ninety. I have tried several kinds of indoors, perhaps the best results being with copper wire screen formed into cylinders six to nine inches in diameter. I gave the 6-inch cylinder to a neighbor having a Montgomery Ward "two-band" set and he liked it so well that he quit using his outdoor, although he has only recently learned that he can get London No. 6 transmission on it quite well. I listen to London No. 6 frequently, No. 5 occasionally, and some of the others a little on my 9-inch cylinder.

Just at present I have both it and one of my outdoor single-wire antennas attached to the antenna terminal. One evening recently No. 6 transmission came in nicely on this 9-inch, on another indoor of different type, on a 35-foot horizontal outdoor, seven feet from the ground, and on a 60-foot inverted V outdoor. I tried them one at a time and with the above noted combination, which I thought slightly better than anything else for London. I have had Daventry on several different frequencies but it seems most likely to be good here on 9.580. W2XE seems to be better on the outdoor horizontal (the 11.830 frequency) than on any of the other three

(*Continued on page* 504)

The HAM and FAN "BAND-SPREAD-2"

By Art Gregor

Here is a real nifty 2-tuber for the short-wave fan or Ham, using a screen-grid pentode detector and a pentode audio amplifier. The coils are designed so that each band that a particular coil covers is spread over nearly the entire dial. Complete details of the set, together with data for constructing special coils, is given in the accompanying article. Foreign amateur and broadcast stations are received with fine volume on this "2-tuber."

● RECENTLY a friend of ours stopped in to see us and wanted some dope on a receiver. This fellow was a young budding Ham and wanted a set that could be used for "foreign" broadcast reception and also for the "Ham bands," the latter, so that our friend could listen to the hundreds of amateurs conversing with each other and so catch-on to the Ham "lingo" and by degrees learn the code and as a result obtain a Ham license.

This lad wanted the dope on a receiver that only used two tubes and generally came up to the standard of the best regenerative receivers. As he was going to use it in the crowded foreign broadcast bands and the equally crowded Ham bands, the set had to have band-spread. The regeneration control must work smoothly, it should be very sensitive and not the least bit "fussy" in operation.

Of course the detector had to be a screen-grid pentode and the audio amplifier likewise a pentode in order to obtain maximum efficiency. The receiver, incidentally, was to work with a 6-volt A battery eliminator and a B-eliminator; this dictated the use of 6.3 volt tubes. He wanted plug-in coils and only as many as necessary, too. The final arrangement decided upon was tried out and gave such fine results that it was borrowed for the purpose of preparing this story.

This receiver, which we choose to call the "Ham and Fan Band-Spread-2," is really very simple to build and economical to construct and operate, and serves the purpose for which it was intended, viz., for the Ham and broadcast bands, to be used by a beginner for example.

To start with we used a chassis of steel, coated with black crackle enamel (these chassis can be bought from any radio parts supply house), for rigidity and the shielding thus provided. For the half dollar or so that this chassis costs it is, in the long run, much cheaper than building the set on wood or bakelite, because there are no body-capacity effects and the set "stays put"; that is, when you tune in a station and prepare to do some copying, a slight jar doesn't change stations for you, a rigid receiver is half the battle against QRM.

Nothing in this receiver is homemade for the simple reason that at the current low prices, it is really cheaper to buy the parts than to build or make them. Even the coils were purchased ready made, although a minor alteration was necessary in order to accomplish the purpose of this receiver. The coils are the new Hammarlund SWK-4 kit and cover from 17 to 270 meters. This receiver does not or rather is not intended to cover the whole short-wave spectrum.

These coils are designed so that a small Hammarlund padding condenser may be mounted directly inside of the

The "Band-Spread-2" is simple to build and easy to tune.

coil form. The padding condenser in this case happens to be 100 mmf. in capacity and is connected in parallel with the grid coil. In order to obtain *band-spread* a very small tuning condenser is used as the main tuning control. When adjusting the receiver the padding condensers are set in each coil so that the particular band that is desired appears within the range of the tuning condenser. For instance, if you wish to operate in the 49-meter broadcast band, the padding condenser is set so that the center of that band comes at mid-scale of the tuning dial. If the amateur bands are desired the padder is set so that those bands appear on the dial as each coil is plugged in. If you are a S-W *broadcast* fan, the coils are adjusted so that each coil covers the band desired.

The detector used is a type 6D6 or 6C6, whichever happens to be available, and the amplifier is a type 41. These are for a 6-volt heater supply. If the receiver is to be operated from a power supply delivering 2.5 volts, then a 57 and a 2A5 should be used.

Looking at the front of the panel, the antenna trimmer is on the left and the regeneration control is on the right and the main tuning dial is in the center. The back view shows the audio amplifier at the left, the detector on the right, and the coil directly in front of it.

The antenna condenser was located on the panel because it requires frequent adjustment and this would be bothersome if it were at the rear of the chassis.

There is nothing new or different about the circuit. It uses cathode feedback; the tickler is in the cathode circuit, instead of in the plate circuit, adding much to the stability of the receiver. The regeneration is controlled by varying the screen-grid voltage through the use of a potentiometer. This is by-passed with a 1 mf. condenser in order that it will be smooth and quiet in operation.

The detector is resistance-capacity coupled to the audio frequency amplifier stage. A high impedance choke could have been used in the plate of the detector, with a slight increase in amplification and a corresponding increase in cost over the resistor-condenser combination.

The audio amplifier tube being a pentode draws quite an amount of current and as earphones are to be used it is advisable to use an output coupling device of some sort. The best arrangement is a regular output transformer with the phones connected through a condenser. If the phones are operated directly in the plate circuit, the plate voltage should be kept below 150 volts or the phones will not last very long (be burned out).

For those who desire to make a complete short-wave installation with this set, we have shown the diagram of a suitable *power supply* unit which will furnish the *heater voltage* as well as the "B" voltage. If care is exercised in construction of both the set and the power supply, there should not be the slightest trace of "hum" in the phones.

The antenna used with this set was just an ordinary single wire affair about 75 feet long and 30 feet above the ground. This length seems to be about optimum for the various short-wave *Ham* and *broadcast* bands, although for the *Ham* bands an antenna 65 feet long should give better results.

The power-supply requires a transformer delivering 500 volts center-tapped, 6.3 volts and 5 volts. Three 8 mf. condensers, plus the two filter chokes, give practically *hum-less* performance. The 15,000 ohm bleeder resistance is essential if good stability in the receiver is expected. The power supply should be built on an aluminum or steel chassis for best results. Further details of such a power-supply will be found in the July '35 issue, page 140.

Complete coil data is shown in the table; whether you wind or buy your coils you need this data, because as we said before, the manufactured coils have to be altered slightly. We hope that you have as much success with this set as our friend had. Drop us a line and let us know how you like it.

PARTS LIST

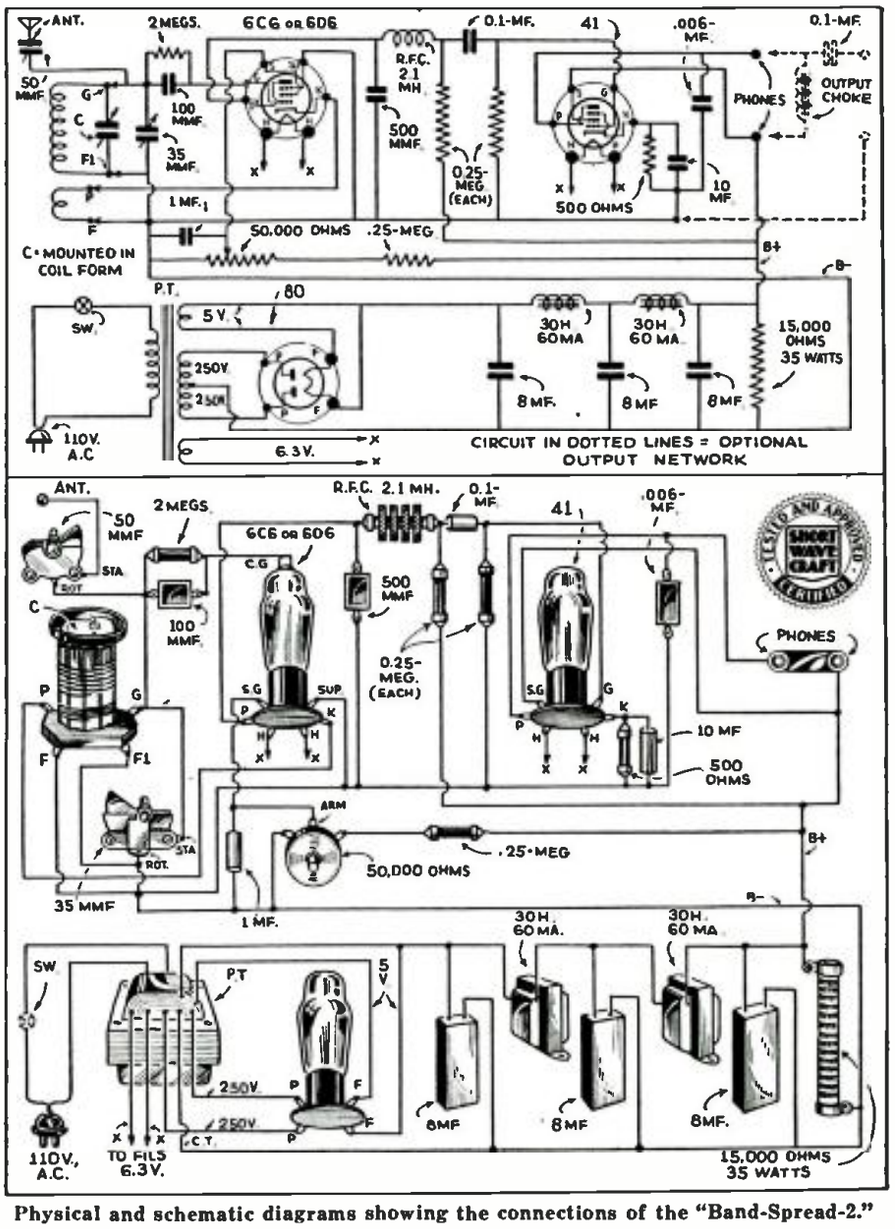
1—crackle-finished 2-tube chassis.
1—set Hammarlund plug-in coils.
4—100 mmf. Hammarlund A.P.C. condensers.
1—35 mmf. tuning condenser, Hammarlund.
1—50 mmf. A.P.C. Hammarlund.
1—.0001 mf. condenser Aerovox.
1—.0005 mf. mica condenser Aerovox.
1—.006 mf. mica condenser Aerovox.
1—.1 mf. condenser Sprague.
1—1 mf. Sprague.
1—10 mf. electrolytic condenser Sprague.
1—2 meg. ½ watt resistor I.R.C.
2—¼ meg. ½ watt resistors, I.R.C.
1—500-ohm 1 watt resistor, I.R.C.
1—250,000-ohm 1 watt resistor, I.R.C.
1—50,000-ohm potentiometer, Electrad.
1—6-prong Isolantite socket, Hammarlund.
1—4-prong Isolantite socket, Hammarlund.
1—6-prong wafer socket, Na-Ald.
1—4-inch Vernier dial I.C.A.
1—6C6-tube
1—41-tube.
1—2.1 MH. R.F. choke Hammarlund.

Coils altered to the following specifications

ORIGINAL COIL	grid turns	Bands used for—
17— 41 meter	8	19 m. BC., 20 m. Ham
33— 75 meter	15	25-31 m. BC., 40 m. Ham
66—150 meter	30	49 m. BC., 80 m. Ham
135—270 meter	as is	Police and 160m. Ham

The tickler coils generally need no changing; if detector oscillates too much, remove one turn at a time (from tickler) until proper results are obtained.

(Continued on page 509)



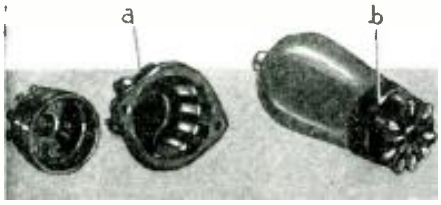
Physical and schematic diagrams showing the connections of the "Band-Spread-2."

WORLD-WIDE SHORT-

New Tube Bases in Germany

● A NEW situation has come up in Germany with the introduction of a new line of tubes with contacts on the side of the base in place of the usual prongs. These new tubes require special sockets to accommodate the side contacts, as the illustration from *Magazin Funk* shows.

All the new sets which are being introduced are being equipped with these new sockets, because of a patent situation, by which the holder of the patents forces all



The latest tube base idea from Germany.

set manufacturers to use these new tubes.

Since the tubes are made exclusively by this same company, a situation of monopoly is fast taking hold.

It is hard to say what the result of this monopoly will be in Germany, because of the close alliance between the Government and certain large manufacturers, but there is no doubt that if the present situation persists, the old type of tube base will fast go out of existence.

New Products at Olympia

● AT THE Olympia Radio Show held in London a short time ago, many new products were introduced for the coming fall and winter season.

Included in these new devices were a number which are of interest to the short-wave fan, since they deal directly with short-wave or all-wave receiver construction.

One of these is a tuning unit with a rather novel switching arrangement comprising a hexagonal drum with 15 contacts on each surface and a set of stationary contacts arranged in a row on an insulating strip. This produces a 15-contact 6-position switch which is adequate for most wave-change switching problems.

In the tuning unit, which is for a superheterodyne tuner arrangement, the coils are mounted adjacent to the drum of the switch so that the complete tuner can be shielded

● The Editors have endeavored to review the more important foreign magazines covering short-wave developments, for the benefit of the thousands of readers of this magazine who do not have the opportunity of seeing these magazines first-hand. The circuits shown are for the most part self-explanatory to the radio student, and wherever possible the constants or values of various condensers, coils, etc., are given. Please do not write to us asking for further data, picture-diagrams or lists of parts for these foreign circuits, as we do not have any further specific information other than that given. If the reader will remember that wherever a tuned circuit is shown, for instance, he may use any short-wave coil and the appropriate corresponding tuning condenser, data for which are given dozens of times in each issue of this magazine, he will have no difficulty in reconstructing these foreign circuits to try them out.

in a small-size box. Separaters are inserted between the coils so that each coil is effectively in an individual box, yet the wires to the switch are extremely short as a glance at the illustration will show.

A third item of interest is an English version of a variable-selectivity I.F. transformer. This is also shown (in cut-away fashion) here. The coil movement is accomplished by a "worm drive" arrangement consisting of a twisted rod (which looks like a cork screw) and a flat stationary strip which acts as a guide for the "worm." One coil is secured to the rod so that it moves up and down as the rod is turned by a knob on the end. Several of the selectivity controls can be ganged together by a drum and cable drive.

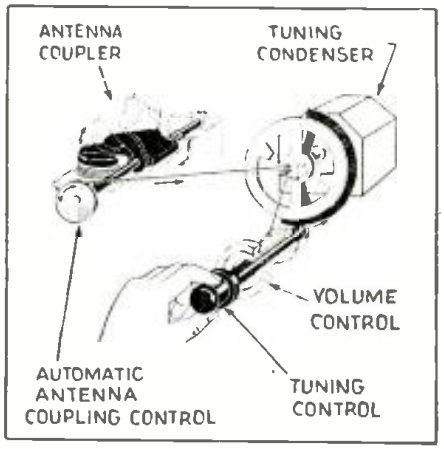
An Aerial Trimmer

● A NEW development from Germany, to insure the most efficient operation of a receiver, was shown at the Berlin Radio Exhibition which took place a short time ago and described in *Funk-Technische Monatsheft*.

It consists of a variable aerial coupling arrangement, shown in the accompanying illustration, so that the optimum coupling is at all times provided. The coils of the aerial coupler are mounted on a shaft that is tied by a strap to the tuning dial, in such a manner that loose coupling is allowed at the dial points where it is needed.

It is claimed that this variable coupling scheme permits accurate tracking of single dial receivers, since it removes the effect of varying load on the grid circuit of the first R.F. tube.

Another advantage claimed for this coupling scheme is that in regenerative sets,



Variable antenna coupling used to aid in tuning receiver.

the regeneration control does not have to be adjusted, since the load on the secondary coil remains constant, so that the degree of regeneration also remains constant. (But the change in L/C ratio still affects regeneration: Editor.)

This is a fine stunt for the experimenter who wants to get the most from his receiver, whether it is a simple plug-in coil arrangement or a complicated all-wave superhet, with band switching. An examination of the sketch shows how the coupling is automatically varied.

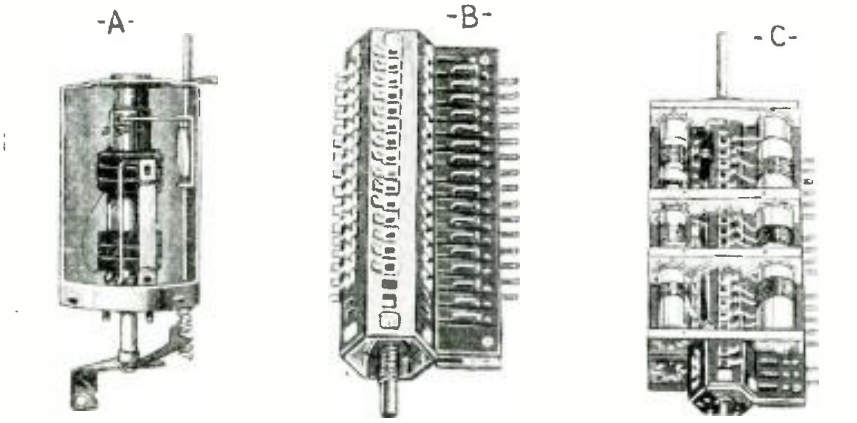
All-Wave Set Kink

● IT IS apparent that radio fans in England are really waking up to the conveniences of an all-wave receiver, compared to the use of two sets or a broadcast set and short-wave converter.

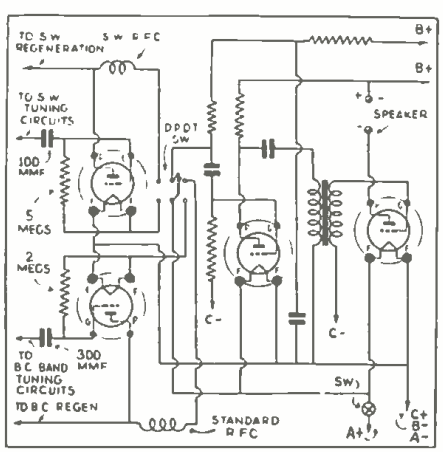
In a recent issue of *Practical and Amateur Wireless*, considerable space was devoted to an arrangement for permitting all-wave results by the use of two tuners, one for the broadcast and long waves (intermediate and long—our English friends call them) and the other for the short-wave spectrum.

A single A.F. amplifier is used, and a double-pole double-throw switch connects the detector output from either tuner to this amplifier. The circuit is shown here for those who may be interested in the methods employed across the "Big Pond."

It will be noticed that battery operation is used throughout.



Items on display at the Olympia Radio Show in London.



A two-channel audio amplifier.

WAVE REVIEW..

Edited by C. W. PALMER

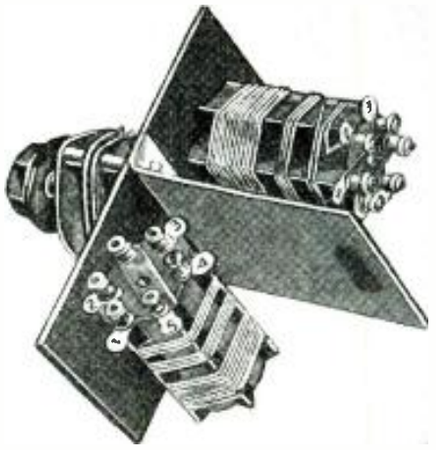
Three-Range S. W. Coils

● A NEW English coil assembly was announced last month by *Wireless World*. This coil unit is designed for regenerative sets having a stage of tuned radio frequency amplification—it contains two coil forms which are shielded from each other by a sheet of copper. The band-switch is mounted on the same assembly, thus keeping the leads as short as possible.

On each of the coil forms, there are three sets of windings covering the three bands from 12 to 80 meters. The aerial coil has one primary and three secondaries, which are connected into the circuit by the band switch. The inter-stage coil has a primary, three secondaries and a plate or regeneration coil.

This coil shows the trend towards the use of band-switching, as used in practically every present-day commercial American all-wave and short-wave receiver. Since the superhet is not as popular in Europe as here, it is natural that their first attempts should be for amateur set builders, who usually construct the regenerative type of set.

It is claimed by *Wireless World* that the flat copper strip between the coil forms provides adequate shielding between them —this may be true if high stage gain is not attempted!



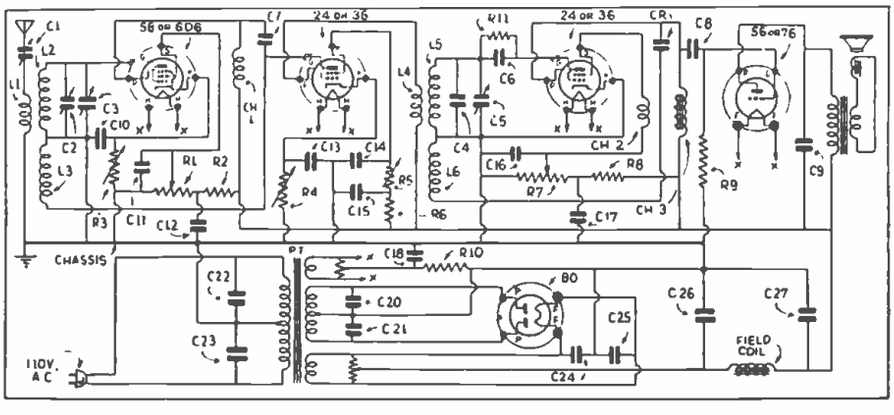
English "three-range" coils.

A German Short-Wave Receiver

● A RATHER novel short-wave circuit of the regenerative type was described in detail in a recent issue of *Bastelbriefe der Drahtlosen*.

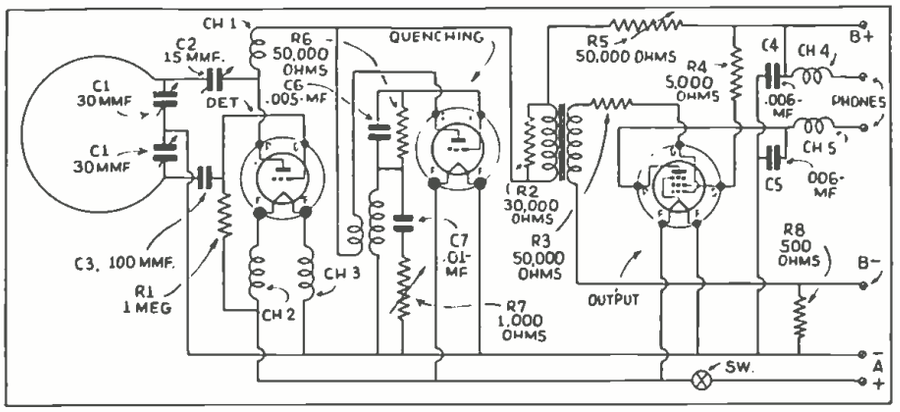
The circuit is shown here for those experimenters who are interested in new circuits. In appearance the set is a simple regenerative type using two stages of R.F. before a regenerative detector and followed by a triode A.F. amplifier impedance-capacity coupled to the detector.

Actually, a novel scheme of introducing regeneration into the first R.F. stage is used to provide high gain and pre-selection. A regeneration coil (L3) is coupled to the secondary of the aerial coupler (L2) and is connected on one side to the chassis and on the other to the grid of the second stage. By so connecting it, the coupling condenser between the two R.F. stages automatically becomes the plate blocking condenser and the regeneration coil acts as a grid choke for the second R.F. stage which is an untuned one. In addition, the use of a large condenser in series with the regeneration coil produces a phase shift which holds down the feed-back within normal limits.



Short-wave receiver popular in Germany.

An Australian Super-Regenerator



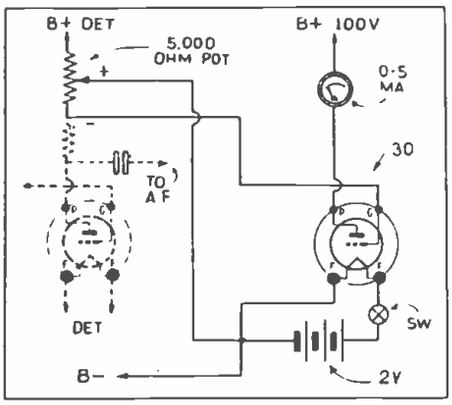
Super-regenerator for 5 meter "field day."

● IN THAT interesting Australian paper —*The Bulletin*—a number of pages are devoted to radio, both technical and news items.

In a recent issue, which we received in our daily mailbag, the circuit of a 5-meter super-regenerative set was published for the use of amateurs who intend to enter the field-day competition soon to take place at Wyong. A radio field day in England and Australia takes the form of a direction finding game in which transmitters are hidden and portable directional receivers are used to locate the transmitters.

The values of the parts used in this super-regenerator are given on the diagram for those who wish to try one. The loop should be made from a circle of copper wire some 10 ins. in diameter. The quenching coils may be two honeycomb coils of about 1,500 turns each. The R.F. chokes may be wound with about 50 turns of number 20 wire on a form ½-in. in diameter.

If you like this department, write to the Editors and let them know. Any suggestions as the type of material you would like to see on these pages will be appreciated.



Tuning indicator suggestion.

A Simple Amplified Tuning Indicator

● THE use of tuning indicators in sets of the superheterodyne variety, especially those containing A.V.C., is becoming almost universal.

However, in small sets, of the regenerative type and T.R.F. type, some difficulty is encountered because the current change is not sufficient to move a tuning indicator over a wide enough range, especially on weak carriers.

To overcome this difficulty, *Wireless World* described, in a recent issue, an amplified tuning indicator that is connected to the plate circuit of the detector tube in any receiver. A low range milliammeter in the plate circuit of the amplifier gives the tuning indication.

The circuit here shows how it is done. A 5,000 ohm potentiometer is connected in series with the detector plate permitting a small amount of the plate current change to be tapped off and fed to a separate tube (which must have its own plate and filament supply) which acts as an amplifier, supplying a plate current indication that varies with the plate current in the detector. Since this plate current varies with changes in the carrier received, a fine indication of tuning results which will work even on a one tube set.

The Barkhausen Oscillator

For Ultra-Short Waves

By F. B. Llewellyn

Radio Research, Bell Telephone Laboratories.

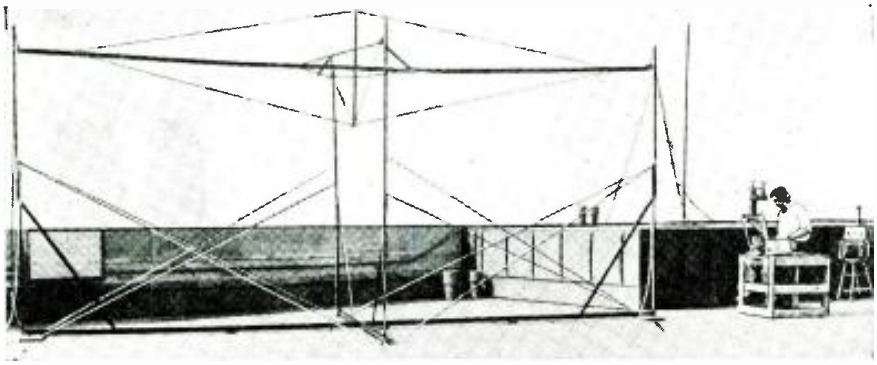


Fig. 5—Photo above shows special receiving lay-out on the roof of the New Jersey Telephone's Building in Newark, N. J., for picking up 60 centimeter waves transmitted from Barkhausen oscillators located in New York City, 8.3 miles away.

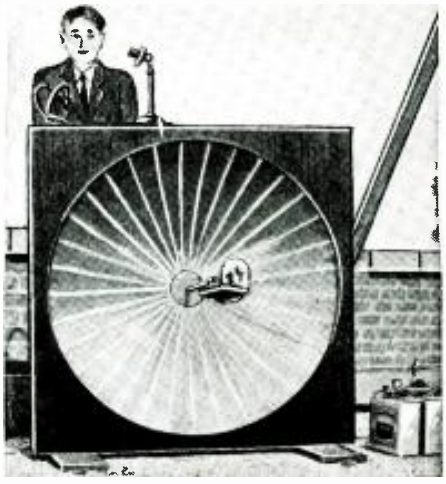


Fig. 6—Some of the ultra short-wave experiments were conducted with 28 centimeter waves across New York City, a distance of about one mile and a half, the Barkhausen oscillator being mounted in a parabolic reflector as shown.

● THE Barkhausen oscillator for ultra-high frequencies has been the subject of many complicated analyses. As with other developments, the history of its theory has gone through three stages; starting with a simple but incomplete concept, advancing through a more and more involved mathematical analysis, and finally yielding the important properties in simple enough form to be stated in everyday language.

The elementary concept upon which the explanation of the Barkhausen oscilator was originally based was that of an electron or group of electrons which danced back and forth through the opening, in a positively polarized grid. Among other things this concept did not show why the number of electrons going in opposite directions through the grid was not always the same. The mathematics which followed led in many cases into strange paths, but finally was placed on a sound basis. When this had been done it was found that the explanation could be made in a perfectly straight-forward way, and that the original concept of the dancing electron contained only enough truth to delay and complicate the process of arriving at the correct answer.

Physically the Barkhausen oscillator consists of a filamentary cathode surrounded by a cylindrical grid and plate, as shown in Figure 1. The grid is operated at a positive potential, the plate is biased to a slightly negative potential, and a tuned circuit LC is usually connected between them.

Electrons starting out from the cathode are attracted by the positive grid, and move with increasing velocity in that direction. Many of the electrons hit the grid, and become of no further concern. Many others, however, pass between the grid wires without hitting them and move toward the

(*Continued on page* 494)

New RCA 200 K.W. S-W Transmitter

● EARLY this coming winter R.C.A. Communications expect to be ready to put into operation a powerful new short-wave transmitting plant at Rocky Point, L. I. The new transmitter will be rated at 200 kilowatts output power and will be the highest powered short-wave station in the western hemisphere. The call letters of the new station will be WEF. At times, engineers of the company have stated, the transmitter will be used for relaying radio broadcast programs to Europe for rebroadcasting purposes, etc. At the present time the transmitting equipment used for trans-Atlantic and other short-wave communication purposes is rated at 40 kilowatts.

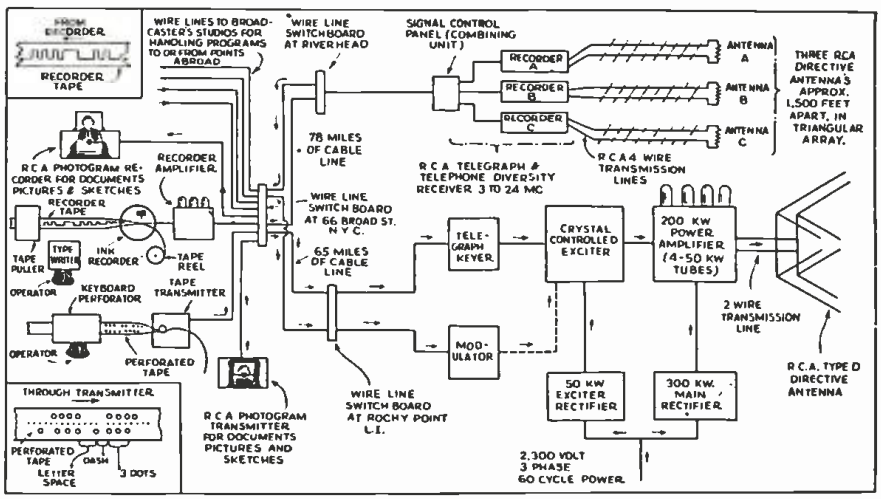
The new high-power transmitter will utilize four of the latest type power tubes, each rated at 50 K.W. output, the tube being made of glass and metal. The new tubes measure about 3½ feet in length and 5 inches in diameter, each end of the tube terminating in a glass envelope through which the grid and filament leads are sealed. The new station will operate on various wavelengths or frequencies, depending upon the season of the year and other conditions. One of the frequencies will be 10,620 kc.

One of the objects of the new transmitter will be to provide better telegraph service to foreign countries and the transmitting speed will also be raised, the signals being perforated on a paper tape by a manual operator, using a key-board similar to that on a typewriter. The perforated paper tape containing the code message is then passed through a suitable keying device so that the signals can be transmitted several times faster than the usual speed of about 40 words per minute, attained by manual transmission with a hand-operated key. Multiplexing will also increase the number of words transmitted and received per minute.

Another object of this new transmitter is to lay down a very powerful signal at all times in Europe, for the purpose of transmitting broadcast programs, plus other important information and radio phone messages intended for rebroadcasting in Europe.

One of the novelties of the new 200 K.W. transmitter is the new rectifier unit, which will not use glass or metal tubes of the familiar types. Instead the rectifier unit itself will be a metal tank containing the necessary electrodes, and the vacuum in this tank will be maintained by a small electrically operated

(*Continued on page* 496)



This picture shows the general layout for the new powerful 200 K.W. short-wave transmitter which is shortly to be opened for European and other long-distance service at Rocky Point, L. I., by R.C.A.

SHORT WAVE SCOUTS

TWENTY-FIRST "TROPHY CUP"

Presented to
SHORT WAVE SCOUT
WALTER A. JASIORKOWSKI
MILWAUKEE, WIS.

For his contribution toward the advancement of the art of Radio
by
SHORT WAVE CRAFT
Magazine

● ON this page is illustrated the handsome trophy which was designed by one of New York's leading silversmiths. It is made of metal throughout, except the base, which is made of handsome black Bakelite. The metal itself is quadruple silver-plated, in the usual manner of all trophies today.

It is a most imposing piece of work, and stands from tip to base 22½". The diameter of the base is 7¾". The diameter of the globe is 5¼". The work throughout is first-class, and no money has been spared in its execution. It will enhance any home, and will be admired by everyone who sees it.

The trophy will be awarded every month, and the winner will be announced in the following issue of SHORT WAVE CRAFT. The winner's name will be hand engraved on the trophy.

The purpose of this contest is to advance the art of radio by "logging" as many short-wave phone stations, amateurs excluded, in a period not exceeding 30 days, as possible by any one contestant. The trophy will be awarded to that SHORT WAVE SCOUT who has logged the greatest number of short-wave stations during any 30-day period.

21st TROPHY WINNER
87 veries; 69 foreign

● WE take pleasure in awarding this, the twenty-first Trophy Cup to be given away, to Mr. Walter A. Jasiorkowski of 964 West Manitoba St., Milwaukee, Wis., who had a very fine list of stations, totalling 87, all of which were verified. Eighteen were located within the United States, and sixty-nine were foreign. It has been quite some time since we have had such a large list of stations, and Mr. Jasiorkowski is to be congratulated for his achievement. All these stations were received within a period of thirty days on a Scott All-Wave Superheterodyne Receiver which was a 1931 model, using 12 tubes. We quote Mr. Jasiorkowski as follows: *"The aerial consisted simply of an insulated 15 inch wire, coupled to the antenna post through a condenser-coil combination of pre-selection. It was found that with this arrangement, an ordinary aerial and ground could be entirely dispensed with while the signal-to-noise level was somewhat better."*

We take it that the winner was only using an antenna 15" long! This is quite an achievement. Some of the other contestants may give the short aerial proposition more consideration.

List of Verified Stations—69 Foreign, 18 U. S.

U. S. STATIONS

W1XAL—6,040 kc.; now on 11,790 kc. Sunday afternoon; Boston.
W1XK—9,570 kc.; 6 a.m. to 12 midnight, Boston.
W2XAD—15,330 kc.; 2-3 p.m. daily; 10:30-4:30 p.m. Sunday; Schenectady.
W2XAF—9,530 kc.; 5:30 to 11 p.m.; Schenectady.
W2XE—15,270 kc.; 10 a.m. to 5 p.m.; New York City.
W2XE—11,830 kc.; 5 p.m. to 7 p.m.; New York City.
W2XE—6,120 kc.; 7 to 10 p.m.; New York City.
W3XAL—6,100 kc.; Mon., Wed., Sat., 5 to 11 p.m.; Boundbrook, N.J.
W3XAU—9,590 kc.; 11 a.m. to 6:45 p.m., Philadelphia.
W3XAU—6,060 kc.; 7 to 10 p.m.; Philadelphia.
W8XAL—6,060 kc.; 6:30 a.m. to 7 p.m.; 10 p.m. to 2 a.m.; Cincinnati.
W8XK—11,870 kc.; 5 p.m. to 9 p.m.; Pittsburgh.
W8XK—6,140 kc.; 9 to 12 midnight; Pittsburgh.
W9XAA—6,080 kc.; very irregular; Chicago.
W9XF—6,100 kc.; 8 to 9 p.m. ex. Mon., Wed., Sat.; 12 to 1 a.m. daily.
KWO—15,415 kc.; phones daytime; Dixon, Calif.
KWU—15,335 kc.; phones Hawaii, Philippines and Japan; Dixon, Cal.
KWV—10,840 kc.; phones irregularly; Dixon, Calif.

FOREIGN STATIONS

Canada

CJRO—6,150 kc.; 7:30 to 11:30 p.m. daily; Sun., 3 to 10 p.m.; Winnipeg.
CJRX—11,720 kc.; same as CJRO.
VE9CA—6,030 kc.; irreg., 7 to 12:30 a.m.; Calgary.
VE9GW—6,090 kc.; Thur., Fri., Sat., 7 to 4 p.m. Sun., 12-8 p.m.; Bowmanville.

(Continued on page 492)

Honorable Mention Awards

Honorable mention:
Jerry M. Hynek, Bad Axe, Mich.
Al. Glasser, Brooklyn, N.Y.
David J. Shinn, Elgin, Kansas.

Trophy Contest Entry Rules

● THE rules for entries in the SHORT WAVE SCOUT Trophy Contest have been amended and 50 per cent of your list of stations submitted must be "foreign." The trophy will be awarded to the SHORT WAVE SCOUT who has logged the greatest number of short-wave stations during any 30 day period; (he must have at least 50 per cent "foreign" stations). This period need not be for the immediate month preceding the closing date. The complete list of rules appeared in the September issue of this magazine.

In the event of a tie between two or more contestants, each logging the same number of stations (each accompanied by the required minimum of 50 per cent "foreigns") the judges will award a similar trophy to each contestant so tying. Each list of stations heard and submitted in the contest must be sworn to before a Notary Public and testify to the fact that the list of stations heard were "logged" over a given 30 day period, that reception was verified and that the contestant personally listened to the station announcements as given in the list.

Only commercial "phone" stations should be entered in your list, no "amateur transmitters" or "commercial code" stations. This contest will close every month on the first day of the month, by which time all entries must be in the editors' hands in New York City. Entries received after this date will be held over for the next month's contest. The next contest will close in New York City, December 1.

The winner each month will be the person sending in the greatest number of verifications. Unverified stations should not be sent in, as they will not count in the selection of the winner. At least 50 percent of the verifications sent in by each listener must be for stations located outside of the country in which he resides! In other words, if the contestant lives in the United States at least 50 percent of his "veries" must be from stations outside of the United States. Letters or cards which do not specifically verify reception, such as those sent by the Daventry stations and, also by commercial telephone stations, will not be accepted as verifications. Only **letters or cards which "specifically" verify reception of a "given station," on a given wave length and on a given day, will be accepted!** In other words it is useless to send in cards from commercial telephone stations or the Daventry stations, which state that specific verifications will not be given. Therefore do not put such stations on your list for entry in the trophy contest!

SHORT WAVE SCOUTS are allowed the use of any receiving set, from a one-tuber up to one of sixteen tubes or upwards, if they so desire.

When sending in entries, note the following few simple instructions: Type your list, or write in ink, **pencilled matter is not allowed.** Send verification cards, letters and the list all in one package, either by mail or by express prepaid; **do not split up the package.** Verification cards and letters will be returned, at the end of the contest, to their owners; the expense to be borne by SHORT WAVE CRAFT magazine.

In order to have uniformity of the entries, when writing or typing your list, observe the following routine: USE A SINGLE LINE FOR EACH STATION; type or write the entries IN THE FOLLOWING ORDER: Station call letters; frequency station transmits at; schedule of transmission, if known (all time should be reduced to Eastern Standard which is five hours behind Greenwich Meridian Time); name of station, city, country; identification signal if any. Sign your name at the bottom of the list and **furthermore state the type of set used by you to receive these stations.**

The judges of the contest will be the editors of SHORT WAVE CRAFT, and their findings

(Continued on page 493)

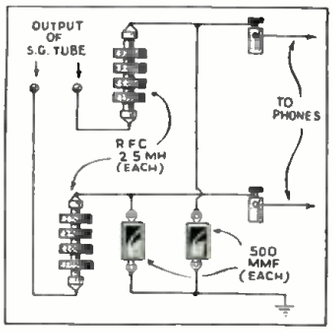
$5.00 FOR BEST SHORT-WAVE KINK

The Editor will award a five dollar prize each month for the best short-wave kink submitted by our readers. All other kinks accepted and published will be awarded eight months' subscription to SHORT WAVE CRAFT. Look over these "kinks" and they will give you some idea of what the editors are looking for. Send a typewritten or ink description, with sketch, of your favorite short-wave kink to the "Kink" Editor, SHORT WAVE CRAFT.

First Prize $5.00

FILTER FOR HEADPHONES

Many short-wave fans are troubled with serious detuning each time the headphones are touched or the phone cord is moved. By keeping traces of R.F. out of the phone cords, this boresome condition is eliminated.



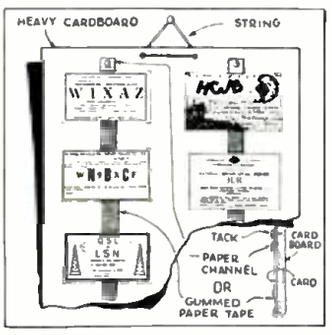
In the drawing you will find that 2 R.F. chokes and 2 condensers are used. There is a choke in each lead with a condenser by passing each lead to the B negative of the receiver circuit. Ordinary 2.5 MH chokes and .0005 mf. condensers work satisfactorily.—Robert Mushaben.

▼ ▼ ▼

MOUNTING VERI CARDS

Here is a good way to put your verification cards and letters on the wall and not fill it full of tacks.

Get a large piece of cardboard; hang it on the wall; then tack your veris to it. Another way is to stick your veris together with some sticky paper tape (ask your butcher or grocer for a couple of feet).



Cut it into one-inch pieces, stick bottom edge of one veri to top edge of another, and so on. Then one tack will hold 8 or 10 veris, and when you have to take them down, you can stack them just the same as when they were separated.—Robert L. Vaughn.

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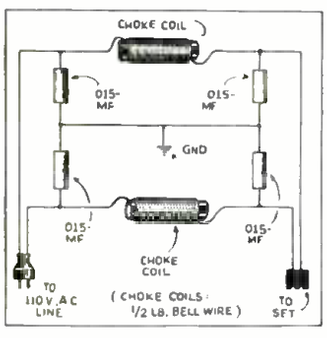
NOISE FILTER

The filter described herewith consists of two choke coils, each connected in one of the leads of the A.C. power line between the lighting socket and the radio receiver.



Each end of a coil is grounded through bypass condensers to shunt any stray oscillations into the earth. The two coils are wound on fiber or bakelite tubes that are about six inches in length and two inches in diameter. The wire used is No. 18 gauge double-cotton-covered and is wound in two layers of 100 turns each over a length of five inches. The D.C. resistance of each of the coils will be less than one ohm. The condenser arrangement requires four by-pass condensers each, having a capacity of .015 microfarads at about 200 volts. They must be arranged by pairs in series and connected between the ends of the coils as shown in the diagram. The inner common terminals are connected together, and this contact must be well grounded to a cold water pipe with a separate wire. Do not use the wire that grounds the radio receiver.—C. Doane, Jr.

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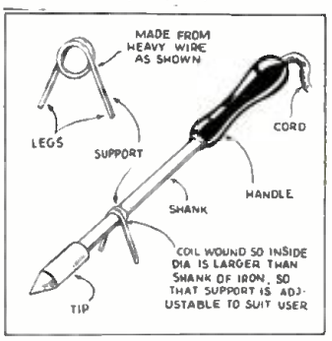

A HANDY SOLDERING IRON SUPPORT

When wiring sets, it is a great convenience to be able to lay down one's soldering iron beside the work instead of returning it to a holder which may be located at the far side of the table. In order to do this without burning the work table, twist a piece of bus bar loosely around the shank of the iron as illustrated. When the iron is in use, the legs hang down in position, and the device may be slid up near the bit by merely tipping the iron.—Russell Yost.

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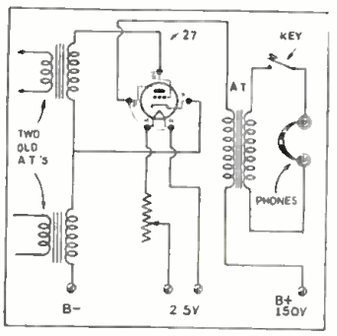

IMPROVING OUR KINK

Tried out your "Short Wave Kink" for code practice in the October number, with some variations dictated by the fact that I did not have a center-tapped choke or P-P transformer. It gave me heavy key-clicks in every circuit I tried until I took the key and phones out of the plate circuit. With the circuit I'm-itated herewith, I get a fine note and an entire absence of clicks.—E. L. Bennett.

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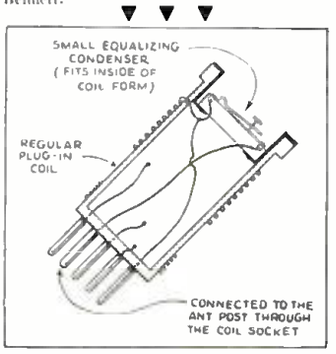

ANTENNA COUPLING KINK

Here is a kink which eliminates the fits of the antenna coupling condenser. Purchase plug-in coil forms with one extra prong. Small equalizing condensers may be purchased which will fit in the top of the plug-in coils. One side of the condenser is connected to the "G" of the grid coil and the other side is connected to the extra prong. The corresponding prong of the coil socket is connected to the antenna post. The condensers are all adjusted for best results, and then they need never be touched again. Stations may be logged and will always be found in the same position on the tuning dial.—Merlin Berrie.

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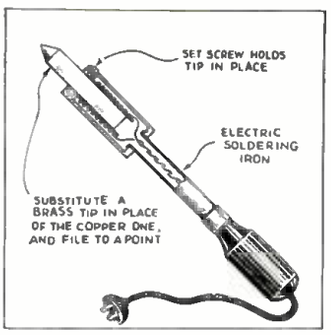
SOLDERING IRON KINK

I found that the copper tip of my electric soldering iron oxidized very rapidly, making it difficult to keep the tip properly tinned. Knowing that brass does not



oxidize readily, I procured a piece of brass rod the same diameter as the copper tip, cut it to proper length and filed a point on it. The new tip was tinned with the aid of salammoniac and has given no trouble since. This particular iron has a hollow core in which the tip fits; a set-screw holds it in place. This idea can be adapted to other types of irons. The brass tip takes a little longer to heat (just a few minutes).—D. J. Vinr.

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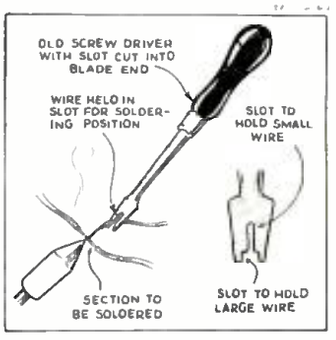
NEW USE FOR SCREWDRIVER

For soldering in tight places, an old screwdriver blade can be slotted, as shown

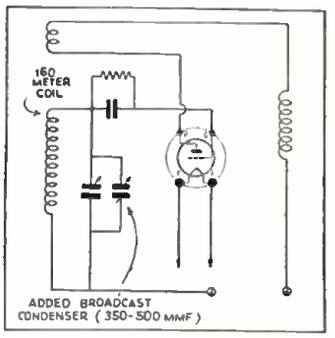


in Fig. 1. When soldering, the wire can be held in the slot of the blade so that the wire may be held for soldering in positions where it is impossible to (Fig. 2) reach your hand. The slot can be made by holding the screwdriver in a vise and using a hack saw that has two or three blades together, to make a wide cut. The end may be filed to make a notch for accommodating larger wires.—Joseph Goveia.

▼ ▼ ▼

TUNING IN B.C. STATIONS

Here is a helpful kink for tuning in the broadcast band (200—550M) smoothly on your short-wave receiver. Use a condenser with a capacity of 350 or 500 mmf. and connect it in parallel with the tuning condenser of the short-wave set.



When using the 160-meter coil, the B.C. condenser boosts the coil into the B.C. band, and separates the stations very nicely.

Many times after you are finished DX-ing with the foreign stations, it is a pleasure to tune in the B.C. stations.—A. Jackson Yundt.

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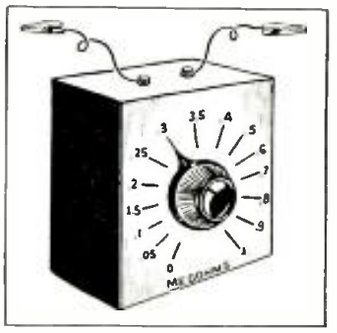

EXPERIMENTER'S TIME-SAVER

You may find the exact resistor required for voltage dropping, biasing, etc., by mounting a one-megohm vari-resistor on a panel with long leads and clips.

It can be calibrated with an ohmmeter in a few moments at your neighborhood radio shop. This kink will save many hours in finding the proper fixed resistor for the greatest gain and stability in amplifiers and receivers.—Eldon W. Travis.

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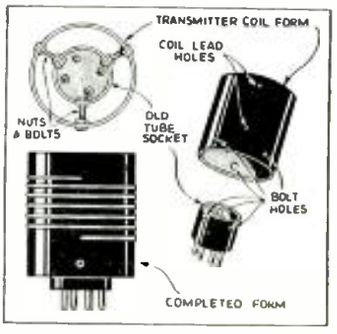

COIL FORM

The drawing above clearly shows how I fasten large coils to tube bases.—M. Boudreau.

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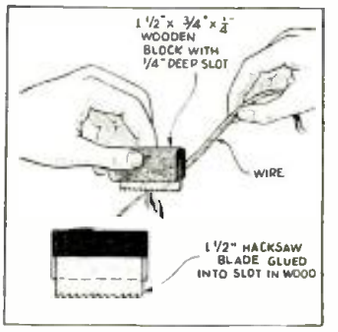
WIRE SCRAPER

Many experimenters will find this kink valuable. A piece of hacksaw blade and a block of wood are all that are needed. L. J. Wood.

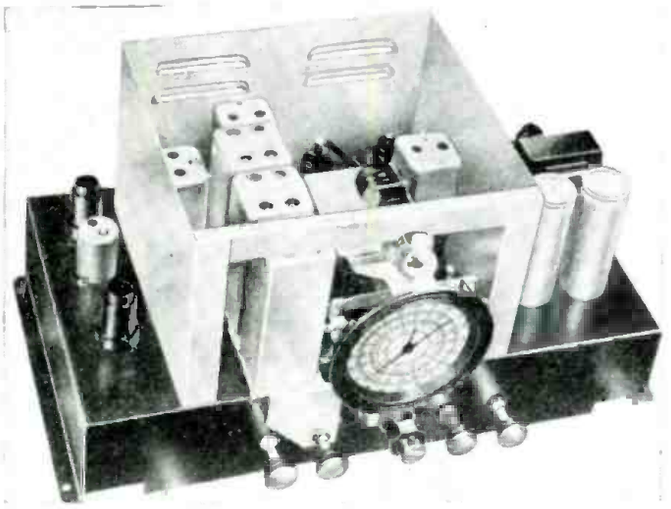


WHAT'S NEW In Short-Wave Apparatus

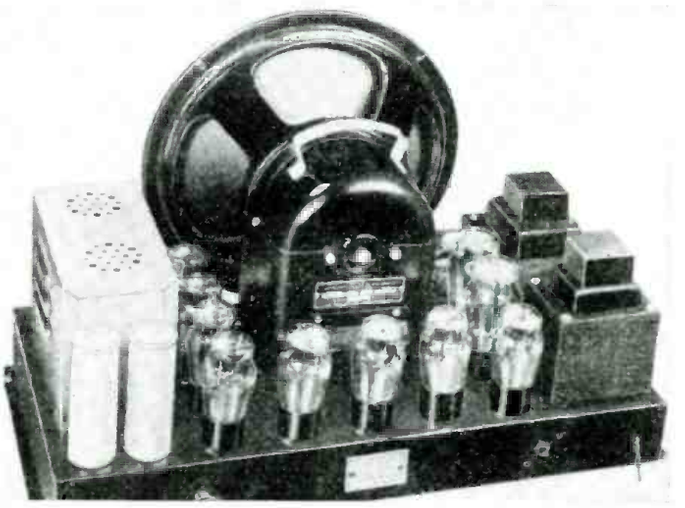
The short-wave apparatus here shown has been carefully selected for description by the editors after a rigid investigation of its merits

A 24 Tube Multi-Wave Set

With 50 Watts Audio Power Output



R.F. tuning unit of Lafayette 24-Tube Superheterodyne.



Audio-Amplifier—Loud-speaker unit which delivers 50 watts of audio power.

● A NEW 24-tube superheterodyne, incorporating cathode-ray tuning, variable band width selectivity, and a dual high-fidelity speaker system, has been announced by the Wholesale Radio Service Co., Inc. This new receiver consists of two individual units, an R.F. chassis which contains 13 metal tubes and a separate audio amplifier and loud speaker unit, which contains 11 glass-type tubes. The loud speaker system consists of 1-12" auditorium speaker and 1-10" high-frequency speaker.

Directly above the main tuning dial, is located the new cathode-ray tuning indicator, which provides a visible check on tuning and also assists tremendously in the adjustment of the receiver. The output amplifier stage, which drives the speaker, consists of 8 type 45 tubes in Class AB, and is capable of delivering approximately 50 watts of audio power. The receiver tunes from 8 to 2,050 meters in the following steps: 8 to 16; 16 to 57.5; 57 to 187; 187 to 555; and 850 to 2050 meters thus making the set suitable for use in *foreign* countries, as well as the United States, inasmuch as a good many foreign stations broadcast on the higher wave lengths. The diagram clearly shows the uses for the various tubes and their connections.

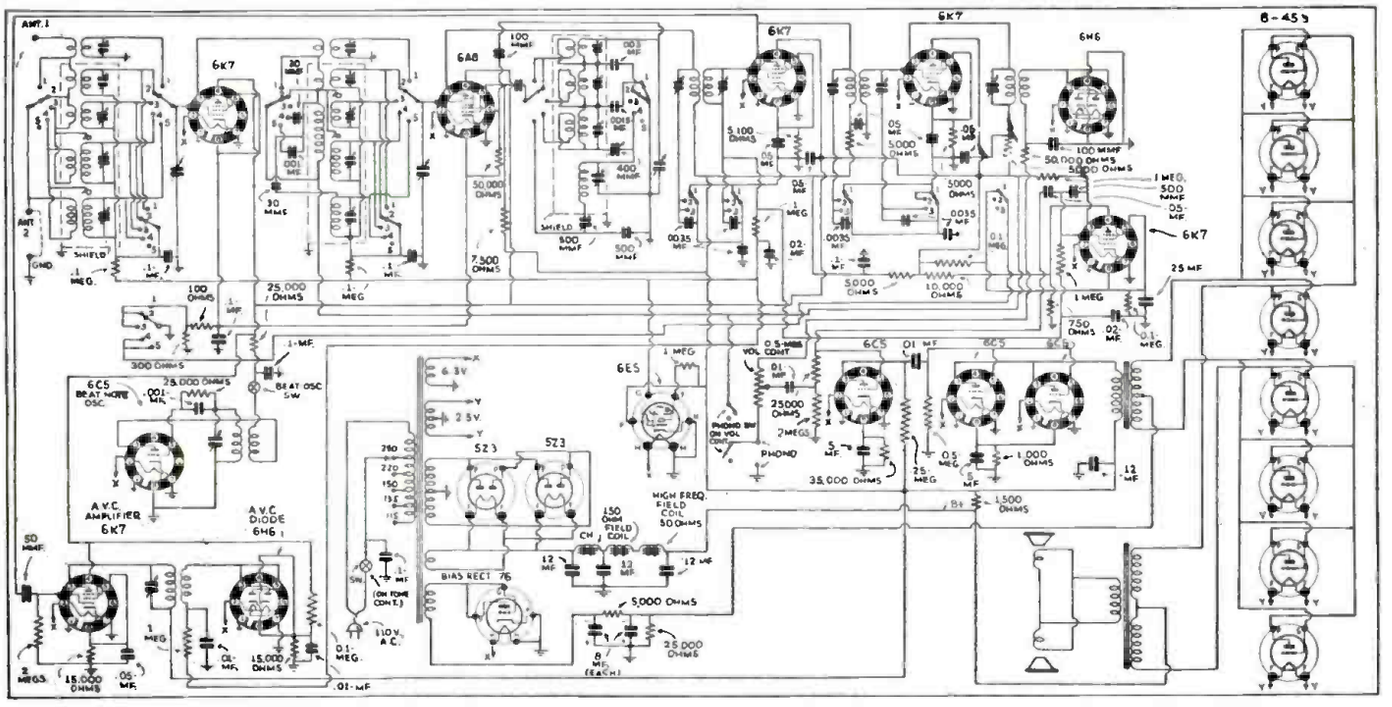
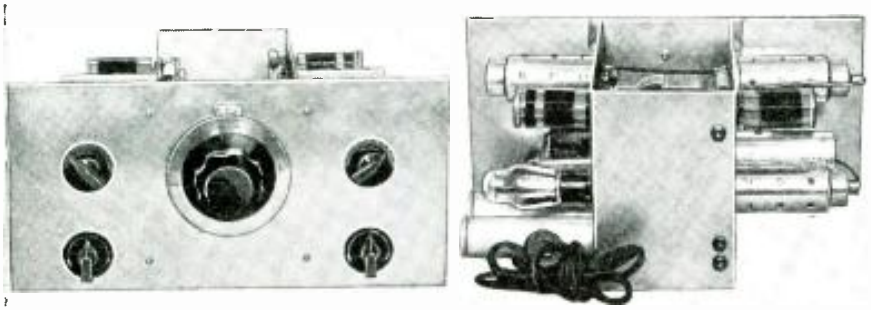


Diagram of 24-tube Lafayette Receiver—an extremely powerful multi-wave superheterodyne. (No. 332)

Names and addresses of manufacturers of apparatus described on this and following pages furnished upon receipt of 3-cent stamp; mention No. of article.

The Three-Tube SUPER-GAINER

By McMurdo Silver



The latest short-wave receiver particularly adapted to "Ham" requirements—the 3-tube "Super-Gainer" here described by Mr. Silver.

● REGENERATION is the oldest known method of getting something for, relatively, nothing. Regeneration applied to a single tube will yield sensitivity limited only by its degree of stability, which is simply another way of saying that in the matter of sensitivity alone, a regenerative detector will give all that can be had from multi-tube "repeater" amplifiers.

If selectivity, or the major portion thereof, can be had through several good tuned circuits, then regeneration can simply and economically contribute to valuable and ordinarily hard-to-obtain additional selectivity and gain.

Going from the general to the specific, the "Super-Gainer" described herewith, using only three tubes, provides all the sensitivity and image selectivity any amateur can desire, and through non-critical I.F. regeneration, practical, simple and fool-proof single-signal C.W. selectivity on C.W. reception.

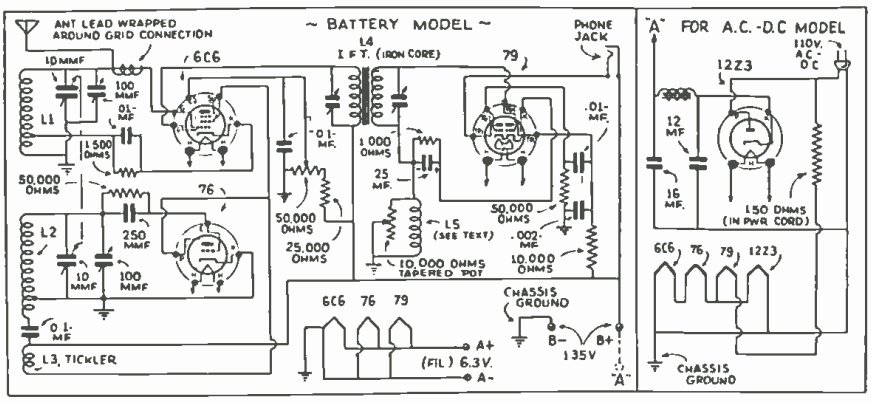
Conceived by Frank Jones, from the original 1932 revelation by McMurdo Silver, of the use of regeneration to obtain single-signal C.W. selectivity, the "Super-Gainer" has been designed by these two competent authorities. For no more than the cost of a three-tube one R.F. regenerative detector and one A.F. receiver, the "Super-Gainer" can be quickly and easily built to give practically the full single-signal CW selectivity and all the gain of much more expensive superhets. As such, the "Super-Gainer" is the answer to the prayer for a fine receiver by thousands of financially embarrassed amateurs unable to spend one to two hundred dollars.

How all this is accomplished is best explained by the circuit for the battery model herewith (the A.C. circuit is a little more involved, hence the D.C. circuit is used for explanation of operation.

Signals are fed from an antenna through the usual low capacity (twisted hook-up wire) condenser to the tuned grid circuit of the 6C6 first detector. This 6C6 is hooked up as the conventional "electron-coupled" regenerative detector, regeneration being controlled by the screen-grid voltage potentiometer R1. Quite obviously this circuit so far is a one-tube regenerative receiver, capable of all of the weak-signal sensitivity of such circuits. But for selectivity, this circuit is called upon only to discriminate between, not close together signals, but really only between a desired signal and its "image" 900 to 1,000 kc. away. This it can easily do—and actually much better, by virtue of a good high-Q circuit, plus regeneration.

The 6C6 first detector feeds a dual tuned Aladdin Polyiron iron-cored I.F. transformer tuned to anywhere between 450 and 500 kc. The two very high-Q tuned circuits of this I.F. transformer contribute about as much selectivity and almost as much repeater gain as two ordinary air-core I.F. transformers would.

(*Continued on page* 507)



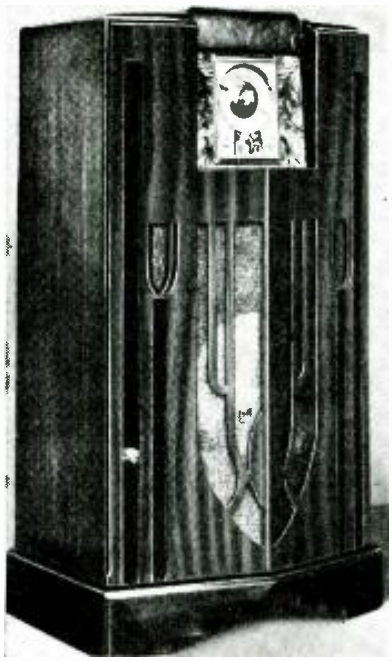
Wiring diagram of the battery and also the A.C. models of the "Super-Gainer." (No. 327.)

$200.00 Cover Title Prize Contest

● FOR the best title to last month's cover illustration, twenty-five other prizes besides the first prize are offered. The first prize is the magnificent 18-tube short and broadcast wave receiver here illustrated and made by the Midwest Company. It is valued at $212.50.

The handsome appearance of the Midwest 18-tube "multi-wave" receiver, mounted in its console cabinet, made of beautiful matched woods, can be noted in the accompanying photo. The makers of this famous Midwest set, this particular model being their very latest de luxe set, have generously offered this receiver as the first prize in this contest, the complete rules for which appeared on page 394 of the November issue.

What the editors require in the contest for this prize Midwest receiver and the twenty-five other prizes is the best possible title that you can think of for the November cover illustration, which ostensibly shows a young man highly enthused over the presentation of one of the Midwest 18-tube receivers as a birthday gift from his wife. To give you an idea as to titles which might be applied to the November cover illustration, here are a few—"A Birthday Gift He Will Never Forget"; "Boy! What a Radio Set!"; "A Birthday Gift He Will Remember," etc.



Here is the magnificent 18-tube Midwest radio set offered as first prize.

This contest will close Nov. 25, and the names of the winners will be announced in the February issue, which is on the newsstands Jan. 1. To make the contest more inviting, the publishers of *Short Wave Craft* will give 25 "Honorable Mention" prizes, 12 yearly subscriptions to *Short Wave Craft* and 13 yearly subscriptions to *Short Wave Listener* Magazine.

The titles may be written on post cards or on a white file card, or even a piece of paper cut approximately the same size as a post card. Each reader may submit as many titles as he cares to. You do not have to be a subscriber to enter this contest.

In the event of a tie equal prizes will be given to the contestants so tying.

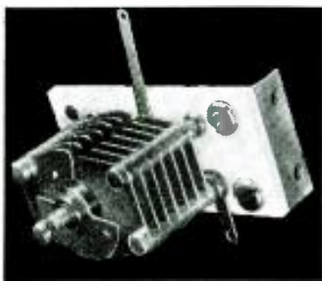
All members of the *Short Wave Craft* Staff as well as the Midwest Radio Corp., and members of their families are not eligible for this contest, in accordance with the usual rule. When submitting your entry, you may send it in on a post card or seal it in an envelope as you like. Do not write anything else on the card or piece of paper (which is to be about 3¼x5½ inches) except the title, together with your name and address in one corner.

Titles submitted will not be returned to the senders, and the opinion of the judges will be final.

Names and addresses of manufacturers of apparatus described on this and following pages furnished upon receipt of 3 cent stamp; mention No. of article.

NEW APPARATUS FOR THE HAM

National Acorn Socket—H19



Dual Stator Condenser—H20

Metal Tube Socket—H21

Acorn Tube Socket—H19

This new isolantite "Acorn tube" socket, is manufactured by the National Company. It is designed for extremely low loss, and the contacts are positive, gripping non-slipping affairs and provide a constant R. F. impedance connection to the tube terminals.

Split-Stator Condenser—H20

This National ultra-midget condenser is of similar design to the one described last month in these columns, except that there are two individual stators. This condenser may be readily employed in special circuits which formerly required tricky remodeling of standard condensers.

Isolantite Socket for Metal Tubes—H21

Another new National item, is this octal socket for the metal tubes and constructed of high grade Isolantite material. The contacts of this socket are also of the non-turning type. This socket provides a low-loss tube mounting for those interested in short-wave receivers using metal tubes.

New Hammarlund Socket—H22

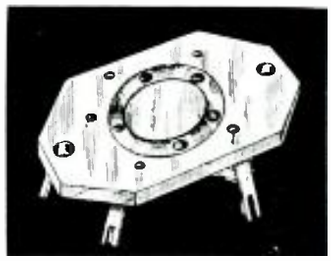
The well-known Hammarlund Isolantite sockets have been redesigned and made considerably more efficient. A groove has been added to the surface of the socket to facilitate locating the holes; you will remember that the original socket had a smooth top. The terminals have also been changed considerably, providing a very firm grip on the tube pin, and it has been lengthened to facilitate soldering. The terminals are mounted in a groove to prevent turning.

New Ultra-High Frequency Tube—H23

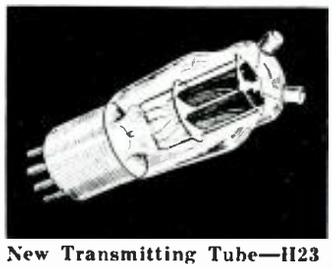
An addition to the transmitting tube family is the new RK24 dual triode. This tube is much like the 53 or 6A6, except that the plate leads are brought out to terminals at the top of the bulb. The base is of Isolantite, providing excellent insulation. This tube is said to perform well in push-pull circuits on wavelengths as low as 2½ meters. The heater voltage is 6.3, and the current only 0.8 amperes. Outputs as high as 30 watts may be obtained from a single tube.

Vernier Dial—H24

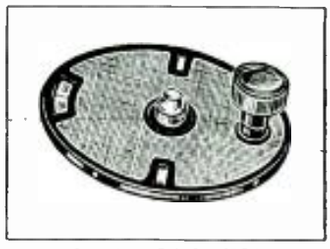
Many fans are familiar with the old Marko dial which has not been manufactured for several years, and will be pleased to learn that the Insuline Corporation of America have recently begun manufacturing this dial with several improved features.



Improved Socket—H22



New Transmitting Tube—H23



Vernier Dial—H24

10 to 600 Meters Range of this Receiver

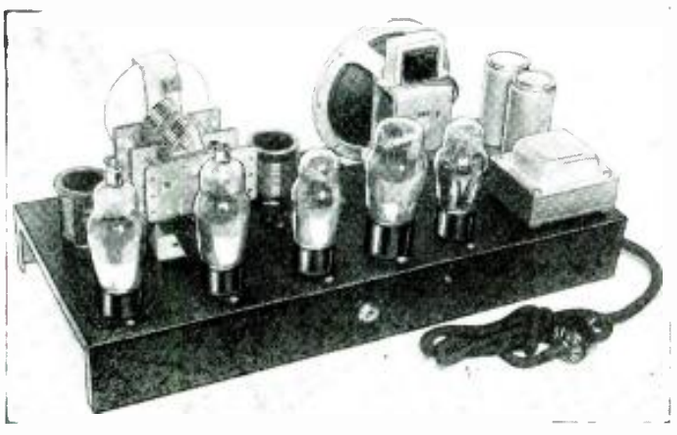
By Guy Stokely, E.E.*

● THE Eilen HG-36 receiver is a powerful 5-tube tuned radio frequency regenerative type receiver having a wavelength coverage of approximately 10 to 600 meters. Space-wound and ribbed plug-in coils, well known for their high electrical efficiency, are used and are so designed as to overlap sufficiently to eliminate the possibility of any gaps in the above range of wavelengths. The receiver has great sensitivity, selectivity, and delivers enormous loudspeaker volume on many of the foreign short-wave stations as well as local stations with excellent tonal qualities. A band-spread station spreader tuning dial simplifies tuning in the crowded short-wave broadcast bands considerably.

The receiver is also highly satisfactory as an *Amateur Band-Spread* receiver, as the amateur bands are spread over from 70 to 90% of the dial range. This enormous spread, obtainable anywhere between 10 and 200 meters, is a result of the special type of tuning control used.

*Eilen Radio Laboratories.

Note how the controls on this improved 5-tube TRF regenerative receiver have been compactly grouped at the right of the set.



A close-up view of the chassis of the 5-tube receiver, which has a range of 10 to 600 meters.

Inspection of the electrical circuit diagram reveals the use of 5 high-gain tubes, i.e., 6D6-6C6-76-42-84 types. Operating under high plate voltage, these tubes are capable of tremendous gain and output. The 42 power pentode output amplifier can deliver as high as 3 watts of audio power to the built-in dynamic speaker with excellent quality of reproduction.

The selectivity, sensitivity, and over-all gain is enhanced enormously by the *tuned* R.F. stage together with adequate shielding of the R.F. sections. Negative grid-bias for the R.F. stage, using a 6D6 tube, is furnished by the potentiometer R1, having a maximum value of 3,000 ohms. It has a stop at 300 ohms, so that the bias can never fall below a safe value. Varying the bias on this stage by this control furnishes an excellent volume control for this receiver. Due to the great over-all gain of this model the volume control is an absolute essential. The potentiometer arrangement R2-R3 maintains the screen-grid at approximately 100 volts positive. The output of the R.F. stage is electro-magnetically coupled into the grid of the detector stage, which uses a type 6C6 tube. Feed-back is accomplished by means of the plate coils L5. The regeneration control functions very smoothly and varies the screen-grid voltage by means of the potentiometer R5. The number of turns on L3-L4-L5 are so proportioned as to offer a high load impedance to the R.F. stage and to allow regeneration to occur in *(Continued on page 488)*

Names and addresses of manufacturers of apparatus described on this and following pages furnished upon receipt of 3 cent stamp; mention No. of article.

THE RADIO AMATEUR

Conducted by Geo. W. Shuart

Radio Amateur Course

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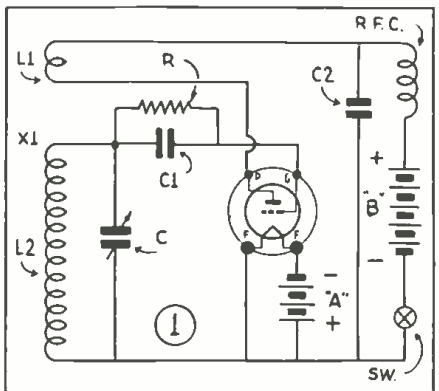
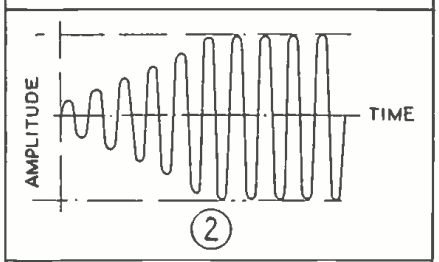
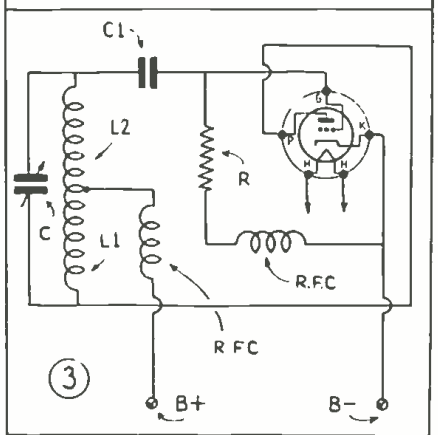
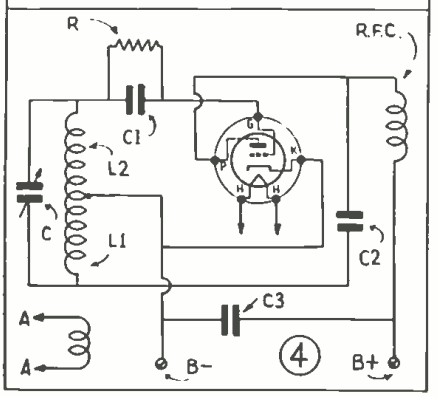








Lesson 4—Vacuum tube as a Regenerator and Oscillator

● TO THE average short-wave "fan" or inexperienced amateur, the two words, *regeneration* and *oscillation*, are very mystifying, insofar as the technicalities of them are concerned. In Webster's Unabridged Dictionary, the word *oscillation* is defined as follows: "To move backward and forward; to vibrate like a pendulum; to vary or fluctuate between fixed limits." The word *regenerate* in the same dictionary is defined as follows: "Reborn; reformed or created again."

In our original lesson covering *alternating current*, (See Sept. issue) we find the current starting at a zero point, building up to a maximum, decreasing again to zero, then building up in the opposite direction, and finally falling to zero—thus completing one cycle or one oscillation. An oscillating vacuum tube is a *generator of alternating current*, but has the advantage over the usual generator employed in generating our house current, in that it can be made to generate electricity of a frequency as high as five hundred million cycles. Before oscillation takes place in a vacuum tube, connected as shown in the accompanying drawings, we must have regeneration. This regeneration represents power taken from the output of the tube and fed back into the input circuit, amplified through the tube and taken out of the plate circuit again. In Figure 1 we have a simple circuit using a triode, which is capable of regenerating and oscillating. If we were to impose a signal voltage on the grid of this tube at the point marked X1, this signal would be carried through the tube and amplified; then by placing coil L1 in inductive relation to coil L2, this signal would be fed back from Coil L1 to L2 and reamplified. This process continues over and over again. That is why our regenerative circuits are so very sensitive.

Fig. 1—The usual regenerative oscillating circuit used for receiving. Fig. 2—The build-up of oscillations; note that the oscillations start feebly and are gradually increased in amplitude due to "regeneration" or "feedback." Figs. 3-4—Series and shunt-fed transmitting circuits.

How Oscillations Are Set Up

The circuit in Fig. 1 shows Coil L1 and L2 very close together. Suppose the filament is lighted and the switch marked "SW" is open: no current will be flowing in the plate circuit. Now if we close the switch, current will immediately start to flow through the circuit from the plus side of the battery through RFC, through L1 to the plate, and thence back to the filament and to the minus of the "B" battery.

Current flowing through L1 induces a field about the coil. This field is termed magnetic lines of force. As these lines of force thread through the turns of L2, a weak oscillating current is built up in the circuit composing L and C, these weak oscillations are transmitted to the grid and amplified by the tube. It so happens that these oscillations (fed back) are of the proper phase, so that one aids the other, and as the feed-back process continues, the oscillations build up in amplitude, as shown in Figure 2 (also Fig. 8.) This build-up in plate current would continue indefinitely if it were not for the automatic regulation which takes place due to the grid-leak R. The grid current increases the same as the plate current increases, and this current flowing in the grid circuit causes a voltage drop across the resistor "R," and this drop is used to bias the tube, so that the plate current cannot rise above a certain fixed maximum. The "B" battery connected in the plate circuit, supplies the necessary power to perpetuate oscillations. In other words, there is no "perpetual motion" in the oscillator, as some people might be led to believe. In our previous lesson on vacuum tubes, we learned that a positive charge on the grid would cause an increase in plate current flow, while a negative charge would cause a decrease in current flow. Assuming that the induced EMF first found in the circuit L2 applied a positive voltage to the grid, the plate current would rise *above its normal value*. This rise in current would strengthen the field around L1 and continue to increase the EMF induced in L2, and so the plate current would continue rising, remember that the energy used to cause the plate current to rise was taken from the plate circuit. This is the *feed-back* action. Due, as we said before, to the action of the grid-leak, this increase cannot continue indefinitely. When the plate cur-

rent *ceases to increase*, the induced voltage in the grid circuit falls to zero. The plate current will then tend to decrease toward its normal resting value, and as it decreases, the magnetic field around L1 will begin to collapse or recede and thus move inward towards its center. The magnetic lines of force of this *decreasing* field now thread through the grid coil in a direction opposite to the movement when they were expanding; that is, when the plate current was rising. This induces an EMF in the grid circuit, but of the opposite polarity. Now, we assumed that the first impulse was *positive* to the grid; this one will then be *negative*, causing the plate current to continue to fall *below* its normal resting value; as the field is entirely collapsed, the plate current will tend to go up to its normal resting value. This will cause a field to again cut the coil L2, causing a positive voltage, the same as the original impulse to be applied to the grid. This action will be reciprocated, and will continue indefinitely, and is termed *sustained oscillation*, just as we show in Figure 2.

The Hartley Oscillator

So far, we have considered an oscillating circuit of the *tickler* feed-back variety commonly used as *detectors* in short-wave receivers. There are many varieties of this circuit. In Figures 3 and 4, we have the *Hartley* circuits. The one in Figure 3 has its plate voltage fed through the section of the coil marked L1, while the plate voltage of Figure 4 is fed directly to the plate of the tube through an R.F. choke. Figure 3 is known as *series* feed, while Figure 4 is termed *parallel* or *shunt* feed. In both cases, we really have a tickler and grid coil as indicated by the letters L1 and L2. In present-day receiver circuits, and in some *transmitting* circuits, the cathode of the tube is connected to the coil in order to obtain feed-back, and the plate is *apparently* not used. This may be quite mystifying to the average person, not technically inclined, but when comparing Figure 5, which has its cathode connected to the coil, with the diagram in Figure 4, we find there is really no difference in the circuit. All we have done is disconnect the "B" negative from the cathode and connected it to the bottom of L1, causing the "B" current to flow through the coil. By comparing and studying these two circuits, the cathode tap arrangement should not be the least bit confusing.

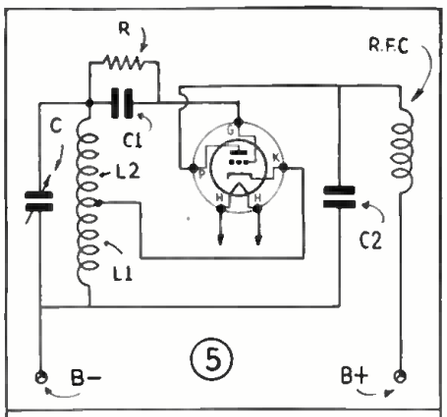
In all the diagrams and circuits so far, we have considered *magnetic* feed-back, that is, energy fed from plate to grid by magnetically or inductively coupling the two coils together. In Figure 6, we show an oscillating circuit which does not have magnetic or inductive coupling. The feed-back in this case is due to the plate-to-grid capacity within the tube. In triodes, this capacity may be anywhere from 3 to 10 mmf. In this circuit, the grid and plate circuits must closely approach resonance with the same frequency, because the feed-back is not as strong or as great as in the other circuits. This is the tuned-plate tuned-grid circuit. Screen-grid tubes will not oscillate in a circuit of this type, because the plate-to-grid capacity, as pointed out in a previous lesson, is too low to effect sufficient feed-back to cause oscillation.

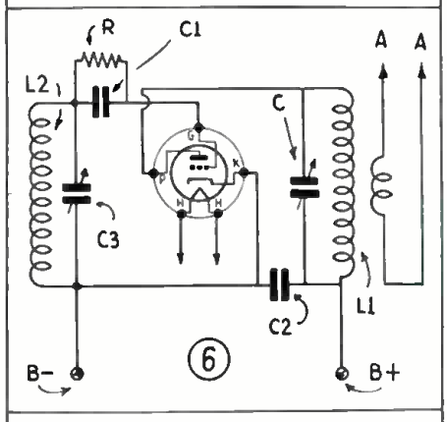
That is why, in the I.F. amplifiers of our superhets, the plate and grid circuits are tuned to the same frequency, allowing extremely high gain with no feed-back. However, if there were coupling directly between L1 and L2 of this circuit, even though it used a screen-grid tube, oscillations would occur. In Figure 7, we have the same type of circuit—tuned-plate, tuned-grid, except that two tubes are used in push-pull, that is, each tube operates on alternate half-cycles. These circuits shown in Figures 3, 4, 6 and 7, can be and are used for *transmitting*.

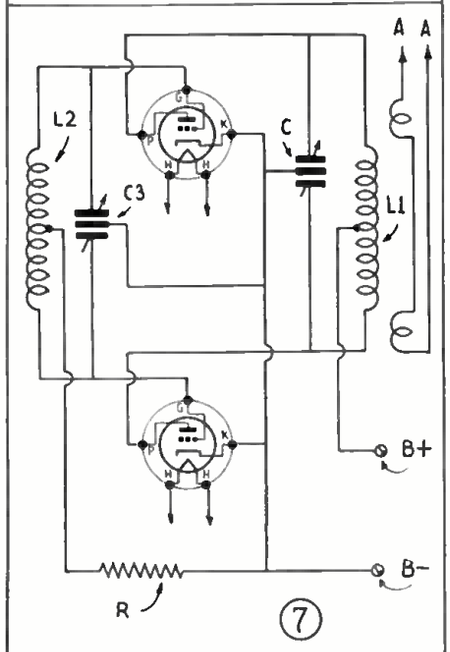
This is the fourth radio lesson of our Radio Amateur Course. In this lesson the oscillating vacuum tube is thoroughly discussed. An explanation is given of the action occurring electrically in a circuit wherein a vacuum tube is used as a regenerative oscillator. Next month, in our "fifth" lesson, we will explain the functions of amplifiers, both audio and radio frequency, class A, B and C.

How can we take R.F. power from such an oscillator and feed it into an antenna? The answer is quite simple, if you will bear in mind what we have said about the inductive relation between two coils and the amount of mutual induction that exists between them. In figures 4, 6 and 7, we have additional coils coupled to L1. The high frequency alternating currents in the tuned circuit, consisting of L1 and C, will induce similar currents in the coil coupled to it. This coil is then con-

(*Continued on page* 507)







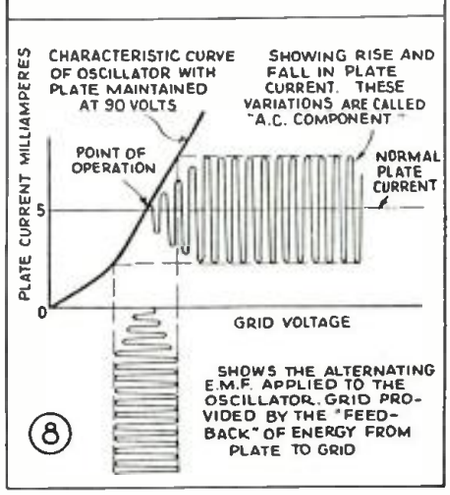


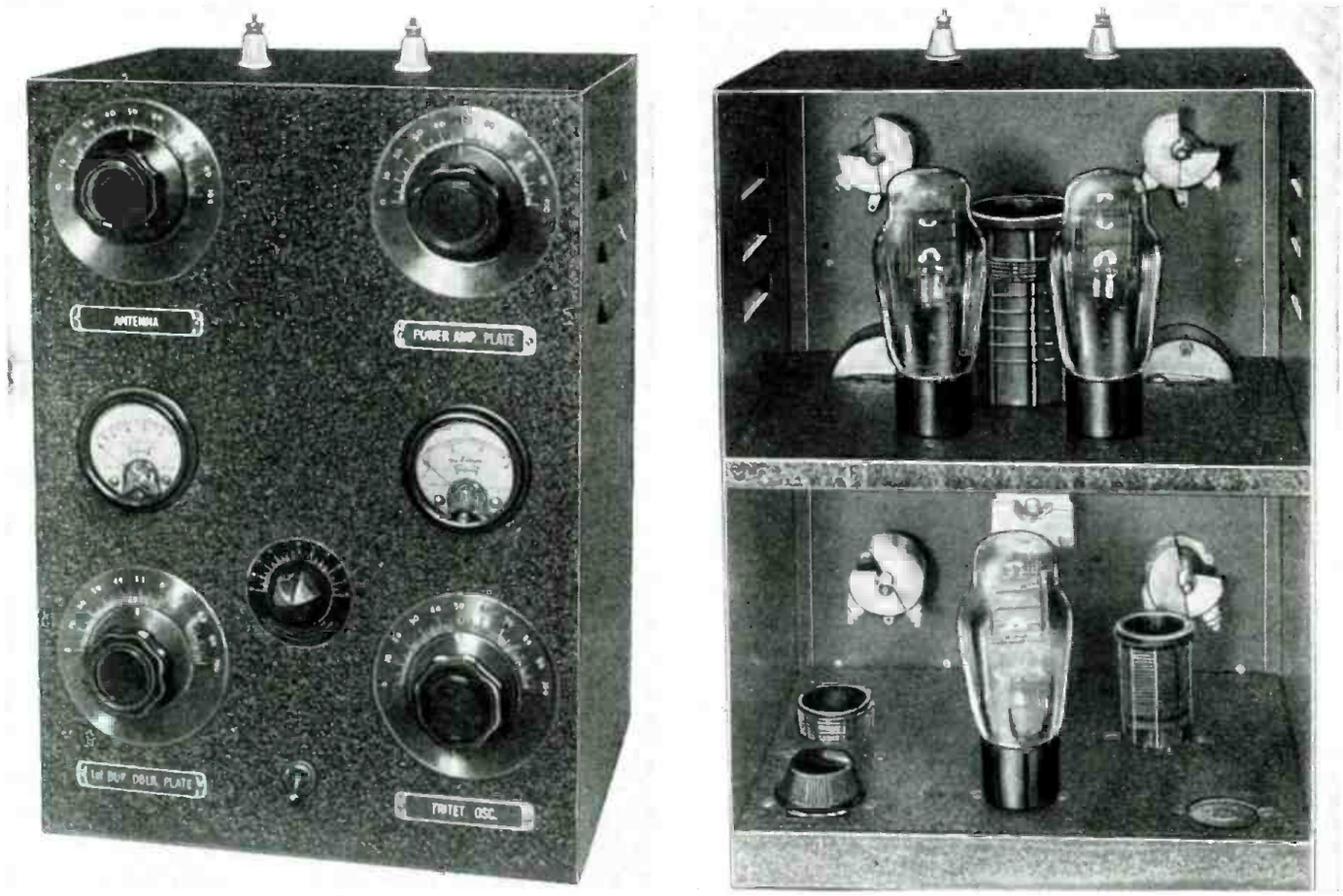
Fig. 5—Shows the cathode tap method of feed-back. Fig. 6—The tuned-plate tuned-grid oscillating circuit used for transmitting. Fig. 7—This circuit is the same as No. 6, except that two tubes are used in push-pull.

Fig. 8—Shows how feeble oscillations are strengthened by feed back from the plate to grid circuit and amplified.

The New HF-35 S-W

By Guy Stokely, E.E.*

● THE HF-35 S-W transmitter has been designed for the transmitting amateur who, although handicapped by limited finances, wishes an unusually *attractive* transmitter which is fully capable of meeting the rigid requirements of present-day Federal Communication Commission regulations. Such a transmitter must have a high degree of frequency stability, must operate only in the frequency bands prescribed for *amateur* use, be free from all spurious frequency radiations, and emit a signal that is free from all traces of unnecessary frequency modulation.



Front and rear views of this very compact 35-watt crystal-controlled Transmitter.

Although a transmitter can be built using a single tube in a self-excited circuit which can comply with the above regulations, the up-to-date amateur transmitter is of the crystal-controlled type. Two very good reasons for the use of this type of transmitter by the beginner as well as the old-timer exist. In the first place, with the crystal-controlled transmitter, the operating frequency is determined solely by the mechanical dimensions of the quartz crystal. If a crystal having the proper dimensions is used, the amateur may feel reasonably certain that his signal lies within the limits of the frequency bands assigned to him by law. Secondly, the type of signal radiated by such a system is of the highest quality. All of the radiated energy is concentrated in a single frequency, thereby enabling it to penetrate interference levels in which the broader signal generated by the self-excited oscillator would be entirely unreadable. A high- or low-powered signal from a transmitter of the self-excited type will have, unless unusually great precautions are observed, a wobbly or ragged tone which is very difficult to read, whereas the crystal-controlled note is easily recognized and copied due to its steadiness and clear-cut characteristics. This feature is of prime importance in the obtaining of satisfactory results in the crowded amateur bands.

In the design of the type HF-35 S-W transmitter are incorporated the high frequency stability of the crystal-controlled oscillator, the efficient frequency multiplication properties of the Tri-Tet oscillator, the high plate efficiency of the Class "C" R.F. power amplifier, the absence of keying clicks, and the low cost of the tubes involved. Power outputs of the order of 35 watts for CW are obtainable on any of the 20-40-80-160-meter bands.

The entire R.F. portion of the transmitter is mounted in a heavy steel cabinet only 10½" wide by 15" high by 8" deep. The double-deck type of construction is used, the oscillator occupying the lower section and the power amplifier and antenna tuning equipment being located in the upper half. The entire cabinet, including the two shelves, is finished in a heavy, durable, black shrivel lacquer presenting an unusually attractive appearance.

The Circuit

Inspection of the circuit diagram reveals that three tubes are used; a type 59 which is well-known for its ready adaptation to the Tri-Tet oscillator circuit; and a pair of 46's functioning as the power amplifier. The 46 tube is ideal for the low-powered transmitter due to its low grid power excitation requirements, its satisfactory use with grid-leak bias, and the relatively high

*Ellen Radio Laboratories.

Transmitter for Hams

The tendency in amateur circles is toward compact and efficient transmitters. This transmitter uses receiving-type tubes and has 35 watts output, is crystal-controlled and housed in a compact metal cabinet. A type 59 is used as a Tri-Tet oscillator and a pair of 46's in parallel as the power amplifier. Complete details covering its construction and operation are given in the article.

power output for plate voltages of the order of 400 to 500 volts.

Plug-in crystal holders are used in the grid circuit of the 59 tube. Crystals of any frequency in the 160-80-40-meter bands may be used. Negative grid bias for the oscillator is obtained by means of the rectified grid current flowing through the grid-leak R1. The condenser-coil combination in the cathode circuit tunes to the neighborhood of the crystal frequency in order for oscillation to occur. The output section of the 59 is tuned to either the crystal frequency or some multiple of it. The cathode condenser C1 is always *shorted out* when the plate circuit is tuned to the crystal frequency, thereby causing the tube to oscillate as a straight R.F. pentode oscillator.

The output of the 59 is capacity-coupled into the grid of the two 46's. Bias for them is obtained from the grid resistor 2. The R.F. choke should be one that is designed for high frequency work, otherwise there will be a considerable power loss at this point. The plate circuit of the amplifier is tuned to any frequency in the 20-40-80-meter bands, depending upon the crystal frequency. The amplifier ALWAYS functions as a straight amplifier in this arrangement. Series feed is used on the plates of all of the tubes, as this method minimizes danger of R.F. getting into the power supply. The antenna coil L5 and its associated tuning condenser connect to the antenna system through the two stand-off insulators shown on the top of the cabinet. Keying is accomplished by interrupting the grid circuit of the two 46's.

Front Panel Layout

Looking at the front panel we have the cathode tuning condenser at the lower right corner and the plate tuning condenser to its left. At the bottom center is a toggle switch, which is used to cut off the plate voltage during receiving periods. Just above the switch is the neutralizing control, neutralizing voltage being furnished by the plate circuit of the 59 tube. The meter on the right has a range of 0-50 M.A. D.C. and reads the plate current of the 59, whereas the one on the left has a range of 0-200 M.A. D.C. and reads the amplifier plate current. The control in the upper right corner is the amplifier plate tuning condenser; the one to its left is the antenna series condenser. Ventilating louvres provide an adequate circulation of air for cooling purposes.

Rear View

Looking at the rear of the cabinet we see the 59 tube on the lower shelf. To the left of it we see the plug-in crystal holder and the cathode coil. To the right of the tube is the plate coil of the 59 and the power supply cable. On the upper deck are the 46 tubes and the plug-in plate-antenna coil and associated tuning equipment.

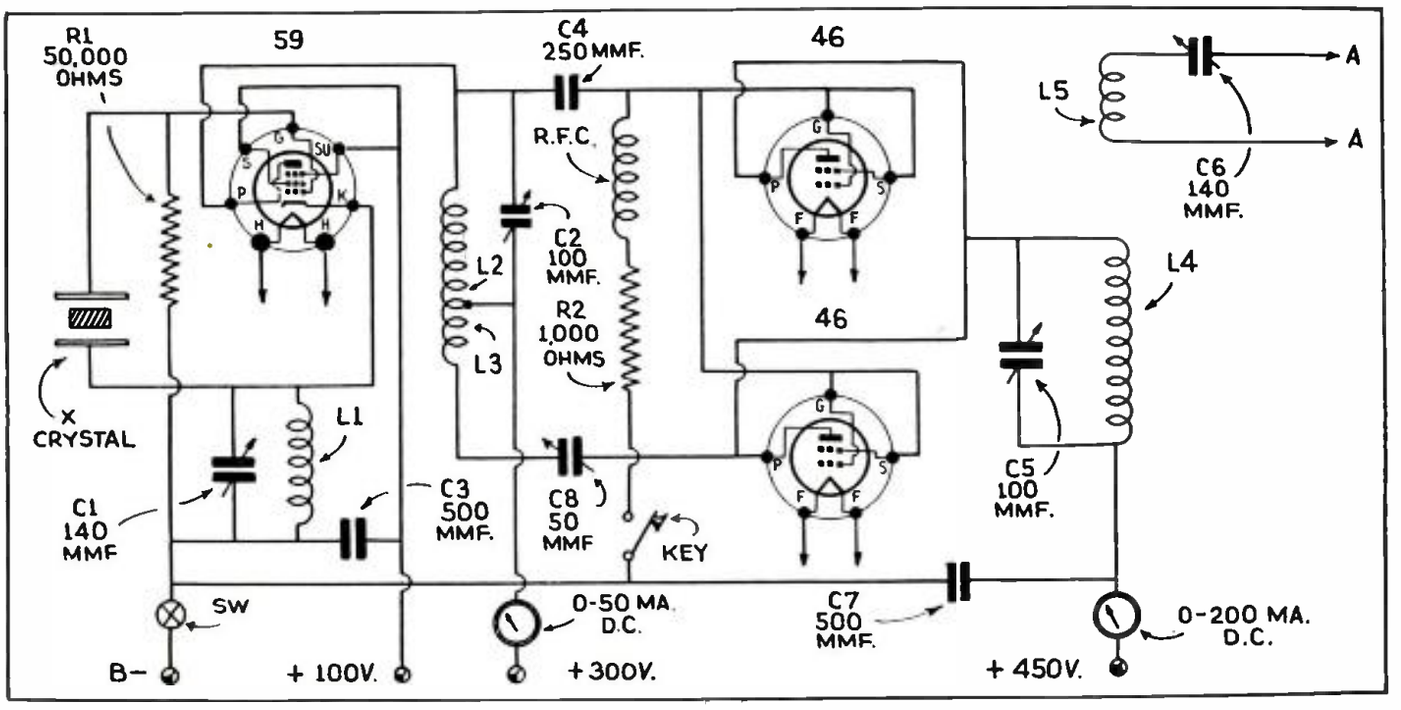
Tuning Procedure

As an example of the tuning procedure let us assume that we wish to operate on the 20-meter band. Proceed as follows:

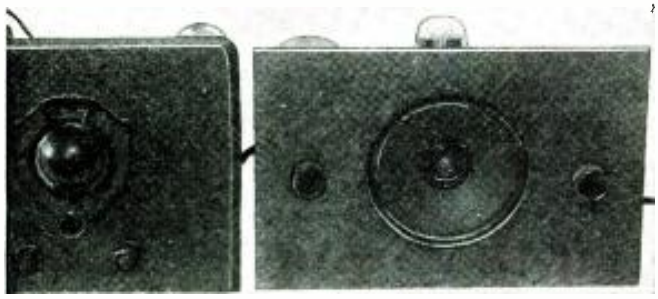
1. Plug a 40-meter crystal in the holder.
2. Plug in coil No. 6 in the cathode coil socket.
3. Plug in coil No. 7 in the plate circuit of the 59.
4. Plug in coil No. 7 in the plate circuit of the 46's.
5. Set C1 at about 75 percent of full scale, and adjust C2 for minimum plate current of the 59 tube.
6. Using the usual loop and flashlight bulb, neutralize the amplifier stage in the usual manner.
7. Close the key and *rapidly* tune the amplifier plate circuit for minimum plate current.
8. Tune the antenna circuit condenser until the amplifier is fully loaded as indicated by an increase in amplifier plate current.

The tuning for other bands is similar to the above. In cases where it is desired to transmit on the crystal frequency turn the cathode condenser to full-scale reading, in which position it automatically short-circuits itself. Then adjust the plate circuit of the 59 as before. The remainder of the tuning is the same as outlined before.

(Continued on page 489)



Wiring diagram showing the connections of the Oscillator and Amplifier stages of the Eilen transmitter.



The power unit in operation with a small S-W receiver.

Audio Amplifier and Power Supply for S-W Receivers

By Van Atwell

An excellent power amplifier, speaker and power-supply unit; it operates on 110 volts A.C.

● THE audio amplifier and power supply to be described in this article was designed for the Short-Wave fan with a modest pocketbook. The total cost of the unit including a speaker should not exceed ten dollars.

When this outfit is hooked up with a simple set using a 6C6 as a regenerative detector the volume on distant stations is all one could hope for. A tone control was incorporated in order to lower the noise level when going after those "hard-to-get" stations. An earphone jack was also added so that those who prefer to "fish" that way will be able to do so.

To start construction of the unit, procure a small chassis, such as those used for the popular midget A.C.-D.C. broadcast receivers. Cut out the mounting holes for the power transformer on the right end near the back, mount the three sockets at the back starting at the left-hand side, the "76" first, the "42" next, and then the "80." The dual electrolytic condenser is mounted just in front of the "76" socket, leaving clearance for the phone jack, which is mounted on the panel.

The power transformer is then bolted into position. When fastening down the transformer do not be afraid to secure it well. A very annoying mechanical hum will result if this precaution is not taken.

The terminal strip is then fastened at the left end of the chassis. This was made of a strip of ⅛" bakelite 1" x 5" but, the length depends, of course, on the depth of the chassis used.

Do not mount the speaker until most of the rough wiring is completed. Start with the heaters of the 76 and 42 tubes and continue the leads to terminals and ground one side to the chassis. After the heaters are wired, the next step is to wire in the cathode resistors and by-pass condensers.

Rear view of the amplifier—power supply unit.

A 2500-ohm ½-watt carbon resistor is used in the 76 cathode, by-passed by a 1 mf. 20 volt tubular condenser. The 42, owing to its greater current consumption, needs a heavier cathode resistor, this being a 400-ohm, 5-watt affair, of the wire-wound variety. With 250 volts on the plate, this size resistor is the correct value to bias the tube at its proper grid voltage of 16½ volts. This resistor should be by-passed by a 10 mf. 35 volt tubular electrolytic condenser to avoid degenerative effects at low audio frequencies.

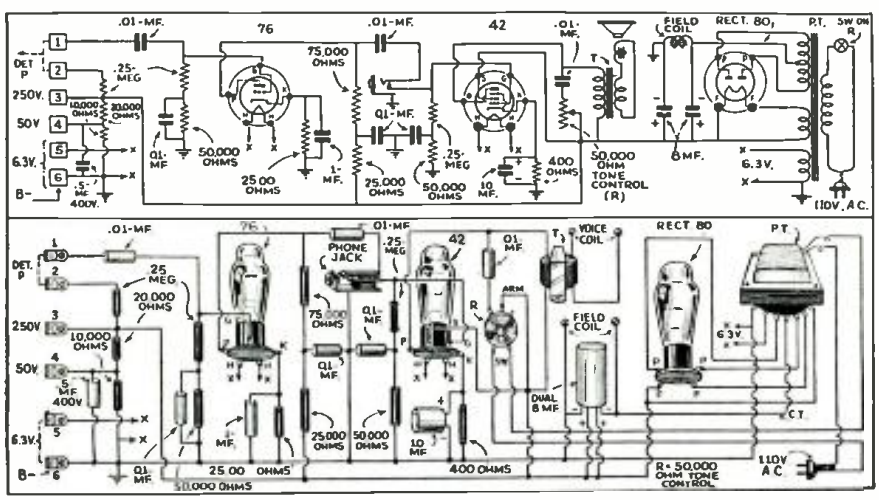
The speaker can now be mounted as it is part of the filter system and would be rather difficult to wire in, were we to leave it till later in the wiring process. It is fastened to the chassis with two bolts through the bracket. The front edge of the cone should be even with the front edge of the chassis. One end of the field winding is connected to the center tap of the high voltage secondary of the power transformer. At this same point, connect one negative (or minus) lead of the dual 8 mf. electrolytic filter condenser. The other end of the field is connected to ground, that is, soldered to the chassis at any convenient point. The second negative lead of the dual electrolytic condenser is also connected to ground. Both positive (or plus) leads go to the B plus connection.

One lead of the output transformer is connected to the plate of the 42. The second lead is soldered to B plus.

The B plus connection is taken off one side of the filament winding of the 80 tube and continues through the set to Post No. 3 on the terminal strip.

Now run a .01 mf. tubular condenser from post No. 1 to the grid terminal of the 76 socket and from that point to

(*Continued on page* 486)



These diagrams show clearly how the various connections are made.

CORRECTED AND REVISED Monthly

Short-Wave Stations of the World

Complete List of Broadcast, Police and Television Stations

We present herewith a revised list of the short-wave broadcasting, experimental and commercial radiophone stations of the world. This is arranged by frequency, but the wavelength figures are also given for the benefit of readers who are more accustomed to working with "meters."

All the stations in this list use telephone transmission of one kind or another and can therefore be identified by the average listener.

Herewith is also presented a very fine list of police as well as television stations. Note: Stations marked with a star ★ are the most active and easily heard stations and transmit at fairly regular times.

Please write to us about any new stations or other important data that you learn through announcements over the air or correspondence with the stations themselves. A post card will be sufficient. We will safely return to you any verifications that you send in to us. Communications of this kind are a big help.

Stations are classified as follows: C—Commercial phone. B—Broadcast service. X—Experimental transmissions.

Around-the-Clock Listening Guide

Although short-wave reception is notorious for its irregularity and seeming inconsistency (wherein lies its greatest appeal to the sporting listener), it is a good idea to follow a general schedule as far as wavelength in relation to the time of the day is concerned. The observance of these simple rules will save time.

From daybreak till 5 p.m. and particularly during bright daylight, listen between 13 and 19 meters (21540 to 15800 kc.).

To the east of the listener, from about 3 p.m.-8 p.m., the 25-35 meter will be found very productive. To the west of the listener this same band is best from about 10 p.m. until shortly after daybreak. (After dark, results above 35 meters are usually much better than during daylight.) These general rules hold for any location in the Northern Hemisphere.

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

NOTE: To convert kc. to megacycles (mc.) shift decimal point 3 places to left: Thus, read 21540 kc. as 21.540 mc.

21540 kc. W8XK
-B- 13.93 meters
WESTINGHOUSE ELECTRIC
PITTSBURGH, PA.
7-9 a.m.; relays KDKA

21420 kc. WKK
-C- 14.01 meters
A. T. & T. CO.
LAWRENCEVILLE, N. J.
Calls Argentina, Brazil and Peru, daytime

21060 kc. WKA
-C- 14.25 meters
LAWRENCEVILLE, N. J.
Calls England
noon

21020 kc. LSN6
-C- 14.27 meters
HURLINGHAM, ARG.
Calls N. Y. C.
6 a. m.-5 p. m.

20700 kc. LSY
-C- 14.49 meters
MONTE GRANDE
ARGENTINA
Tests irregularly

20380 kc. GAA
-C- 14.72 meters
RUGBY, ENGLAND
Calls Argentina, Brazil, mornings

19900 kc. LSG
-C- 15.08 meters
MONTE GRANDE,
ARGENTINA
Tests irregularly, daytime

19820 kc. WKN
-C- 15.14 meters
LAWRENCEVILLE, N. J.
Calls England, daytime

19650 kc. LSN5
-C- 15.27 meters
HURLINGHAM, ARGENTINA
Calls Europe, daytime

19600 kc. LSF
-C- 15.31 meters
MONTE GRANDE,
ARGENTINA
Tests irregularly, daytime

19380 kc. WOP
-C- 15.48 meters
OCEAN GATE, N. J.
Calls Peru, daytime

19355 kc. FTM
-C- 15.50 meters
ST. ASSISE, FRANCE
Calls Argentine, mornings

19220 kc. WKF
-C- 15.60 meters
LAWRENCEVILLE, N. J.
Calls England, daytime

19160 kc. GAP
-C- 15.66 meters
RUGBY, ENGLAND
Calls Australia, early a.m.

18970 kc. GAQ
-C- 15.81 meters
RUGBY, ENGLAND
Calls S. Africa, mornings

18830 kc. ★PLE
-C- 15.93 meters
BANDOENG, JAVA
Calls Holland, early a. m.
Broadcasts Tues., Thurs., Sat. 10-10:30 a.m.

18620 kc. GAU
-C- 16.11 meters
RUGBY, ENGLAND
Calls N. Y., daytime

18345 kc. FZS
-C- 16.35 meters
SAIGON, INDO-CHINA
Phones Paris, early morning

18340 kc. WLA
-C- 16.36 meters
LAWRENCEVILLE, N. J.
Calls England, daytime

18310 kc. GAS
-C- 16.38 meters
RUGBY, ENGLAND
Calls N. Y., daytime

18250 kc. FTO
-C- 16.43 meters
ST. ASSISE, FRANCE
Calls S. America, daytime

18200 kc. GAW
-C- 16.48 meters
RUGBY, ENGLAND
Calls N. Y., daytime

18135 kc. PMC
-C- 16.54 meters
BANDOENG, JAVA
Phones Holland, early a. m.

18115 kc. LSY3
-C- 16.56 meters
MONTE GRANDE,
ARGENTINA
Tests irregularly

18040 kc. GAB
-C- 16.63 meters
RUGBY, ENGLAND
Calls Canada,
morn. and early aftn.

17810 kc. PCV
-C- 16.84 meters
KOOTWIJK, HOLLAND
Calls Java, 6-9 a. m.

17790 kc. GSG
-B- 16.86 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
6-6:45 a.m.

17780 kc ★W3XAL
-B- 16.87 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ. Daily exc. Sun.
9 a.m.-1 p.m.

17775 kc. PHI
-B- 16.88 meters
HUIZEN, HOLLAND
Daily exc. Tues. and Wed. 8:30-10:30, Sat. and Sun. till 11:30

17760 kc. ★DJE
-B- 16.89 meters
BROADCASTING HOUSE
BERLIN, GERMANY
Irregular 8-11:30 a.m.

17760 kc. IAC
-C- 16.89 meters
PISA, ITALY
Calls ships, 6:30-7:30 a. m.

17310 kc. W3XL
-X- 17.33 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Tests irregularly

17120 kc. WOO
-C- 17.52 meters
A. T. & T. CO.,
OCEAN GATE, N. J.
Calls ships

17080 kc. GBC
-C- 17.56 meters
RUGBY, ENGLAND
Calls Ships

16270 kc. WLK
-C- 18.44 meters
LAWRENCEVILLE, N. J.
Phones
Arg., Braz., Peru, daytime

16270 kc. WOG
-C- 18.44 meters
OCEAN GATE, N. J.
Calls England,
morning and early afternoon

16240 kc. KTO
-C- 18.47 meters
MANILLA, P. I.
Calls Cal., Tokio and ships
8-11:30 a.m.

16233 kc. FZR3
-C- 18.48 meters
SAIGON, INDO-CHINA
Calls Paris and Pacific Isles

15880 kc. FTK
-C- 18.90 meters
ST. ASSISE, FRANCE
Phones Saigon, morning

15810 kc. LSL
-C- 18.98 meters
HURLINGHAM, ARGENTINA
Calls
Brazil and Europe, daytime

15760 kc. JYT
-X- 19.04 meters
KEMIKWA-CHO, CHIBA-KEN, JAPAN
Irregular in late afternoon and early morning

15660 kc. JVE
-C- 19.16 meters
NAZAKI, JAPAN
Phones Java 3-5 a.m.

15620 kc. JVF
-C- 19.2 meters
NAZAKI, JAPAN
Phones U.S., 5 a.m. & 4 p.m.

15415 kc. KWO
-C- 19.46 meters
DIXON, CAL.
Phones Hawaii 2-7 p.m.

15370 kc. ★HAS3
-B- 19.52 meters
BUDAPEST, HUNGARY
Broadcasts Sundays, 9-10 a.m.

15355 kc. KWU
-C- 19.53 meters
DIXON, CAL.
Phones Pacific Isles and Japan

15330kc.★W2XAD
-B- 19.56 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays
WGY daily, 2-3 p.m.
Sun. 10:30 a.m.-4 p.m.

15280 kc. DJQ
-B- 19.63 meters
BROADCASTING HOUSE
BERLIN, GERMANY
8-11:30 a.m.

15270 kc. ★W2XE
-B- 19.65 meters
ATLANTIC BROADCASTING CORP.
485 Madison Av., N.Y.C.
Relays
WABC daily, 11 a.m.-6 p.m.

15260 kc. GSI
-B- 19.66 meters
DAVENTRY, ENGLAND
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
12:15-2:15 p.m.

15250 kc. W1XAL
-B- 19.67 meters
BOSTON, MASS.
Irregular, in mornins

15245 kc. ★
-B- 19.68 meters
"RADIO COLONIAL"
PARIS, FRANCE
Service de la Radiodiffusion
103 Rue de Grenelle, Paris
7-11 a.m.

15220 kc. ★PCJ
-B- 19.71 meters
N.V. PHILIPS' RADIO
EINDHOVEN, HOLLAND
Sat. and Sun. 8:30-11:30 a.m.
Also Tues. 3-6 a.m.,
Wed. 7-11 a.m.

15210 kc. ★W8XK
-B- 19.72 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
9 a.m.-7 p.m.
Relays KDKA

15200 kc. ★DJB
-B- 19.74 meters
BROADCASTING HOUSE
BERLIN, GERMANY
3:45-7:15 a.m., 8-11:30 a.m.

15140 kc. ★GSF
-B- 19.82 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
6-8:45, 9-10:30 a.m.

15120 kc. ★HVJ
-B- 19.83 meters
VATICAN CITY
ROME, ITALY
10:30 to 10:45 a.m., exeept Sunday

15090 kc. RKI
-C- 19.88 meters
MOSCOW, U.S.S.R.
Phones Tashkent near 7 a.m. and relays RNE on Sundays irregularly

15055 kc. WNC
-C- 19.92 meters
HIALEAH, FLORIDA
Calls Central America, daytime

14980 kc. KAY
-C- 20.03 meters
MANILA, P. I.
Phones Pacific Isles

14950 kc. HJB
-C- 20.07 meters
BOGOTA, COL.
Calls WNC, daytime

(All Schedules Eastern Standard Time)

14600 kc. JVH
-B.C- 20.55 meters.
NAZAKI, JAPAN
Broadcasts Mon. and Thurs. 4-5 p.m.

14590 kc. WMN
-C- 20.56 meters
LAWRENCEVILLE, N. J.
Phones England morning and afternoon

14535 kc. HBJ
-B- 20.64 meters
RADIO NATIONS, GENEVA, SWITZERLAND
Broadcasts irregularly

14500 kc. LSM2
-C- 20.69 meters
HURLINGHAM, ARGENTINA
Calls U. S., evening

14485 kc. TIR
-C- 20.71 meters
CARTAGO, COSTA RICA
Phones Cen. Amer. & U.S.A. Daytime

14485 kc. HPF
-C- 20.71 meters
PANAMA CITY, PAN.
Phones WNC daytime

14485 kc. TGF
-C- 20.71 meters
GUATEMALA CITY, GUAT.
Phones WNC daytime

14485 kc. YNA
-C- 20.71 meters
MANAGUA, NICARAGUA
Phones WNC daytime

14470 kc. WMF
-C- 20.73 meters
LAWRENCEVILLE, N. J.
Phones England morning and afternoon

14440 kc. GBW
-C- 20.78 meters
RUGBY, ENGLAND
Calls U.S.A., afternoon

13990 kc. GBA
-C- 21.44 meters
RUGBY, ENGLAND
Calls Buenos Aires, late afternoon

13610 kc. JYK
-C- 22.04 meters
KEMIKAWA-CHO, CHIBA-KEN, JAPAN
Phones California till 11 p. m.

13585 kc. GBB
-C- 22.08 meters
RUGBY, ENGLAND
Calls Egypt & Canada, afternoons

13415 kc. GCJ
-C- 22.36 meters
RUGBY, ENGLAND
Calls Japan & China early morning

13390 kc. WMA
-C- 22.40 meters
LAWRENCEVILLE, N. J.
Phones England morning and afternoon

13345 kc. YVC
-C- 22.48 meters
MARACAY, VENEZUELA
Calls Hialeah daytime

13075 kc. VPD
-X- 22.94 meters
SUVA, FIJI ISLANDS
Daily exc. Sun. 12:30-1:30 a.m.

12840 kc. WOO
-C- 23.36 meters
OCEAN GATE, N. J.
Calls ships

12825 kc. CNR
-B, C- 23.39 meters
DIRECTOR GENERAL
Telegraph and Telephone Stations, Rabat, Morocco
Broadcasts, Sunday, 7:30-9 a. m.

12800 kc. IAC
-C- 23.45 meters
PISA, ITALY
Calls Italian ships, mornings

12780 kc. GBC
-C- 23.47 meters
RUGBY, ENGLAND
Calls ships

12396 kc. CT1GO
-B- 24.2 meters
PAREDE, PORTUGAL
Sun. 10-11:30 a.m., Tues., Thur., Fri. 1:00-2:15 p.m.

12290 kc. GBU
-C- 24.41 meters
RUGBY, ENGLAND
Calls N.Y.C., afternoon

12235 kc. TFJ
-C- 24.52 meters
REYKJAVIK, ICELAND
Phones England mornings, Broadcasts irregularly

12150 kc. GBS
-C- 24.69 meters
RUGBY, ENGLAND
Calls N.Y.C., afternoon

12000 kc. ★RNE
-B- 25 meters
MOSCOW, U. S. S. R.
Sun. 6-9, 10-11 a.m., 12:30 p.m. Wed. 5-6 a.m.

11991 kc. FZS2
-C- 25.02 meters
SAIGON, INDO-CHINA
Phones Paris, morning

11950 kc. KKQ
-X- 25.10 meters
BOLINAS, CALIF.
Tests, irregularly, evenings

11940 kc. FTA
-C- 25.13 meters
STE. ASSISE, FRANCE
Phones CNR morning, Hurlingham, Arge., nights

11890 kc. ★
-B- 25.23 meters
"RADIO COLONIAL"
PARIS, FRANCE
11:50 a.m.-6 p.m.

11870 kc. ★W8XK
-B- 25.26 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
5-9 p.m.
Fri. till 12 m
Relays KDKA

11860 kc. GSE
-B- 25.29 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND

11830 kc. W2XE
-B- 25.36 meters
ATLANTIC BROADCASTING CORP.
485 MADISON AVE., N. Y. C.
Relays WABC 6-8 p.m.

11810 kc. ★2RO
-B- 25.4 meters
E.I.A.R.
Via Montello 5
ROME, ITALY
8:15-9 a.m., 9:15-10:15 a.m., 12 n.-1 p.m., 1:45-5 p.m.

11800 kc. CO9WR
-X- 25.42 meters
P. O. Box 85
SANCTI SPIRITUS, CUBA
Testing in early evening

11790 kc. W1XAL
-B- 25.45 meters
BOSTON, MASS.
Sun. 5-7 p.m.

11770 kc. DJD
-B- 25.49 meters
BROADCASTING HOUSE, BERLIN, GERMANY
12-4:30 p.m.

11750 kc. ★GSD
-B- 25.53 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
3-5 a.m., 9 a.m.-12n; 12:15-4 p.m.

11730 kc. PHI
-B- 25.57 meters
HUIZEN, HOLLAND
Daily exc. Tues. and Wed. 8:30-10:30 a.m., Sun. 8:30-11:30 a.m.

11720 kc. ★CJRX
-B- 25.6 meters
WINNIPEG, CANADA
Daily, 8 p. m.-12 m.

11715 kc. ★
-B- 25.61 meters
"RADIO COLONIAL"
PARIS, FRANCE
7-10:10 p.m.
11 p.m.-1 a.m., 6-6:10 a.m.

11710 kc. ★HJ4ABA
-B- 25.62 meters
P. O. BOX 50,
MEDELLIN, COLOMBIA
11:30 a.m.-1 p.m., 6:30-10:30 p.m.

11680 kc. KIO
-X- 25.68 meters
KAHUKU, HAWAII
Tests in the evening

11560 kc. VIZ3
-X- 25.95 meters
AMALGAMATED WIRELESS OF AUSTRALASIA
FISKVILLE, AUSTRALIA
Calls Canada evening and early a.m.

11413 kc. CJA4
-C- 26.28 meters
DRUMMONDVILLE, QUE., CAN.
Tests with Australia irregularly in evening

11050 kc. ZLT4
-C- 27.15 meters
WELLINGTON, N. ZEALAND
Phones Australia and England early a.m. Also broadcasts irregularly on Sunday, 9-10 a.m.

11000 kc. PLP
-B-C- 27.27 meters
BANDOENG, JAVA
Relays NIROM programs 5:30-11 a.m. irregular on Sundays

10770 kc. GBP
-C- 27.85 meters
RUGBY, ENGLAND
Calls
Sydney, Austral. early a. m.

10740 kc. ★JVM
-B- 27.93 meters
NAZAKI, JAPAN
Daily 12m.-1 a.m., 4-8 a.m. Tues. and Fri. 2-3 p.m.

10675 kc. WNB
-C- 28.1 meters
LAWRENCEVILLE, N. J.
Calls Bermuda, daytime

10670 kc. ★CEC
-C- 28.12 meters
SANTIAGO, CHILE
Broadcasts Thurs., Sun. 8:30-9 p.m.

10660 kc. ★JVN
-C- 28.14 meters
NAZAKI, JAPAN
Broadcasts
irregularly 2-7:45 a.m.

10550 kc. WOK
-C- 28.44 meters
LAWRENCEVILLE, N. J.
Phones
Arge., Braz., Peru, nights

10520 kc. VLK
-C- 28.51 meters
SYDNEY, AUSTRALIA
Calls Rugby, early a.m.

10430 kc. YBG
-C- 28.76 meters
MEDAN, SUMATRA
5:30-6:30 a. m., 7:30-8:30 p. m.

10420 kc. XGW
-C- 28.79 meters
SHANGHAI, CHINA
Calls Manila and England, 6-9 a. m. and California late evening

10410 kc. PDK
-C- 28.80 meters
KOOTWIJK, HOLLAND
Calls Java 7:30-9:40 a. m.

10410 kc. KES
-X- 28.80 meters
BOLINAS, CALIF.
Tests evenings

10350 kc. LSX
-C- 28.98 meters
MONTE GRANDE, ARGENTINA
Tests irregularly 8 p.m.-12 midnight.

10330 kc. ORK
-B-C- 29.04 meters
RUYSSELEDE, BELGIUM
Broadcasts 1:30-3 p.m.

10300 kc. LSL2
-C- 29.13 meters
HURLINGHAM, ARGENTINA
Calls Europe, evenings

10290 kc. DIQ
-X- 29.16 meters
KONIGSWUSTERHAUSEN, GERMANY
Broadcasts irregularly

10260 kc. PMN
-C- 29.24 meters
BANDOENG, JAVA
Calls Australia 5 a.m.

10250 kv. LSK3
-C- 29.27 meters
HURLINGHAM, ARGENTINA
Calls Europe and U. S., afternoon and evening

10220 kc. PSH
-C- 29.35 meters
RIO DE JANEIRO, BRAZIL

10140 kc. OPM
-C- 29.59 meters
LEOPOLDVILLE, BELGIAN CONGO
Phones around 3 a.m.

10055 kc. ZFB
-C- 29.84 meters
HAMILTON, BERMUDA
Phones N. Y. C. daytime

9950 kc. GCU
-C- 30.15 meters
RUGBY, ENGLAND
Calls N.Y.C. evening

9890 kc. LSN
-C- 30.33 meters
HURLINGHAM, ARGENTINA
Calls New York, evenings

9870 kc. WON
-C- 30.4 meters
LAWRENCEVILLE, N. J.
Phones England, evening

9860 kc. ★EAQ
-B- 30.43 meters
P. O. Box 951
MADRID, SPAIN
Daily 5:15-7:30 p.m.;
Saturday also 12 n.-2 p.m.
Irregularly 7:30-9:30

9840 kc. JYS
-X- 30.49 meters
KEMIKAWA-CHO, CHIBA-KEN, JAPAN
Irregular, 4-7 a. m.

9800 kc. LSE
-C- 30.61 meters
MONTE GRANDE, ARGENTINA
Tests irregularly

9790 kc. GCW
-C- 30.64 meters
RUGBY, ENGLAND
Calls N.Y.C., evening

9760 kc. VLJ-VLZ2
-C- 30.74 meters
AMALGAMATED WIRELESS OF AUSTRALIA
SYDNEY, AUSTRALIA
Phones Java and N. Zealand early a.m.

9750 kc. WOF
-C- 30.77 meters
LAWRENCEVILLE, N. J.
Phones England, evening

9710 kc. GCA
-C- 30.89 meters
RUGBY, ENGLAND
Calls Arge. & Brazil, evenings

9635 kc. ★2RO
-B- 31.13 meters
E.I.A.R.,
ROME, ITALY
M., W., F. 6-9 p.m.

9625 kc. ★CT1AA
-B- 31.17 meters
LISBON, PORTUGAL
Tues., Thurs., Sat. 4:30-7 p.m.

9595 kc. ★HBL
-B- 31.27 meters
LEAGUE OF NATIONS
GENEVA, SWITZERLAND
Saturdays, 5:30-6:15 p. m.
Mon. at 1:45 a.m.

9590 kc. ★VK2ME
-B- 31.28 meters
AMALGAMATED WIRELESS, LTD., 47 YORK ST.
SYDNEY, AUSTRALIA
Sun. 1-3, 4:30-8:30, 9-11 a.m.

9590 kc. HP5J
-B- 31.28 meters
J Street,
PANAMA CITY, PANAMA
7:30-10 p.m.

9590 kc. W3XAU
-B- 31.28 meters
NEWTOWN SQUARE, PA.
Relays WCAU
12 N-7:30 p.m.

9580 kc. ★ GSC
-B- 31.32 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
4:15-5:45, 6-8, 10-11 p.m.

9580 kc. ★VK3LR
-B- 31.32 meters
Research Section,
Postmaster Gen'ls. Dept.,
61 Little Collins St.,
MELBOURNE, AUSTRALIA
3-7:30 a.m. except Sun. also Fri. 10:30 p.m.-2 a.m.

9570 kc. ★W1XK
-B- 31.35 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
SPRINGFIELD, MASS.
Relays WBZ, 7 a.m.-1 a.m. Sun. 8 a.m.-1 a.m.

9568 kc. LKJ1
-B- 31.35 meters
JELOY, NORWAY
5-8 a.m., 11 a.m.-6 p.m.

9565 kc. VUB
-B- 31.36 meters
BOMBAY, INDIA
11 a.m.-12:30 p.m., Wed., Thurs., Sat.

9560 kc. ★DJA
-B- 31.38 meters
BROADCASTING HOUSE, BERLIN
5:05-9:15 p.m.
12:30-2 a.m.
8-11:30 a.m.

9540 kc. ★DJN
-B- 31.45 meters
BROADCASTING HOUSE
BERLIN, GERMANY
12:30-2 a.m.
3:45-7:15 a.m.
5:05-10:45 p.m.

9530 kc. ★W2XAF
-B- 31.48 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY 4 p.m.-12 m.
Sun. 4:15 p.m.-12 m.

9518 kc. ★VK3ME
-B- 31.54 meters
AMALGAMATED WIRELESS, Ltd.
G. P. O. Box 1272L,
MELBOURNE, AUSTRALIA
Wed. to Sat.
5:00-7:00 a. m.

9510 kc. ★GSB
-B- 31.55 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
3-5 a.m., 10:30 a.m.-12 n. 12:15-4, 4:15-5:45 p.m.

9501 kc. ★PRF5
-B- 31.58 meters
RIO DE JANEIRO, BRAZIL
Irregularly 4:45-5:45 p.m.

9428 kc. ★COCH
-B- 31.8 meters
2 B ST., VEDADO,
HAVANA, CUBA
10 a.m.-12 n., 4-6:30, 8-10 p.m.
also 11 a.m.-12 N. Thurs.

9415 kc. PLV
-C- 31.87 meters
BANDOENG, JAVA
Phones Holland around 9:45 a.m.
Broadcasts Tues. and Thurs. 10-10:30 a.m.

9330 kc. CJA2
-C- 32.15 meters
DRUMMONDVILLE, CANADA
Phones England irregularly

9280 kc. GCB
-C- 32.33 meters
RUGBY, ENGLAND
Calls Can. & Egypt, evenings

9170 kc. WNA
-C- 32.72 meters
LAWRENCEVILLE, N. J.
Phones England, evening

9125 kc. HAT4
-B- 32.88 meters
"RADIOLABOR."
GYALI-UT. 22
BUDAPEST, HUNGARY
Sunday 6-7 p.m.

9060 kc. TFK
-C- 33.11 meters
REYKJAVIK, ICELAND
Phones London afternoons.
Broadcasts irregularly.

9020 kc. GCS
-C- 33.26 meters
RUGBY, ENGLAND
Calls N.Y.C., evenings

9010 kc. KEJ
-C- 33.3 meters
BOLINAS, CAL.
Relays NBC & CBS
Programs in evening irregularly

8795 kc. HKV
-B- 34.09 meters
BOGOTA, COLOMBIA
Irregular; 6:30 p.m.-12 m.

(All Schedules Eastern Standard Time)

8775 kc. PNI
-C- 34.19 meters
MAKASSER, CELEBES, N.I.
Phones Java around 4 a. m.

8760 kc. GCQ
-C- 34.25 meters
RUGBY, ENGLAND
Calls S. Africa, afternoon

8750 kc. ZEK
-B- 34.29 meters
HONGKONG, CHINA
Relays ZBW
Daily 11:30 p. m.-1:15 a. m.
Mon. and Thurs. 3-7 a. m.
Tues., Wed., Fri. 6-10 a. m.
Sat. 6-11 a. m.

8730 kc. GCI
-C- 34.36 meters
RUGBY, ENGLAND
Calls India, 8 a. m.

8680 kc. GBC
-C- 34.56 meters
RUGBY, ENGLAND
Calls ships

8560 kc. WOO
-C- 35.05 meters
OCEAN GATE, N. J.
Calls ships irregular

8380 kc. IAC
-C- 35.8 meters
Pisa, Italy

8220 kc. ZP10
-B- 36.4 meters
ASUNCION, PARAGUAY
7-9 p.m.

8214 kc. HCJB
-B- 36.5 meters
QUITO, ECUADOR
7-11 p.m., except Monday
Sun. 11 a.m.-12 n.; 4-10 p.m.

8185 kc. PSK
-C- 36.65 meters
RIO DE JANEIRO, BRAZIL
Irregularly

8170 kc. CO9JQ
-X- 36.72 meters
CAMAGUEY, CUBA
Broadcast 8-9 p.m. daily except Sat. and Sun.

8036 kc. CNR
-B- 37.33 meters
RABAT, MOROCCO
Sunday, 2:30-5 p. m.

7901 kc. LSL
-C- 37.97 meters
HURLINGHAM, ARGENTINA
Calls Brazil, night

7880 kc. JYR
-B- 38.07 meters
KEMIKAWA-CHO, CHIBA-KEN, JAPAN
4-7:40 a. m.

7860 kc. HC2JSB
-B- 38.17 meters
GUAYAQUIL, ECUADOR
8:15-11:15 p.m.

7799 kc. ★HBP
-B- 38.47 meters
LEAGUE OF NATIONS, GENEVA, SWITZERLAND
5:30-6:15 p. m., Saturday

7715 kc. KEE
-C- 38.89 meters
BOLINAS, CAL.
Relays NBC & CBS
Programs in evening irregularly

7630 kc. ZHJ
-B- 39.32 meters
PENANG, MALAYA
Daily 7-9 a.m.
also Sat. 11 p.m.-1 A.M. (Sun.)

7510 kc. JVP
-C- 39.95 meters
NAZAKI, JAPAN
Heard irregularly

7400 kc. HJ3ABD
-B- 40.54 meters
P. O. Box 509
BOGOTA, COLOMBIA
Daily 12-2 p. m.; 7-11 p. m.
Sunday, 5-9 p. m.

7380 kc. XECR
-B- 40.65 meters
FOREIGN OFFICE, MEXICO CITY, MEX.
Sun. 6-7 p.m.

7310 kc. HJ1ABD
-B- 41.04 meters
CARTAGENA, COLO.
Irregularly, evenings

7100 kc. HKE
-B- 42.25 meters
BOGOTA, COL., S. A.
Tue. and Sat. 8-9 p. m.; Mon. & Thurs. 6:30-7 p. m.

7030 kc. HRP1
-B- 42.67 meters
SAN PEDRO SULA, HONDURAS
Reported on this and other waves irregularly in evening

7000 kc. HJ1ABK
-B- 42 meters
CALLE, BOLIVIA, PROGROSO-IGUALDAD
BARRANQUILLA, COLOMBIA
Testing in evening

6905 kc. GDS
-C- 43.45 meters
RUGBY, ENGLAND
Calls N.Y.C. evening

6860 kc. KEL
-X- 43.70 meters
BOLINAS, CALIF.
Tests irregularly
11 a. m.-12 n.; 6-9 p. m.

6800 kc. HIH
-B- 44.12 meters
SAN PEDRO de MACORIS
DOMINICAN REP.
12:10-1:40 p.m., 6:40-7:40 p.m.,
Sun. 3-4 a.m. 12:10-1:40 p.m., 2:20-4:40 p.m.

6755 kc. WOA
-C- 44.41 meters
LAWRENCEVILLE, N. J.
Phones England, evening

6750 kc. JVT
-X- 44.44 meters
NAZAKI, JAPAN
KOKUSAI-DENWA KAISHA, LTD., TOKIO
Broadcasts 2-7:45 a.m.

6710 kc. ★TIEP
-B- 44.71 meters
LA-VOZ DEL TROPICO
SAN JOSE, COSTA RICA
APARTADO 257, Daily 7-10 p.m.

6672 kc. YVQ
-C- 44.95 meters
MARACAY, VENEZUELA
Broadcasts Sat. 8-9 p.m.

6660 kc. ★HC2RL
-B- 45.05 meters
P. O. BOX 759, GUAYAQUIL, ECUADOR, S. A.
Sunday, 5:45-7:45 p. m.
Tues., 9:15-11:15 p. m.

6650 kc. IAC
-C- 45.11 meters
PISA, ITALY
Calls ships, evenings

6620 kc. ★PRADO
-B- 45.30 meters
RIOBAMBA, ECUADOR
Thurs. 9-11:45 p.m.

6611 kc. RV72
-B- 45.38 meters
MOSCOW, U. S. S. R.
1-6 p. m.

6610 kc. HI4D
-B- 45.39 meters
SANTO DOMINGO, DOMINICAN REPUBLIC
Except Sun. 11:55 a.m.-1:40 p.m.; 4:40-7:40 p.m.

6600 kc. YV5AM
-B- 45.45 meters
"ECOS de LLANO"
SAN JUAN de LOS MORROS, VENEZUELA
Testing in evening

6550 kc. TIRCC
-B- 45.77 meters
RADIOEMISORA CATOLICA COSTARRICENSE
SAN JOSE, COSTA RICA
Sun. 12:45-2:30, 6-7, 8-9 p.m.

6528 kc. HIL
-B- 45.95 meters
SANTO DOMINGO, D.R.
Sat., 8-10 p.m.

6520 kc. ★YV6RV
-B- 46.01 meters
VALENCIA, VENEZUELA
5-7, 9-11 p.m., irregular

6500 kc. HJ5ABD
-B- 46.15 meters
MANIZALES, COL.
12-1:30 p. m., 7-10 p. m.

6447 kc. HJ1ABB
-B- 46.53 meters
BARRANQUILLA, COL., S. A.
P. O. BOX 715.
11:30 a. m.-1 p. m.; 5-10 p. m.

6410 kc. TI2PG
-B- 46.8 meters
APARTADO 225,
SAN JOSE, COSTA RICA
"Costa Rica Broadcasting"
9-10 p.m.

6450 kc. HJ4ABJ
-B- 46.51 meters
"LA VOZ de CAMBEBE,"
IBAQUE, COLOMBIA
6-9 p.m.

6425 kc. W9XBS
-X- 46.7 meters
Daily News Building,
Chicago, Ill.
Operates irregularly in afternoon

6385 kc. YN1GG
-B- 46.99 meters
"LA VOZ de LOS LAGOS,"
MANAGUA, NICARAGUA
Irregular in evening

6375 kc. YV4RC
-B- 47.06 meters
CARACAS VENEZUELA
4:30-10:30 p.m.

6316 kc. HIZ
-B- 47.5 meters
SANTO DOMINGO
DOMINICAN REPUBLIC
Daily except Sat. and Sun.
4:40-5:40 p. m.; Sat., 9:40-11:40 p. m.; Sun., 11:40 a. m.-1:40 p. m.

6230 kc. OAX4G
-B- 48 meters
Apartado 1242
LIMA, PERU
Wed. 7-11:30 p.m.

6198 kc. CT1GO
-B- 48.4 meters
Portuguese Radio Club.
PAREDE, PORTUGAL
Sun. 11:30 a.m.-1 p.m.
Daily exc. Tues. 7:20-8:30 p.m.

6185 kc. HI1A
-B- 48.5 meters
P. O. BOX 423, SANTIAGO, DOMINICAN REP.
11:40 a. m.-1:40 p. m.
7:40-9:40 p. m.

6175 kc. HJ2ABA
-B- 48.58 meters
TUNJA, COLOMBIA
1-2; 7:30-9:30 p.m.

6170 kc. HJ3ABF
-B- 48.62 meters
BOGOTA, COLOMBIA
6-11 p.m.

6160 kc. ★YV3RC
-B- 48.7 meters
CARACAS, VENEZUELA
10:30 a.m.- 1 p.m., 4:30-9:30 p.m.

6155 kc. CO9GC
-B- 48.74 meters
GRAU & CAMENEROS LABS., BOX 137, SANTIAGO, CUBA
9-10 a.m., 11:30 a.m.-1:30 p.m., 3-4:30 p.m., 10-11 p.m., 12 m.-2 a.m.

6150 kc. CSL
-B- 48.78 meters
LISBON, PORTUGAL
7-8:30 a.m., 2-7 p.m.

6150 kc. ★CJRO
-B- 48.78 meters
WINNIPEG, MAN., CANADA
8 p. m.-12 m.
Sun. 3-10:30 p. m.

6150 kc. HJ5ABC
-B- 48.78 meters
CALI, COLOMBIA
M., W., F., 7-10 p.m.

6140 kc. ★W8XK
-B- 48.86 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
Relays KDKA
9 p.m.-1 a.m.

6130 kc. COCD
-B- 48.92 meters
"La Voz del Aire"
CALLE G y 25, VEDADO, HAVANA, CUBA
Relays CMCD 8 p.m.-12 m.

6130 kc. HJ1ABE
-B- 48.92 meters
CARTAGENA, COL.
P. O. Box 31
Daily 11:15 a. m.-1 p. m.; Sun. 9-11 a.m.; Mon. 10 p.m.-12 m.
Wed. 8-11 p.m.

6130 kc. ZGE
-B- 48.92 meters
KUALA LUMPUR,
FED. MALAY STATES
Sun., Tue., and Fri., 6:40-8:40 a. m.

6120 kc. ★W2XE
-B- 49.02 meters
ATLANTIC BROADCASTING CORP.
485 MADISON AVE., N. Y. C.
Relays WABC, 8-11 p.m.

6112 kc. YV2RC
-B- 49.08 meters
CARACAS, VENEZUELA
Sun. 8:30 a.m.-10:30 p.m., Daily except Sun. 11 a.m.-1:30 p.m., 4-9:30 p.m.

6110 kc. ★GSL
-B- 49.10 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
2:15-4, 6-8, 10-11 p.m.

6110 kc. VUC
-B- 49.1 meters
CALCUTTA, INDIA
Daily except Sat., 3-5:30 a. m., 9:30 a. m.-noon;
Sat., 11:45 a. m.-3 p. m.

6105 kc. HJ4ABB
-B- 49.14 meters
MANIZALES, COL., S. A.
P. O. Box 175
Mon. to Fri. 12:15-1 p. m.;
Tues. & Fri. 7:30-10 p. m.;
Sun. 2:30-5 p. m.

6100 kc. ★W3XAL
-B- 49.18 meters
NATIONAL BROADCASTING CO.
BOUND BROOK, N. J.
Relays WJZ
Monday, Wednesday, Saturday, 5-6 p.m., Sun. 12 m-1 a.m.

6100 kc. ★W9XF
-B- 49.18 meters
DOWNERS GROVE, ILL.
Relays WENR, Chicago

6097 kc. JB
-B- 49.2 meters
AFRICAN BROADCASTING CO.
JOHANNESBURG, SOUTH AFRICA.
Sun.-Fri. 11:45 p.m. 12:30 a.m. (next day)
Mon.-Sat. 3:30-7 a.m.
9 a.m.-4 p.m.
Sun. 8-10:15 a.m.; 12:30-3 p.m.

6090 kc. ★CRCX
-B- 49.26 meters
TORONTO, CANADA
Daily 6 p.m.-12 m., Sun. 12 n -12m

6090 kc. VE9BJ
-B- 49.26 meters
SAINT JOHN, N. B., CAN.
7-8:30 p. m.

6080 kc. CP5
-B- 49.34 meters
LAPAZ, BOLIVIA
7-10:30 p. m.

6080 kc. W9XAA
-B- 49.34 meters
CHICAGO FEDERATION OF LABOR
CHICAGO, ILL.
Relays WCFL
Sunday 11:30 a. m.-9 p. m. and Tues., Thurs., Sat., 4 p. m.-12 m.

6072 kc. OER2
-B- 49.41 meters
VIENNA, AUSTRIA
9 a.m.-5 p.m.

6070 kc. HP5H
-B- 49.42 meters
COLON, PANAMA
Testing in evening.

6070 kc. HJ4ABC
-B- 49.42 meters
PERIERA, COL.
9:30-11:30 a.m., 7-8 or 9 p.m.

6070 kc. VE9CS
-B- 49.42 meters
VANCOUVER, B. C., CANADA
Sun. 1:45-9 p. m., 10:30 p. m.-1 a. m.; Tues. 6-7:30 p. m., 11:30 p. m.-1:30 a. m. Daily 6-7:30 p. m.

6065 kc. HJ4ABL
-B- 49.46 meters
MANIZALES, COL.
Daily 11 a.m.-12 n., 5:30-7:30 p.m., Sat. 10:30-11:30 p.m.

6060 kc. OXY
-B- 49.50 meters
SKAMLEBOAEK, DENMARK
1-6:30 p. m.; also 11 a. m.-12 n. Sunday

6060 kc. VQ7LO
-B- 49.5 meters
NAIROBI, KENYA, AFRICA
Mon.-Fri. 5:45-6:15 a.m., 11:30 a.m.-2:30 p.m. Also 8:30-9:30 a.m. on Tues. and Thurs. Sat. 11:30 a.m.-3:30 p.m. Sun. 11 a.m.-2 p.m.

6060 kc. ★W8XAL
-B- 49.50 meters
CROSLEY RADIO CORP.
CINCINNATI, OHIO
6:30 a.m.-8 p.m.; 11 p.m.-1 a.m.
Relays WLW

6060 kc. W3XAU
-B- 49.50 meters
NEWTOWN SQUARE, PA.
Relays WCAU, Philadelphia
8 p.m.-11 p.m.

6050 kc. GSA
-B- 49.59 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
See "When to Listen In" Column.

6045 kc. HJ3ABI
-B- 49.63 meters
BOGOTA, COLO.
Irregular in evening

6042 kc. HJ1ABG
-B- 49.65 meters
BARRANQUILLA, COLO.
12 n.-1 p.m., 6-10 p.m.
Sun. 1-6 p.m.

6040 kc. ★W4XB
-B- 49.67 meters
MIAMI BEACH, FLA.
Relays WIOD 12 n.-2 p.m., 5:30 p.m.-12 m.

6040 kc. PRA8
-B- 49.67 meters
RADIO CLUB OF PERNAMBUCO
PERNAMBUCO, BRAZIL
1-3 p.m., 4-7:30 p.m. daily

6040 kc. ★W1XAL
-B- 49.67 meters
BOSTON, MASS.
Tues., Thurs. 7:15-9:15 p.m.

6030 kc. ★HP5B
-B- 49.75 meters
P. O. BOX 910
PANAMA CITY, PAN.
12 N.-1 p.m., 8-10:30 p.m.

6030 kc. VE9CA
-B- 49.75 meters
CALGARY, ALBERTA, CAN.
Thurs. 9 a.m.-2 a.m. (Fri.);
Sun. 12 n.-12 m.
Irregularly on other days from 9 a.m.-12 m.

6020 kc. CQN
-B- 49.83 meters
MACAO, CHINA
Mon. and Fri. 3-5 a.m.

6020 kc. ★DJC
-B- 49.83 meters
BROADCASTING HOUSE, BERLIN
12 n.-4:30 p.m., 5:05-10:45 p. m.

6020 kc. HJ3ABH
-B- 49.83 meters
BOGOTA, COLO.
APARTADO 565
7-11 p.m.

6018 kc. ZHI
-B- 49.9 meters
RADIO SERVICE CO.,
20 ORCHARD RO.,
SINGAPORE, MALAYA
Mon., Wed. and Thurs 5:40-8:10 a.m. Sat. 10:40 p.m.-1:10 a.m. (Sun.) Every other Sunday 5:10-6:40 a.m.

6010 kc. ★COCO
-B- 49.92 meters
P.O. BOX 98
HAVANA, CUBA
Daily 9:30-11 a.m., 4-7 p.m. and 8-10 p.m.
Sat. also 11:30 p.m.-1:30 a.m.

6000 kc. TGW
-B- 50 meters
GUATEMALA CITY, GUAT.
12n-2 p.m., 7:30-8:30 p.m., 10 p.m.-12 m. Sat. also from 12 m.-6 a.m. (Sun.)

6000 kc. RV59
-B- 50 meters
MOSCOW, U. S. S. R.
Daily 3-6 p.m.

5990 kc. ★XEBT
-B- 50.08 meters
MEXICO CITY, MEX.
P. O. Box 79-44
8 a.m.-1 a.m.

5980 kc. XECW
-B- 50.17 meters
CALLE del BAJIO 120
MEXICO CITY, MEX.
4-4:30 p.m., 10:30 p.m., 12 m.

5980 kc. HIX
-B- 50.17 meters
SANTO DOMINGO, DOMINICAN REP.
Sun. 7:10 a.m.; Tues. and Fri. 11:10 a.m., 4:40 and 8:10 p.m.; Mon., Wed., Thurs. and Sat. 11:10 a.m. and 4:40 p.m.

5968 kc. HVJ
-B- 50.27 meters
VATICAN CITY (ROME)
2-2:15 p. m., daily. Sun., 5-5:30 a. m.

(All Schedules Eastern Standard Time)

5950 kc. HJ1ABJ
-B- 50.42 meters
SANTA MARTA, COLO.
11 a.m.-1 p.m., 7-9 p.m.

5950 kc. HJ4ABE
-B- 50.42 meters
MEDELLIN, COLO.
Mon. 7-11 p.m., Tues., Thurs., Sat. 6:30-8 p.m., Wed. and Fri. 7:30-11 p.m.

5940 kc. TG2X
-B- 50.5 meters
GUATEMALA CITY, GUAT.
4-6, 9-10 p.m.

5890 kc. HJ2ABC
-B- 50.97 meters
CUCUTA, COL.

5880 kc. YV8RV
-B- 51.02 meters
"LA VOZ de LARA"
BARQUISIMETO,
COLOMBIA
6-10 p.m.

5850 kc. ★YV5RMO
-B- 51.28 meters
CALLE REGISTRO, LAS DELICIAS APARTADO de CORRES 214
MARACAIBO, VENEZUELA
11:30 a.m.-1 p.m., 5:30-10 p.m.

5853 kc. WOB
-C- 51.26 meters
LAWRENCEVILLE, N. J.
Calls Bermuda, nights

5825 kc. TIGPH
-B- 51.5 meters
SAN JOSE, COSTA RICA
6:15-11 p.m.

5790 kc. JVU
-C- 51.81 meters
NAZAKI, JAPAN
Broadcasts 2-7:45 a.m.

5780 kc. HI1J
-B- 51.9 meters
SAN PEDRO de MACORIS, DOM. REP.
7-9:30 p.m.

5780 kc. OAX4D
-B- 51.9 meters
P.O. Box 853
LIMA, PERU
Mon., Wed. & Sat. 9-11:30 p.m.

5720 kc. YV10RSC
-B- 52.45 meters
"LA VOZ de TACHIRA,"
SAN CRISTOBAL,
COLOMBIA
Testing near 12 m.

5714 kc. HCK
-B- 52.5 meters
QUITO, ECUADOR, S. A.

5713 kc. TGS
-B- 52.51 meters
GAUTEMALA CITY, GUAT.
Tues., Thurs., and Sun. 6-8 p.m.

5500 kc. TI5HH
-B- 54.55 meters
SAN RAMON, COSTA RICA
Irregularly around 9:45 p.m.

5077 kc. WCN
-C- 59.08 meters
LAWRENCEVILLE, N. J.
Phones England irregularly

5025 kc. ZFA
-C- 59.7 meters
HAMILTON, BERMUDA
Calls U.S.A., nights

5000 kc. TFL
-C- 60 meters
REYKJAVIK, ICELAND
Calls London at night.
Also broadcasts irregularly

4975 kc. GBC
-C- 60.30 meters
RUGBY, ENGLAND
Calls Ships, late at night

4820 kc. GDW
-C- 62.24 meters
RUGBY, ENGLAND
Calls N.Y.C., late at night

4752 kc. WOO
-C- 63.1 meters
OCEAN GATE, N. J.
Calls ships irregularly

4600 kc. HC2ET
-B- 65.22 meters
Apartado 249
GUAYAQUIL, ECUADOR
Wed., Sat. 9-11:30 p.m.

4470 kc. YDB
-B- 67.11 meters
N.I.R.O.M.
SOERABAJA, JAVA
10:30 p.m.-1:30 a.m., 5:30-11 a.m., 5:45-6:45 p.m.

4320 kc. GDB
-C- 69.44 meters
RUGBY, ENGLAND
Tests, 8-11 p. m.

4273 kc. RV15
-B- 70.20 meters
KHABAROVSK, SIBERIA, U. S. S. R.
Daily, 3-9 a.m.

4272 kc. WOO
-C- 70.22 meters
OCEAN GATE, N. J.
Calls ships irregularly

4098 kc. WND
-C- 73.21 meters
HIALEAH, FLORIDA
Calls Bahama Isles

4002 kc. CT2AJ
-B- 74.95 meters
PONTA DELGADA,
SAO MIGUEL, AZORES
Wed. and Sat. 5-7 p. m.

3543 kc. CR7AA
-B- 84.67 meters
P. O. BOX 594
LOURENCO MARQUES, MOZAMBIQUE, E. AFRICA
1:30-3:30 p.m., Mon., Thurs., and Sat.

3490 kc. YDH3
-B- 85.96 meters
BANDOENG, JAVA
Daily except Fri., 4:30-5:30 a. m.

3040 kc. YDA
-B- 98.68 meters
N.I.R.O.M.
TANDJONGPRIOK, JAVA
10:30 p.m.-1:30 a.m., 5:30-11 a.m.

(All Schedules Eastern Standard Time)

Police Radio Alarm Stations

CGZ	Vancouver, B.C.	2342 kc.
CJW	St. Johns, N.B.	2390 kc.
CJZ	Verdeen, Que.	2390 kc.
KGHA		
KGHB		
KGHC	Portable-Mobile	
KGHD	In State of Wash.	2490 kc.
KGHE		
KGHG	Las Vegas, Nev.	2474 kc.
KGHK	Palo Alto, Cal.	1674 kc.
KGHM	Reno, Nev.	2474 kc.
KGHN	Hutchinson, Kans.	2450 kc.
KGHO	Des Moines, Iowa	1682 kc.
KGHP	Lakton, Okla.	2466 kc.
KGHQ	Chinook Pass, W.	2490 kc.
KGHR	(Mobile) in Wash.	2490 kc.
KGHS	Spokane, Wash.	2414 kc.
KGHT	Brownsville, Tex.	2382 kc.
KGHU	Austin, Tex.	2482 kc.
KGHV	Corpus Christi, Tex.	2382 kc.
KGHW	Centralia, Wash.	2414 kc.
KGHX	Santa Ana, Cal.	2490 kc.
KGHY	Whittier, Cal.	1712 kc.
KGHZ	Little Rock, Ark.	2406 kc.
KGJX	Pasadena, Cal.	1712 kc.
KGLX	Albuquerque, N.M.	2414 kc.
KGOZ	Cedar Rapids, Iowa	2466 kc.
KGPA	Seattle, Wash.	2414 kc.
KGPB	Minneapolis, Minn.	2430 kc.
KGPC	St. Louis, Mo.	1706 kc.
KGPD	San Francisco, Cal.	2474 kc.
KGPE	Kansas City, Mo.	2422 kc.
KGPF	Santa Fe, N.Mex.	2414 kc.
KGPG	Vallejo, Cal.	2422 kc.
KGPH	Oklahoma City, Okla.	2450 kc.
KGPI	Omaha, Neb.	2466 kc.
KGPJ	Beaumont, Tex.	1712 kc.
KGPK	Sioux City, Iowa	2466 kc.
KGPL	Los Angeles, Cal.	1712 kc.
KGPM	San Jose, Cal.	2466 kc.
KGPN	Davenport, Iowa	2466 kc.
KGPO	Tulsa, Okla.	2450 kc.
KGPP	Portland, Ore.	2442 kc.
KGPQ	Honolulu, T.H.	1712 kc.
KGPR	Minneapolis, Minn.	2430 kc.
KGPS	Bakersfield, Cal.	2414 kc.
KGPW	Salt Lake City, Utah	2406 kc.
KGPX	Denver, Colo	2442 kc.
KGPY	Baton Rouge, La.	1574 kc.
KGPZ	Wichita, Kans.	2450 kc.
KGZA	Fresno, Cal.	2414 kc.
KGZB	Houston, Tex.	1712 kc.
KGZC	Topeka, Kans.	2422 kc.
KGZD	San Diego, Cal.	2490 kc.
KGZE	San Antonio, Tex.	2482 kc.
KGZF	Chanute, Kans.	2450 kc.
KGZG	Des Moines, Iowa	2466 kc.
KGZH	Klamath Falls, Ore.	2382 kc.
KGZI	Wichita Falls, Tex.	2458 kc.
KGZJ	Phoenix, Ariz.	2430 kc.
KGZL	Shreveport, La.	1712 kc.
KGZM	El Paso, Tex.	2414 kc.
KGZN	Tacoma, Wash.	2414 kc.
KGZO	Santa Barbara, Cal.	2414 kc.
KGZP	Coffeyville, Kans.	2450 kc.
KGZQ	Waco, Tex.	1712 kc.
KGZR	Salem, Ore.	2442 kc.
KGZS	McAlester, Okla.	2458 kc.
KGZT	Santa Cruz, Cal.	1674 kc.
KGZU	Lincoln, Neb.	2490 kc.
KGZV	Aberdeen, Wash.	2414 kc.
KGZW	Lubbock, Tex.	2458 kc.
KGZX	Albuquerque, N.Mex.	2414 kc.
KGZY	San Bernardino, Cal.	1712 kc.
KIUK	Jefferson City, Mo.	1674 kc.
KNFA	Clovis, N.Mex.	2414 kc.
KNFB	Idaho Falls, Idaho	2414 kc.
KNFC	SS Gov. Stevens, (Wash.)	2490 kc.
KNFD	SS Gov. J. Rogers, (Wash.)	2490 kc.
KNFE	Duluth, Minn.	2382 kc.
KNFF	Leavenworth, Kans.	2422 kc.
KNFG	Olympia, Wash.	2490 kc.
KNFH	Garden City, Kans.	2474 kc.
KNFI	Mt. Vernon, Wash.	2414 kc.
KNFJ	Pomona, Cal.	1712 kc.
KNFK	Bellingham, Wash.	2490 kc.
KNFL	Shuksan, Wash.	2490 kc.
KNFM	Compton, Cal.	2490 kc.
KNFN	Waterloo, Iowa	1682 kc.
KNFO	Storm Lake, Iowa	1682 kc.
KNFP	Everett, Wash.	2414 kc.
KNFQ	Skykomish, Wash.	2490 kc.
KNGE	Cleburne, Tex.	1712 kc.
KNGF	Sacramento, Cal.	2422 kc.
KNGG	Phoenix, Ariz.	1698 kc.
KNGH	Dodge City, Kans.	2474 kc.
KNGJ	El Centro, Cal.	2490 kc.
KNGK	Duncan, Okla.	2450 kc.
KNGL	Galveston, Tex.	1712 kc.
KSNE	Duluth, Minn.	2382 kc.
KSW	Berkeley, Cal.	1658 kc.
KVP	Dallas, Tex.	1712 kc.
VDM	Halifax, N.S.	1690 kc.
VYR	Montreal, Can.	1706 kc.
VYW	Winnipeg, Man.	2396 kc.
WCK	Belle Island, Mich.	2414 kc.
WEY	Boston, Mass.	1630 kc.
WKDT	Detroit, Mich.	1630 kc.
WKDU	Cincinnati, Ohio	1706 kc.
WMDZ	Indianapolis, Ind.	2442 kc.
WMJ	Buffalo, N.Y.	2422 kc.
WMO	Highland Park, Mich.	2414 kc.
WMP	Framingham, Mass.	1666 kc.
WNFP	Niagara Falls, N.Y.	2422 kc.
WPDA	Tulare, Cal.	2414 kc.
WPDB	Chicago, Ill.	1712 kc.
WPDC	Chicago, Ill.	1712 kc.
WPDD	Chicago, Ill.	1712 kc.
WPDE	Louisville, Ky.	2442 kc.
WPDF	Flint, Mich.	2466 kc.
WPDG	Youngstown, Ohio	2458 kc.
WPDH	Richmond, Ind.	2442 kc.
WPDI	Columbus, Ohio	2430 kc.
WPDK	Milwaukee, Wis.	2150 kc.
WPDL	Lansing, Mich.	2442 kc.
WPDM	Dayton, Ohio	2430 kc.
WPDN	Auburn, N.Y.	2382 kc.
WPDO	Akron, Ohio	2458 kc.
WPDP	Philadelphia, Pa.	2474 kc.
WPDR	Rochester, N.Y.	2422 kc.
WPDS	St. Paul, Minn.	2430 kc.
WPDT	Kokomo, Ind.	2490 kc.
WPDU	Pittsburgh, Pa.	1712 kc.
WPDV	Charlotte, N.C.	2458 kc.
WPDW	Washington, D.C.	2122 kc.
WPDX	Detroit, Mich.	2414 kc.
WPDY	Atlanta, Ga.	2414 kc.
WPDZ	Fort Wayne, Ind.	2490 kc.
WPEA	Syracuse, N.Y.	2382 kc.
WPEB	Grand Rapids, Mich.	2442 kc.
WPEC	Memphis, Tenn.	2466 kc.
WPED	Arlington, Mass.	1712 kc.
WPEE	New York, N.Y.	2450 kc.
WPEF	New York, N.Y.	2450 kc.
WPEG	New York, N.Y.	2450 kc.
WPEH	Somerville, Mass.	1712 kc.
WPEI	E. Providence, R.I.	1712 kc.
WPEK	New Orleans, La.	2430 kc.
WPEL	W. Bridgewater, Mass.	1666 kc.
WPEM	Woonsocket, R.I.	2466 kc.
WPEP	Kenosha, Wis.	2450 kc.
WPES	Saginaw, Mich.	2442 kc.
WPET	Lexington, Ky.	1706 kc.
WPEV	Portable (in Mass.)	1666 kc.
WPEW	Northampton, Mass.	1666 kc.
WPFA	Newton, Mass.	1712 kc.
WPFC	Muskegon, Mich.	2442 kc.
WPFE	Reading, Pa.	2442 kc.
WPFG	Jacksonville, Fla.	2442 kc.
WPFH	Baltimore, Md.	2414 kc.
WPFI	Columbus, Ga.	2414 kc.
WPFJ	Hammond, Ind.	1712 kc.
WPFK	Hackensack, N.J.	2430 kc.
WPFL	Gary, Ind.	2470 kc.
WPFM	Birmingham, Ala.	2382 kc.
WPFN	Fairhaven, Mass.	1712 kc.
WPFO	Knoxville, Tenn.	2474 kc.
WPFP	Clarksburg, W.Va.	2490 kc.
WPFQ	Swarthmore, Pa.	2474 kc.
WPFR	Johnson City, Tenn.	2470 kc.
WPFS	Asheville, N.C.	2474 kc.
WPFT	Lakeland, Fla.	2442 kc.
WPFU	Portland, Me.	2422 kc.
WPFV	Pawtucket, R.I.	2466 kc.
WPFW	Bridgeport, Conn.	2466 kc.
WPFX	Palm Beach, Fla.	2442 kc.
WPFY	Yonkers, N.Y.	2442 kc.
WPFZ	Miami, Fla.	2442 kc.
WPGA	Bay City, Mich.	2466 kc.
WPGB	Port Huron, Mich.	2466 kc.
WPGC	S. Schenectady, N.Y.	1658 kc.
WPGD	Rockford, Ill.	2458 kc.
WPGF	Providence, R.I.	1712 kc.
WPGG	Findlay, Ohio	1596 kc.
WPGH	Albany, N.Y.	2414 kc.
WPGI	Portsmouth, Ohio	2430 kc.
WPGJ	Utica, N.Y.	2414 kc.
WPGK	Cranston, R.I.	2466 kc.
WPGL	Binghamton, N.Y.	2442 kc.
WPGN	South Bend, Ind.	2490 kc.
WPGO	Huntington, N.Y.	2490 kc.
WPGP	Muncie, Ind.	2442 kc.
WPGQ	Columbus, Ohio	1596 kc.
WPGS	Mineola, N.Y.	2490 kc.
WPGT	New Castle, Pa.	2482 kc.
WPGU	Cohasset, Mass.	1712 kc.
WPGV	Boston, Mass.	1712 kc.
WPGW	Mobile, Ala.	2382 kc.
WPGX	Worcester, Mass.	2466 kc.
WPGZ	Johnson City, Tenn.	2474 kc.
WPHA	Fitchburg, Mass.	2166 kc.
WPHB	Nashua, N.H.	2422 kc.
WPHC	Massillon, Ohio	1682 kc.
WPHD	Steubenville, Ohio	2458 kc.
WPHE	Marion Co., Ind.	1634 kc.
WPHF	Richmond, Va.	2450 kc.
WPHG	Medford, Mass.	1712 kc.
WPHI	Charleston, W.Va.	2490 kc.
WPHJ	Fairmont, W.Va.	2490 kc.
WPHK	Wilmington, Ohio	1596 kc.
WPHL	Portable in Ohio	1682 kc.
WPHM	Orlando, Fla.	2442 kc.
WPHN	Tampa, Fla.	2466 kc.
WPHO	Zanesville, Ohio	2430 kc.
WPHP	Jackson, Mich.	2466 kc.
WPHQ	Parkersburg, W.Va.	2490 kc.
WPHS	Culver, Ind.	1634 kc.
WPHT	Cambridge, Ohio	1682 kc.
WPHV	Bristol, Va.	2450 kc.
WPHY	Elizabethton, Tenn.	2474 kc.
WPSP	Harrisburg, Pa.	1674 kc.
WQFA	New Haven, Conn.	2466 kc.
WQFE	Seymour, Ind.	1634 kc.
WRBH	Cleveland, Ohio	2458 kc.
WRDQ	Toledo, Ohio	2474 kc.
WRDR	Grosse Pt. Village, Mich.	2414 kc.
WRDS	E. Lansing, Mich.	1666 kc.
W1XAO	Boston, Mass.	1712 kc.

"WHEN TO LISTEN IN"
Appears on Page 502

FOR TELEVISION STATIONS SEE PAGE 493

SHORT WAVE LEAGUE

HONORARY MEMBERS

Dr. Lee de Forest
John L. Reinartz
D. E. Replogle
Hollis Baird
E. T. Somerset
Baron Manfred von Ardenne
Hugo Gernsback

Executive Secretary

Further Hints on Forming Short-Wave League Clubs

● IN the article appearing in the *Short-Wave League* Department of the November issue, we describe the general procedure in forming a new "Short-Wave League" club. The rules and suggestions there given will be found valuable for use in forming a "short-wave" club of practically any size, and if you are contemplating the formation of a short-wave club, you should not fail to read the article on page 417 of the November issue. The method of calling the first meeting of the new club, the appointment of officers, and the drafting of the constitution and bylaws were there discussed.

Granting that the club has been formed, and the first or organization meeting held, and the officers and committees elected or appointed, let us consider a few of the important factors which help to keep such a club alive.

The "Code Class"

The average radio club probably has a number of members from the start who are not proficient in the radio code and who will have to be coached. Therefore, one of the members of the club, who is a licensed operator or who is an expert in code transmitting and receiving, will probably soon find himself faced with the job of teaching those unfamiliar with the code, and who may wish to prepare for the Government operator's license examinations. No transmitting license is issued by the Federal Communications Commission without a code test, the code requirement being that the applicant for the license must be able to copy code at a speed of ten words per minute.

All that is required to teach the code for a small class of two to six students possibly, is an ordinary buzzer, a couple of dry cells, a telegraph key, and a single headphone for each student, with a headband to hold the phone in place. The phone may be a cheap 75-ohm one or a cheap high-resistance radio receiver. The several pairs of phones (whether single or double), can be connected in series across the vibrator contacts of the buzzer, with a 0.1 mf. condenser in series with one of the wires leading to the phone or phones.

Copies of the Continental Code used by radio operators may be obtained from many radio supply houses, or you may look up and copy it from a book in your local library.

The next most important item in keeping a radio club running in good order, is to provide regular monthly talks or lectures on short-waves, general radio subjects, and once in a while *television* subjects perhaps. In most cases, sufficient talent will be found available among the club's members to permit the presentation of such a talk or lecture once a month. It seems to be one of the peculiar slants of human nature, however, that we grow so familiar with those always around us, such as the members of the club, that we do not always have the same interest in a talk given by one of our own club members perhaps, and it is, therefore, a very good idea to import an out-of-town speaker now and then.

New Members

To attract new members to the club, do not fail to get a reading notice in your local paper a few days or a week before the out-of-town speaker is to give the lecture. Also, you should endeavor to have a news item concerning the club's activities in your local newspaper. Report any lectures that are to be given, also that a code class holds regular sessions, and the dates on which the class meets and the hour. Nowadays, with so much activity among the high schools of the country, with special vocational classes being given at night for people of all ages, it should not be a very difficult matter to interest the instructor in physics, or the principal of the local grade or high school, to possibly provide a meeting room for the local radio club, especially when code instruction is offered by one of the members. This will all tie in with the

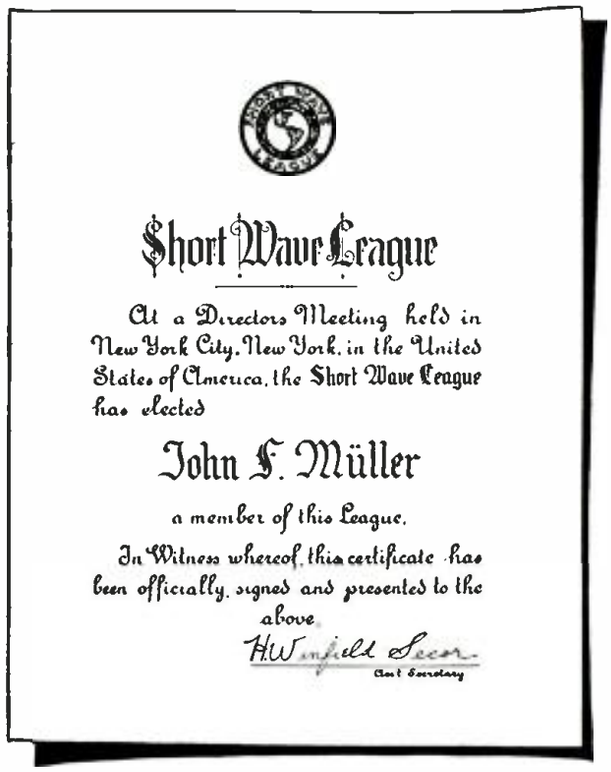
(Continued on page 501)

Here's Your Button

The illustration herewith shows the beautiful design of the "Official" Short Wave League button, which is available to everyone who becomes a member of the Short Wave League.

The requirements for joining the League are explained in a booklet, copies of which will be mailed upon request. The button measures ¾ inch in diameter and is inlaid in enamel—3 colors—red, white, and blue.

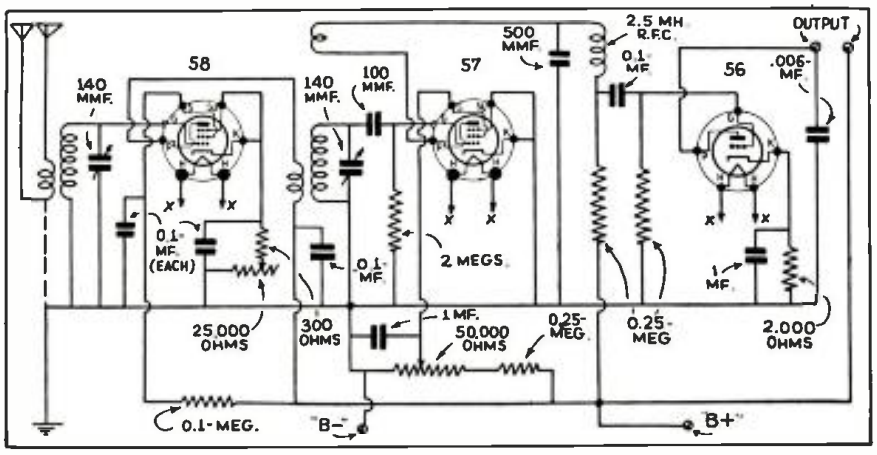
Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for $2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.



This is the handsome certificate that is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7¼" x 9½".

See page 452 how to obtain certificate.

• • • Short Wave



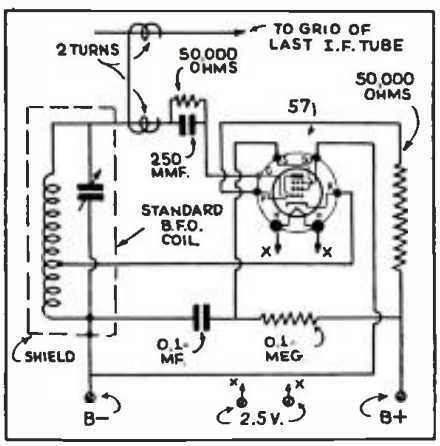
3-Tube T.R.F. Short-Wave Receiver.

3-TUBE S-W RECEIVER

John Kreyling, Bound Brook, N.J.

(Q) Will you please print a diagram of a 3-tube receiver using a 58, 57, and a 56, the 58 to be used as a tuned R.F. amplifier inductively coupled to the 57 detector and resistance coupling between the detector and the 56 audio amplifier?

(A) We are pleased to print the diagram you request. The R.F. gain-control is connected in the cathode circuit of the 58. Regeneration in the detector is controlled by a 50,000 ohm potentiometer. The antenna coil can be coupled to a doublet or an antenna and ground combination.



Beat Frequency Oscillator Diagram.

BEAT OSCILLATOR FOR SUPER-HET

Kenneth Jones, Los Angeles, Calif.

(Q) I am building the 6-tube superhet described by Stanley Olsson. I would like to have you print a circuit of a suitable beat frequency oscillator using a type 57 tube.

(A) In the beat oscillator shown, the coil and condenser is of standard manufacture. If you wish to construct this coil yourself, merely remove 25 or 30 turns from one coil of an I.F. transformer, making a tap at this point and winding back the turns removed. These transformers usually have two coils; only one is used.

1-TUBE, 5-METER RECEIVER

Lealand E. Gray, Jr., Framingham, Mass.

(Q) I have recently become interested in receiving the various 5-meter amateur phone stations and would like a hook-up of a simple set using one type 30 tube.

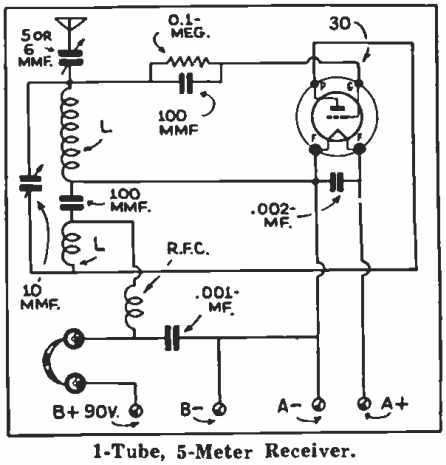
(A) In the diagram, we show a type 30 tube used as a self-quenching detector. The two coils marked "L" should have four or five turns each, of No. 14 wire, ½" inside diameter. The spacing between turns should be adjusted until the 5-meter band comes within the range of the tuning condenser. Proper operation is evidenced by a strong hissing sound.

MONITOR-FREQUENCY METER

Joe Paulsen, Pittsburgh, Pa.

(Q) I have built several combination monitors and frequency meters and have had quite a bit of trouble due to instability. Isn't there some way in which a pentagrid converter may be used to improve the stability of such a device?

(A) The 6A7 or 2A7 pentagrid converters can be used to considerable advantage in a combination frequency meter-monitor. In the diagram we find that the first three elements of the tube are used as an electron-coupled oscillator. The pentode section is used as an untuned detector or rectifier, with the pick-up coil in the grid circuit and a pair of phones connected in the plate circuit. The detector section does not need to be tuned. The coils should have 30 or 40 turns of fine wire wound on a 1" diameter form. This will allow the signals to come through and the oscillator section will heterodyne them. The tuned circuit "L and C" should be calibrated; the values will correspond to the usual coil-condenser combination.



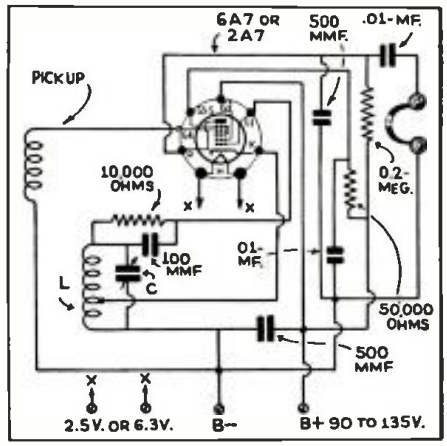
1-Tube, 5-Meter Receiver.

EDITED BY GEORGE

● Because the amount of work involved in the drawing of diagrams and the compilation of data, we are forced to charge 25c each for letters that are answered directly through the mail. This fee includes only hand-drawn schematic drawings. We cannot furnish "picture-layouts" or "full-sized" working drawings. Letters not accompanied by 25c will be answered in turn on this page. The 25c remittance may be made in

WHERE TO BUY PARTS

A number of our readers write to us every month, requesting information regarding the cost of building certain apparatus described in *Short Wave Craft*, and also where to buy the parts. It is not our policy to recommend any particular radio organization selling parts. However, in each parts list, we endeavor to specify standard makes of parts which can be obtained from any of the mail order radio supply houses advertising in *Short Wave Craft*. If you desire quotations on receivers and apparatus described in *Short Wave Craft*, write to these companies, and give them a list of parts, or better still ask them for a catalog and check the prices yourself.



Monitor-Frequency Meter Using Converter Tube.

REQUESTS FOR LARGE DIAGRAMS

In our daily mail, we constantly receive requests for diagrams of anywhere from 5 to 12-tube receivers. Many of these requests are accompanied by 25c required for answers directed through the mail. All the diagrams furnished through the mail are hand-drawn, and it is impossible for us to take the time necessary to construct a diagram of a multi-tube set. All such requests are refused, and the money is returned. If you desire a large diagram of a transmitter or receiver, refer to your back copies of *Short Wave Craft* in which you will surely find something that will suffice.

SPACE EXPLORER

Adolph Liveris, Worcester, Mass.

(Q) I am interested in constructing a 4-tube space explorer described in the August, 1934, issue of *Short Wave Craft*. The list called for a "Find-All" R.F. choke, and plate impedance. Also, what is the wattage of the flexible resistors?

(A) The Find-All R.F. choke should be 2.5 mh. The plate impedance may be anywhere from 300 to 500 henrys and the flexible resistors should be 2 watt units. For your information, condensers No. 12 and 19 are .1 mf, and No. 24A is .006 mf.

QUESTION BOX

W. SHUART, W2AMN

the form of stamps or coin.

Special problems involving considerable research will be quoted upon request. We cannot offer opinions as to the relative merits of commercial instruments.

Correspondents are requested to write or print their names and addresses clearly. Hundreds of letters remain unanswered because of incomplete or illegible addresses.

OBTAINING SCREEN-GRID VOLTAGE

Richard Lindauer, Bellville, Ill.

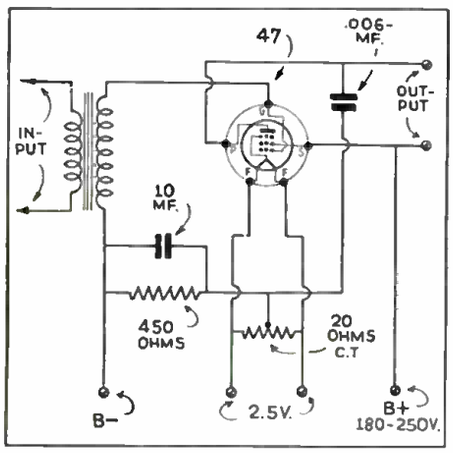
(Q) I would like to know what value of resistance would be needed to reduce 180 volts to the correct voltage for the screen-grid of a 58 I.F. stage in a superhet.

(A) In most screen-grid circuits, a 100,000 ohm resistor is connected in series with the screen-grid of each tube. The screen-grid should be by-passed to ground directly at the terminal of the socket.

ANTENNA TUNER

M. J. Lizak, Toronto, Ontario, Can.

(Q) Would you be kind enough to inform me which is the proper capacity to use in the antenna tuner described in the



Pentode Audio Amplifier Using 47.

April, 1935, issue. The diagram shows 350 mmf.. and the parts list shows 35.

(A) The 350 mmf., as shown in the diagram, is the proper value of the condensers used in the antenna tuner. The 35 mmf. shown in the parts list was a misprint.

PENTODE AMPLIFIER FOR "SWITCH-COIL 2"

Forrest McCuiston, Ontario, Calif.

(Q) Please print a diagram of an audio amplifier, using a type 47 tube, which can be used with the "Switch-Coil 2."

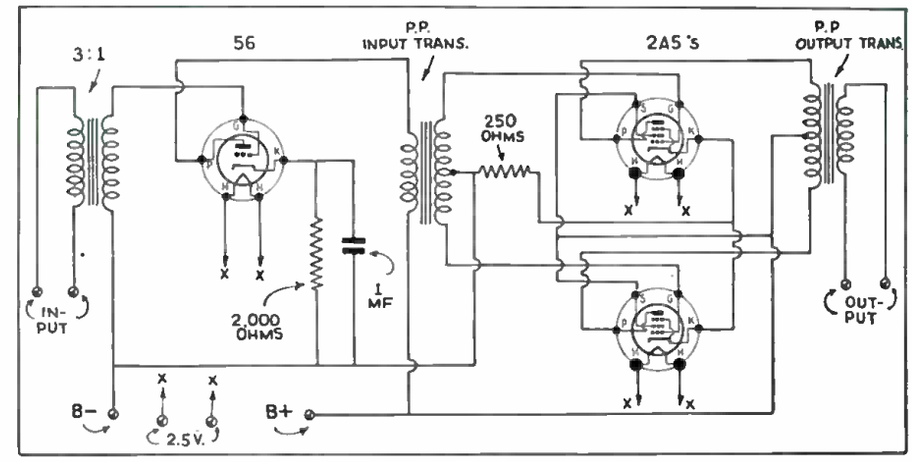
(A) In the diagram shown, the two terminals marked "input" connect to the phone terminals of the "Switch-Coil 2." The output terminals of the amplifier connect the speaker.

CODE-PRACTICE OSCILLATOR

George Sackl, Lakewood, Ohio.

(Q) Please show a diagram in the *Question Box* of a code-practice oscillator, using a type 56 tube and an audio transformer.

(A) The diagram you request is shown together with the proper connections of the audio transformer. The key is connected in series with the headphones. The variable resistor "R" is used to control the tone.



2-Stage Audio Amplifier for "All-Star" Set.

2-STAGE POWER AMPLIFIER

Frank Skrceny, Jr., Flushing, Mich.

(Q) I have constructed the "All-Star" receiver and would like to have you print a diagram of a suitable power amplifier for this receiver. I would like to use a 56 driver with two 2A5's in push-pull as the output stage.

(A) The diagram is shown on this page. However, we do not advise that you connect the 56 to the output of the 2A5 already used in the "All-Star Senior." The 56 driver should be connected to the output of the 56 second detector in the "All-Star" receiver. The input transformer of the amplifier will replace the coupling transformer now used.

1-TUBE POCKET SET

Jack Lody, Knoxville, Tenn.

(Q) I have built the 1-tube pocket set featured in the December, 1934, issue of *Short Wave Craft*. I would like to have the data for winding "broadcast" band coils.

(A) The 1-tube pocket set is a super-regenerator and will create a tremendous amount of interference in the broadcast band. It is also very broad in tuning, and would not be at all satisfactory for that purpose.

MODULATED OSCILLATOR

Charles Roberts, Kansas City, Mo.

(Q) Please print diagram of modulated oscillator for 160 meters.

(A) Modulated oscillators should be used on no band above 5 meters. You need an MOPA.

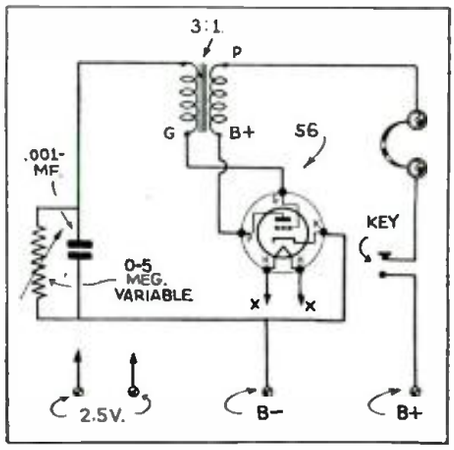
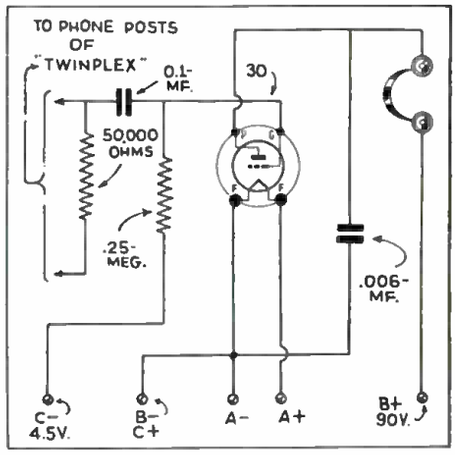


Diagram of Code-Practice Oscillator.

AMPLIFIER FOR "19 TWINPLEX"

Gerald Johnson, Westby, Wis.

(Q) Please print in your next question box a diagram of an economical amplifier for the "19 Twinplex" receiver, using either a type 30 or 33 tube.



Resistance-Coupled Amplifier for "19 Twinplex."

(A) The most economical tube to use would be a type 30 in a resistance-coupled circuit. You will find such a diagram printed on this page.

COIL DATA

George Schneider, Sharpsburg, Pa.

(Q) I would like to have the coil data for a receiver using a 24A detector with a regeneration control in the screen-grid circuit. The condensers used will be 100 mmf. variables with 15 to 25 mmf. trimmers for band-spread.

(A) In nearly every issue of *Short Wave Craft* we give coil data to be used in conjunction with 140 mmf. condensers. This same data can be used for constructing coils for your set. Complete pictorial drawings of 4- and 6-prong plug-in coils were also given in the April 1935 Question Box.

45'S AS OSCILLATORS

John Gray, Long Island City, N.Y.

(Q) What output can I expect of two 45's in push-pull as oscillators on 20, 40, and 80 meters?

(A) With the usual 400 volts on the plates, you should obtain around 20 watts from a pair of 45's.

Short Wave SCOUT NEWS

O. L. P. Report from Connecticut

● HERE is my first report as an "official listening post" for SHORT-WAVE CRAFT. I wish to thank you again, for the beautiful trophy. It sure is one swell piece of work.

It has been reported to this listening post, by an O.R.N.L.P. in Cleveland, Ohio, that there is a new Cuban on 8.8 meg. using the call CO9JQ. Every time this operator has been at the dial, he has looked for this station, but no luck yet. How about this, fellows, has anyone else heard this?

Among the stations heard at this post in the past twenty days were:

HP5J Panama City, Panama. (9:50 p.m.) 9-6, 9590 kc. very good. (9-6 means Sept. 6, etc.)

DJB Berlin, Germany. (9:45 a.m.) 9-7, 15200 kc. very good.

DJE Berlin, Germany. (10:00 a.m.) 9-7, 17760 kc. very good.

GBU Rugby, England. (7:05 p.m.) 9-9, 12290 kc. very good.

COCD Havana, Cuba. (8:15 p.m.) 9-9, 6130 kc. bad.

HIZ Santo Domingo. (7:15 p.m.) 9-11, 6316 kc. good.

YV3RC Caracas, Venezuela. (7:30 p.m.) 9-12, 6160 kc. good.

HJ4ABL Manizales, Col. (7:50 p.m.) 9-13, 6065 kc. fair.

PHI Eindhoven, Holland. (10:15 a.m.) 9-14, 17775 kc. very good.

YV5RMO Maracaibo, Venezuela. (8:50 p.m.) 9-16, 5850 kc. very good.

HJ4ABA Medellin, Col. (7:45 p.m.) 9-18, 11710 kc. fair; excessive fading.

This station seems to be about the only one on the 25-meter band that is coming through here lately. On 49 meters the South Americans seem to be ruling the band again.

Verifications received this month—DJD 11770, DJN 9540, DJB 15200.

A. E. VREDENBURGH,
13 Aberdeen Terrace,
Stamford, Conn.

Listening in at Freeport

● THE outstanding radio thrill that happened during the past month was the splendid work done by the "Hams" in Florida during the recent hurricane. I know all short-wave listeners will join me in congratulating them on their splendid work.

Here are some tips for you 20-meter listeners:

F8DR at Paris, France, on 14,400 kc. is usually heard on R9 at 4 to 7 p.m. E.S.T. He speaks English and plays records at times.

LAI6 at Oslo, Norway, on 14,340 kc. is heard about 6 p.m., E.S.T. (R6).

PAOIDW Amsterdam, Holland, on 14,000 kc., at about 5:30 E.S.T. (R8).

VK2EP in Conberra, Australia, on 14,310 kc. who has a directional antenna pointing toward the United States.

2RO operating on 11,810 kc. in the afternoons is not heard very well.

2RO on 9635 kc. on Mondays, Wednesdays and Fridays is generally very good.

CT1AA on 9,600 kc. is a very good signal.

VK2ME on 9,590 is heard very well till 8:30 a.m. on Sundays.

SUZ, Cairo, Egypt, on 13,820 kc. works London almost every day from 11 a.m. to 1 p.m., E.S.T., using inverted speech.

YV2RC on 6,112 kc. in Caracas, Venezuela is plenty hot with their new transmitter.

Our two Dutch friends PCJ on 15,220 kc. and PHI on 17,775 kc. are coming in like a "ton of bricks"—this is the expression the announcer uses when he reads letters from listeners.

On the 49-meter band or 6,120 kc. and thereabouts YV3RC-6,160 kc., COCD 6,130 kc., HJ4ABC-6,065 kc., HP5B-6,030 kc., COC-6,010 kc., XEBT-5,990 kc. The above come in regularly through the static that prevails in the summer on this band.

ANGELO CENTANINO,
Box 516,
Freeport, Pa.

Hats Off! to Mr. Vredenburgh!

A. E. Vredenburgh won the nineteenth Short Wave Scout silver trophy for his log of 27 stations, with 18 foreigns, as reported in the October issue. If you won one of these trophies, don't forget to send your picture with the trophy—if it has not already been published. We'll find a spot for the photo somewhere.

Report from Puerto Rico

● I WANT to thank and greet all and every one of the S.-W.L.'s in the United States, and especially those of you who have honored me with their S.-W.L. cards, and to which I have already sent mine.

I want to tell all listeners that conditions have not been so bad during this month and I have logged more than eighty different stations.

Between them, there are several new ones, viz:

YV10RSC—5720 kc.—LaVoz de Tachira, San Cristobal, Venezuela, from whom I have received a verification.

HJ1ABK—7000 kc.—Calle Bolivia, Progreso-Igualdad, at Barranquilla, Columbia. (Received verification).

VP4TC—7075 kc.—Mr. D. Serrao-Port of Spain, Trinidad. Also received veri for a football game broadcast.

La Voz de Cumbebe—Ibague, Dept. de Tolima Columbia, on 6450 kc. comes in very good every evening.

HRL—5870 kc.—La Voz de Honduras, Tegucigalpa, Honduras, has inaugurated their transmissions every night QSA5-R8.

CO9JQ—8610 kc.—Camaguey, Cuba, is on the air also now.

There is a station on Surinam (Dutch Guiana) which broadcasts every evening, but have been unable to understand their call. The same with another station on nearly same frequency (7000 kc.) transmitting programs located at St. Kitts, B.W.I. but cannot hear their call.

As for the new ones, I think that's enough. The regular DJ's are coming in very good.

The same with the Daventry stations, which are the best now, no matter the wave length used.

All the Columbians coming in good. Sixteen stations have been heard in three days from that country. Ecuador is getting also crowded with S.-W. stations.

On the 23rd of this month a new station will be inaugurated: YV5AM-Ecos del Llano—San Juan de los Morros, Venezuela will use the 6600 kc. frequency. I am expecting a veri from test programs.

In reference to the other common stations, I do not think that listeners will be interested in a report on them. Will be glad to answer any request for information from listeners everywhere.

JUAN CLOQUELL STORER,
José de Diego St. No. 1,
P. O. Box 194,
Arecibo, Puerto Rico.

Latest "Hot" Tips for Short-Wave Listeners from our "OFFICIAL LISTENING POSTS"

Brecksville, Ohio, O.L.P. Short-Wave Log—Time is E.S.

Date	Time	Call	KC.	Location	Remarks
Aug. 25	p.m. 6:45	GSD	11,750	England..	Very, very loud and clear
25	7:35	CO2LL	About 14,000	Cuba....	Testing. Amateur?
31	8:15	W3XAL	6,100	U. S.....	Very, very loud
31	8:30	HJ1ABE	5,950	Colombia, S.A....	Very loud, clear and steady
31	8:40	HJ1ABB	6,447	Colombia, S.A....	Very loud and clear
Sept. 1	a.m. 10:25	PHI	17,775	Holland	Very loud and clear
1	11:25	GAA	20,380	England..	Very, very loud
1	p.m. 1:45	FTA	11,940	France.	Very, very loud
1	6:15	DJD	11,770	Germany	Very loud and steady
1	6:25	GSD	11,750	England.	Very, very loud
1	6:35	GSC	9,580	England.	Very loud
1	10:50	DJC	6,020	Germany	Very loud. Some static
1	11:05	GSC	9,580	England..	Very loud. Some fading
3	noon 12:00	LSL	21,160	Argentina	Very loud
3	p.m. 7:35	KWU	15,355	U. S	Calling KTO
4	1:30	LSL	21,160	Argentina	Loud
4	4:25	GBB	13,585	England.	Very loud
4	6:50	2RO	9,635	Italy....	Loud, but noisy
5	a.m. 10:10	FNSM	...	Isle De France	Calling Paris
5	p.m. 7:10	KKP	16,030	Hawaii	Very, very loud
6	a.m. 8:50	PHI	17,775	Holland	Very loud
6	9:00	GSG	17,790	England.	Very loud
8	9:40	HAS3	15,370	Hungary	Just understandable
8	9:55	PHI	17,775	Holland	Very good
15	8:00	PHI	17,775	Holland	Very loud and clear
20	p.m. 6:50	EAQ	9,860	Spain....	Fair, but weak
20	7:05	2RO	9,635	Italy	Fair, noisy
20	7:25	KKP	16,030	Hawaii	Very loud

From Sept. 15 to Sept. 20, reception was very poor. The European stations could not be heard. The U. S. and Canadian stations were very loud. All bands were very noisy.

EDWARD M. HEISER.

Report from Sinking Springs, Pa.

● LAST month I commented on the reception of Radio-Reykjavik. This month with the presentation of the ac-

(*Continued on page* 505)

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Audio Amplifier and Power Supply for S-W Receivers

(*Continued from page* 476)

ground a 250,000-ohm resistor successfully isolates this circuit. This procedure of bypassing is followed through to the plate of the 76 and the grid of the 42, thereby assuring greater gain from the amplifier without the annoyance of audio oscillation or "motor-boating" frequently heard in some resistance-coupled amplifiers.

The series resistors in the plate circuit of the 76 are one 75,000-ohm and one 25,000-ohm, and in the grid circuit of the 42, one 250,000-ohm and one 50,000-ohm; all ½-watt sizes are used.

A 250,000-ohm, 1-watt resistor is connected from post No. 2 to post No. 3. This is used when the detector tube of the set is to be fed directly into the amplifier. In such cases post No. 1 and post No. 2 are connected together. A 2,000-ohm, 1-watt resistor is then connected from post No. 3 to post No. 4 and a 10,000-ohm 1-watt resistor by-passed by a .5 mf. 400 volt tubular condenser is connected to ground. These two resistors act as a voltage divider and supply 50 volts for the screen voltage of a screen-grid regenerative detector. They also act as a bleeder circuit, preventing voltage surge from damaging the filter condensers, before the 42 heats up.

The panel is the next and concluding step in the assembly of this unit. It was made of 3-ply veneer (wood) 7" x 10" and makes a very effective baffle. The phone jack is mounted on the left side and the tone control and switch on the right. Follow the schematic or picture diagram very closely when hooking up the phone jack, as it is very important that the resistors in the grid circuit of the 42 *are in that circuit at all times* or the tube will be seriously damaged. The panel is bolted to the chassis with two 6/32 machine screws and also to the top of the speaker.

In closing it is suggested that the builder of this unit use a power transformer with a heater rating of at least 3 amperes, which is ample to supply even a large superhet tuner.

Parts List

1—chassis and panel (see text).
3—.01 mf. 400 volt tubular condensers, Aerovox.
1—1 mf. 20 volt tubular condenser. Aerovox.
3—.1 mf. 400 volt tubular condensers. Aerovox.
1—10 mf. 35 volt tubular Electrolytic condensers, Aerovox.
1—Dual 8 mfd. 450 volt Electrolytic condenser, Aerovox.
1—.5 mfd. 400 volt tubular condenser, Aerovox.
1—2500-ohm ½-watt carbon resistor. I.R.C.
1—10,000-ohm 1-watt carbon resistor. I.R.C.
1—20,000-ohm 1-watt carbon resistor. I.R.C.
1—25,000-ohm ½-watt carbon resistor. I.R.C.
2—50,000-ohm ½-watt carbon resistors. I.R.C.
1—75,000-ohm ½-watt carbon resistor. I.R.C.
2—250,000-ohm ½-watt carbon resistors. I.R.C.
1—250,000-ohm 1-watt carbon resistor. I.R.C.
1—400-ohm 5-watt wire-wound resistor. I.R.C.
1—50,000-ohm potentiometer with switch, Electrad.
1—Piece bakelite for terminal strip (see text).
6—Fahnestock clips.
1—Wafer socket—76.
1—Wafer socket—42.
1—Wafer socket—80.
1—double-circuit phone jack.
1—power transformer.
1—6" pentode output dynamic-speaker—1800-ohm field—Wright De Coster, Inc.
1—Line cord and plug.
1—76 tube.
1—42 tube.
1—80 tube.

Girl Operators, Attention!

Listen "YL's" and "XYL's"!! Why not send the Editor a good photo of your "Rig"—and don't forget yourself. A separate photo of yourself will do, with a "clear" photo of that station! $5.00 for best "YL" photo.—Editor.

SELECT YOUR HOLIDAY GIFTS from this LIST of REAL SHORT WAVE VALUES

Any member of your family or friends will appreciate your generous Gift and will remember you not for a day or two, but for years.

WE GUARANTEE SATISFACTORY RESULTS ON ALL OF OUR PRODUCTS

EILEN HG-36
5 Tube Bandspread Receiver

BIGGER AND MORE POWERFUL THAN EVER! EILEN HG-36 kit comes to you complete with stage shields and all holes accurately drilled, and with simple, easy to follow instructions. Uses 6D6-6C6-76-42-*84* hi-gain tubes operating under high voltage as *TUNED RF* amplifier, *TUNED* screen-grid regenerative detector, triode audio amplifier, output power pentode amplifier, high voltage full-wave rectifier and complete built-in power supply. Operates from 105 to 130 volt AC house lightlink system. *Entirely self-contained. No external accessories required.*

The receiver is completely shielded, thereby eliminating hand-capacity and feed back effects. The regeneration control is smooth, noiseless, free from fringe howl, and once set is consistent over an entire band. *HG-36 uses 2 TUNED STAGES*—single dial control. Not merely a screen-grid RF amplifier of doubtful value—but a scientifically engineered receiver with a tuned RF circuit that really *TUNES* and provides a high gain over the entire range of 10-600 meters. *Selectivity is excellent.* With this receiver you can separate those stations in the foreign SW or crowded amateur bands. Broadcast interference on SW waves is eliminated. Either a doublet or single wire aerial may be used. *USES A SPECIAL TWO POINTER, TWO SCALE, DUAL RATIO, ILLUMINATED, AIRPLANE DIAL, EQUIPPED WITH 2 TUNING KNOB CONTROLS. WITH ONE KNOB YOU TUNE AS USUAL—THE OTHER TUNING KNOB OPERATES THE SECOND POINTER ON THE DIAL AND GIVES TREMENDOUS BAND-SPREAD ON ANY RANGE OF FREQUENCIES BETWEEN 10-600 METERS. ANY OF THE FOREIGN SW OR AMATEUR BANDS ARE SPREAD OVER FROM 70 to 90% OF THE BANDSPREAD DIAL SCALE.*

Band-spread tuning—volume control—powerful hi-voltage amplifier delivering 9 watts of audio power to the built-in hi-fidelity dynamic speaker—hum free power supply—automatic phone jack—selectivity, sensitivity, and tonal qualities found only in high priced sets make HG-36 so effective that the SW fan and AMATEUR cannot afford to be without it. TREMENDOUS VOLUME! SOLD ON MONEY BACK GUARANTEE! YOU MUST BE SATISFIED.

If METAL TUBES (6K7-6K7-6C5-6F6-5Z4) are preferred, add $1.00 to tube price.

Chasis and cabinet are of heavy steel and have a durable, black shrivel finish. An extremely ATTRACTIVE kit that you can be proud to own. Complete set of RF and detector coils for 10-200 meters, and instructions included.

HG-36 KIT, not wired, but including all necessary parts, 8 coils for 10-200 meters, and instructions, less cabinet and tubes..... **$13.95**
Beautiful metal cabinet $2.00
5 Matched Arcturus tubes..... 2.85
SPECIAL: Complete KIT, cabinet and tubes..... **$17.95**
2 Broadcast band coils, extra..... $1.25
LABOR FOR WIRING and TESTING, ready to use..... 2.00

EILEN 6A SW
4-TUBE RECEIVER

A Midget in Size—A Giant in Performance

EILEN 6A is the most compact and powerful SW receiver of its kind on the market. *AN UNUSUAL VALUE.* Read the following features and order yours today. *YOU WILL NEVER REGRET IT!*

★ **Full 6-Tube Performance—Uses 6K7-6F7 (twin 2 in 1 tube)—6C5-12A7 (twin 2 in 1 tube) as aperiodic RF amplifier—screen grid regenerative detector—powerful 3 stage audio amplifier with pentode output tube—half wave HUM FREE rectifier and complete built in power supply. Completely self contained. No external accessories required.**
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★ **Operates entirely from the 105 to 130 volt AC or DC house current.**
★ **Beautiful, large, velvety, illuminated airplane tuning dial.**
★ **Smooth regeneration control—free from fringe howls.**
★ **Band spread station trimmer enabling stations in the crowded foreign SW or amateur bands to be spread out with ease.**
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★ **Selectivity, appearance and volume on the speaker or phones that will amaze you.**
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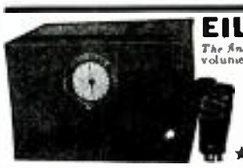
★ **MANY FOREIGN STATIONS roll in on the speaker with excellent volume under good conditions in a fairly good location.**
★ **Beautiful, heavy, black shrivel finish metal chassis and cabinet. MUST BE SEEN TO BE APPRECIATED.**
★ **SOLD ON OUR USUAL MONEY BACK GUARANTEE. YOU MUST BE SATISFIED. TRY ONE AND SEE FOR YOURSELF!**

EILEN 6A KIT, not wired, but including all necessary parts, 4 coils for 10-200 meters and instructions, less cabinet, tubes and loud speaker. **$7.45**
Beautiful cabinet, extra..... 1.25
4 Matched Arcturus tubes..... 3.15
Special loud speaker 1.45
2 Broadcast band coils..... 1.25
SPECIAL: Complete KIT, cabinet, tubes, speaker, and BC coil..... **$12.75**
LABOR FOR WIRING AND TEST-ING, ready to use, extra 1.50

AMATEURS: Model 6A-AB is same as the 6A except that special tuning circuit enabling the 20-40-80-160 meter amateur bands to be spread over 60 to 80% of dial scale is used. Switch for removing plate voltage during transmitting periods and coils included. Add $1.00 to price of 6A.



EILEN 5A SW 4-tube RECEIVER

The finest, low-priced, SW receiver kit on the market. The sensitivity, volume, unusual beauty, and hum-free reception obtainable from this set make it an outstanding value. Uses 6D6-6J6-76-12A7 (twin 2 in 1) as aperiodic RF amplifier, screen-grid regenerative detector, triode audio amplifier, power pentode amplifier, rectifier and built-in power supply. Operates entirely from 105 to 130 volts AC or DC house current.

★ **See article p. 343 Oct. issue of SWC.**
★ **Illuminated, vernier, airplane dial.**
★ **BAND-SPREAD station trimmer.**
★ **Tremendous headphone volume—operates a magnetic speaker on many stations.**
★ **Large 3 winding coils for selectivity and efficiency.**
★ **So simple that even a beginner can build and operate it.**
★ **Heavy, black shrivel finished metal chassis and cabinet. MUST BE SEEN TO BE APPRECIATED.**
★ **An excellent receiver for the DX fan.**
★ **SOLD ON OUR USUAL MONEY BACK GUARANTEE.**

KIT, not wired, but containing all necessary parts, 4 coils for 10-200 meters and instructions, less tubes, cabinet, and speaker..... **$6.95**
4 Matched Arcturus tubes..... 2.85
Beautiful cabinet 1.25
2 Broadcast band coils..... 1.25
SPECIAL: Complete KIT, cabinet, tubes, & 1 BC coil. **$11.45**
Labor for wiring and testing, extra... $1.50

IF METAL TUBES (6K7-6K7-6C5-12A7) are preferred, add $1.00 to tube price.

AMATEURS: Model 5A-AB is same as 5A except it has special tuning circuit and coils for spreading out the 20-40-80-160 M bands over 60 to 80% of dial scale. Add $1.00 to price of 5A.

ALL-ELECTRIC SW
3 TUBE RECEIVER

The original Eilen All-Electric kit using 6F7 (twin 2 in 1), 76, and 1V tubes as regenerative detector, two step audio amplifier, rectifier and built-in power supply. Owners have reported as high as 35 foreign countries on this model. Excellent volume. Operates from 105 to 130 volt AC or DC house current. Beautiful, heavy, black shrivel finish metal chassis and panel. Vernier dial. MONEY BACK GUARANTEE.

SPECIAL: KIT, not wired but with cabinet, tubes, and BC coil **$9.65**
Labor for wiring and testing, if desired..... 1.50

KIT of parts, not wired, less cabinet, tubes, and speaker..... **$5.95**
Cabinet, extra 1.25
3 Arcturus tubes 2.25
2 Broadcast band coils..... 1.25

EILEN DC3
3-Tube Receiver

A powerful and efficient battery operated receiver which produces RESULTS. Uses 32-30-33 tubes as screen-grid regenerative detector, triode amplifier, and power pentode audio frequency amplifier. Great headphone volume. Operates a magnetic speaker on many stations. Coils for 10-200 meters and instructions included. *MONEY BACK GUARANTEE.*

KIT of parts, wired, less cabinet, tubes, speaker or phones..... **$5.95**
Beautiful cabinet 12.5; 3 Arcturus tubes 2.05; 2 Broadcast band coils, 1.25. **SPECIAL:** KIT, cabinet, 3 tubes, and 1 BC coil **$9.95** Labor for wiring and testing, extra $1.50

EILEN HF-35
SW 3 Tube Transmitter Kit

At Last! A powerful, well engineered, amateur SW transmitter of great beauty and efficiency at a price within the amateur's reach. Crystal control — Tri-tet oscillator-doubler—Class C RF power amplifier—Triplett meters—EILEN transmitting dials—built-in antenna tuning system —75 WATTS CW output on 80-40-20-160 M bands. Requires power supply delivering 450 V at 160 MA and 2½ V at 3 amp. Extremely BEAUTIFUL appearance — heavy, black shrivel finished metal shelving and cabinet. Only the highest quality of parts which can stand up under hard usage are used. SOLD ON MONEY BACK GUARANTEE.

KIT of parts, not wired, less tubes, crystal, crystal holder and power supply, including cabinet, coils for any 1 band..... **$23.95**
3 Raytheon 59-46-46 tubes extra..... $2.15
EILEN quartz crystal (80 or 160 M)..... 1.95
or 40 M band 2.95
EILEN crystal holder..... 1.00
Coils for 3 additional bands, per set of 3..... 1.45

EILEN AM-3
3 TUBE POWER AMPLIFIER

See article p. 406 Nov. issue SWC.

A powerful 2 stage audio frequency amplifier using 76-43-1223 tubes as triode audio amplifier, power pentode output amplifier, rectifier and built-in power supply. Will deliver enormous volume when connected to any 1-2 or 3 tube SW receiver. Beautiful black shrivel finish metal chassis and cabinet. *DYNAMIC SPEAKER BUILT INTO CABINET. Money back guarantee.*

SPECIAL: KIT, cabinet and tubes, not wired..... **$7.95**
Labor for wiring and testing $1.50

KIT of parts, not wired, less tubes and cabinet..... **$5.95**
Cabinet..... 1.25
3 Arcturus tubes... 2.25

EILEN HV-475 1 TUBE POWER SUPPLY

Designed for use with HF-35 KIT. Built into beautiful, heavy, black shrivel finish metal cabinet and chassis to match HF-35. Dimensions are such as to fit directly under HF-35. A he-man's power supply. Delivers 475 volts of pure DC at 200 MA and 2½ V at 5 amp. and an extra 7½ V at 3 amp. Uses 83 tube in full wave rectifier and is well filtered. (2 section filter). **KIT** of all parts, not wired, less tube **$13.95**
1 Arcturus tube No. 83 extra..... 65c

SPECIAL:

Transmitting grid leaks, 25,000 ohms 10 watt	$0.21
RCA filter chokes, cased, 30 H 100 MA	.49
RCA double chokes, cased, 30 H 100 MA	.79
Power Xfmr, unmounted, 1250 V C.T. at 150 MA—2½ V C.T. at 12 A—two 7½ V C.T. at 3 Amp	2.45
RCA Transmitting rheostats. Model PR-535, 75 for that 50 watter	.39

DX2 SW
2 TUBE RECEIVER

A simple and effective battery operated receiver for the beginner or the SW fan who wishes an inexpensive 2 tube receiver. Uses 32-30 tubes as screen-grid regenerative detector and audio frequency amplifier. Beautiful, heavy, black shrivel finish metal chassis and panel. Coils for 10-200 meters and simple instructions included.

SPECIAL: KIT, cabinet, tubes, and BC coil, not wired, **$6.95**
Labor for wiring and testing, extra... $1.50

KIT of parts, not wired, less cabinet and tubes..... **$3.95**
Beautiful cabinet... $1.25
2 Arcturus tubes..... 1.30
2 Broadcast coils..... 1.25

EILEN HFX
ONE TUBE TRANSCEIVER

A compact, efficient, and well designed 5 meter transceiver that can furnish reliable 2 way communication over distances up to several miles. An excellent way to pass away the long winter hours. Uses 19 (twin 2 in 1) tube. Operates from 135 volts B battery and 2 volt A battery. Eilen transmitting dial—highest quality of parts—Beautiful, black shrivel finish metal chassis and cabinet. When in receiving position the 19 tube functions as super-reg. detector and audio amplifier. When switch is in transmitting position it functions as oscillator and modulator. *MONEY BACK GUARANTEE.* Special 5 meter coils and instructions included.

KIT of parts, not wired, less cabinet, tube and batteries. Cabinet, extra.....$1.25
1 Arcturus tube.... .75
SPECIAL: Kit (not wired) with cabinet and tube. **$7.45**
Wired and tested, if desired, extra... $1.50

FREE: Catalogue of S.W. kits, parts and accessories. Send for *your* copy.
Prompt shipment. 36 hour service. 20% deposit on C.O.D. orders.

EILEN RADIO LABORATORIES, DEPT. SC12, 136 LIBERTY ST., NEW YORK, N. Y.

10 to 600 Meters Range of this Receiver

(*Continued from page* 471)

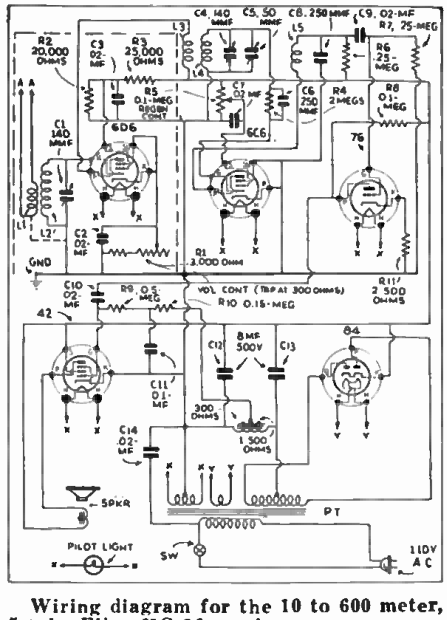
that range of screen-grid voltages, where detector sensitivity is a maximum. The two tuning condensers (.00014 mf. each) are ganged together and operated from a single tuning control. Two metal shields effectively isolate the R.F. and detector stages. The small trimmer condenser C5 serves the purpose of lining up the R.F. and detector stages.

Resistance-capacity coupling is used between the detector and first audio stage which uses a 76 tube. It is essential that a high value of load resistance be used in the detector plate circuit in order to realize the high gain of which the 6C6 tube is capable. A value of 250,000 ohms is satisfactory. The by-pass capacity C8 tends to prevent the entrance of R.F. currents into the audio stages of the receiver. Bias for the 76 is furnished by the resistor R11 (2,500 ohms). The output of the 76 is resistance-capacity coupled to the 42 pentode output stage. Bias for this tube is obtained by grounding its cathode and connecting the grid return to the 300 ohm tap on the filter system. When using this method the resistance-capacity R9 R10 C11 is necessary and functions as a *hum-filter*.

The power supply is designed to operate from 110 volts 60 cycles. Full-wave rectification utilizing the type 84 tube is used. This tube has a very low internal voltage drop and is ideal for the purpose. A by-pass condenser C14 connects from the 110 volt A.C. leads to chassis and serves as an effective tunable hum-filter. An efficient and effective filter system is obtained by using the 1,800 ohm speaker field as the filter choke in conjunction with a pair of 8 mf. high voltage electrolytic filter condensers. The 25 cycle model, which is also available, uses an extra filter section in order to bring the A.C. hum down to the same negligible level as that obtained in the 60 cycle model.

The receiver is entirely self-contained, no external accessories being required. It is mounted in a heavy steel chassis and cabinet and is finished in a durable, black shrivel lacquer presenting an unusually attractive appearance. A metal grill is built into the cabinet for the dynamic speaker. A dual high ratio, illuminated, airplane type vernier dial makes tuning quite easy. A jack on the rear of the chassis allows the use of headphones if desired. When used, the speaker is automatically disconnected.

Provision is made for the use of either a doublet antenna or the usual single-wire type of antenna.



Wiring diagram for the 10 to 600 meter, 5-tube Eilen HG-36 receiver.

The New HF-35 S-W Transmitter for Hams

(*Continued from page 475*)

Coil Data

Coil forms have diameter of 1½"

No.	L1 turns	L2 — L3 turns		Size wire	
1		70	20	No. 22	Close wound
2	46			No. 22	Close wound
3		42	16	No. 16	Close wound
4	18			No. 16	Close wound
5		17	5	No. 16	Close wound
6	7			No. 16	Close wound
7		8	3	No. 16	Close wound

AMPLIFIER-ANTENNA COILS
Diameter 1¾"

No.	Size wire	L4 — L5	
1P	No. 22	70 turns	27 Close wound
3P	No. 16	42	15 ¼"spacing between L4 and L5
5P	No. 16	17	7
7P		8	4

Output Frequency	Crystal Fred.	Coil L1	Coil L2-L3	Coil L4-L5
160 M band	160	short	No. 1	No. 1P
80 M band	80	short	No. 3	No. 3P
80 M band	or 160	No. 2	No. 3	No. 3P
40 M band	40	short	No. 5	No. 5P
40 M band	or 80	4	No. 5	No. 5P
20 M band	40	6	No. 7	No. 7P

The proper coils to use for any amateur band are shown in the above chart.

Parts List

Black shrivel metal cabinet and shelves (Eilen).
4—Silvered transmitting dials (Eilen).
1—0-50 MA. D.C. Triplett meter.
1—0-200 MA. D.C. Triplett meter.
1—Toggle switch
One set of coils for any band (Eilen).
1—7-prong socket (Eby).
2—5-prong socket (Eby).
4—4-prong socket (Eby).
C1-C6 0.00014 mf. Hammarlund.
C2-C5 .0001 mf. Hammarlund.
C3-C7 .0005 mf. mica, 500 volt Dubilier.
C4 .00025 mf. mica, 500 volt Dubilier.
C8 0.00005 mf. neut. Cond. 500 volt Hammarlund.
R1 50,000 ohms.
R2 1,000 ohms, 2 watt.
RFC S-W transmitting R.F. choke (Eilen).
1—crystal holder (Eilen).
1—quartz crystal (Eilen).
S—switch H&H
K—key.
2—stand-off insulators (Johnson).
1—power supply cable.
1—power supply supplying 2½ volts at 4 amperes and 450 volts at 160 MA. (Eilen Model PS 500).

Midget A.C.-D.C. Set Works Speaker

(*Continued from page 459*)

List of Parts Required

C1—Antenna Trimmer, Hammarlund MICS-70. (10 to 70 mmf.).
C2—Station Selector Variable Condenser. Hammarlund MC-140-S (140 mmf.).
C3—1 mf. Cartridge Condenser (optional).
C4—.0001 mf. Mica Condenser.
C5—.1 mf. Cartridge Condenser.
C6—.005 mf. Mica Condenser.
C7—.01 mf. Cartridge Condenser.
C8—.5 mf. Cartridge Condenser.
C9—.01 mf. Cartridge Condenser.
C10—5 mf., 35-volt Cartridge Condenser.
C11—.006 mf. Mica Condenser.
C12, C13—Dual Electrolytic Cardboard Condenser; 8 mf. per section.
C14—.01 mf. Cartridge Condenser.
R-1—2 meg. ½-watt I.R.C. resistor.
R2—50,000-ohm Electrad potentiometer with switch, SW1.
R3—100,000-ohm 1 watt I.R.C. resistor.
R4—250,000-ohm ½-watt I.R.C. resistor.
R5—1 meg. ½-watt I.R.C. resistor.
R6—2,000-ohm ½-watt I.R.C. resistor.
R7—175,000-ohm 1-watt I.R.C. resistor.
R8—1 meg. ½-watt I.R.C. resistor.
R9—500-ohm 1-watt I.R.C. resistor.
R10—10,000-ohm 1-watt I.R.C. resistor.
R11—300-ohm 50-watt resistor in line cord.
T1—Hammarlund 4-prong plug-in coils—5 coils covering bands from 17 to 560 meters.
J1, J2—Ear-phone clips soldered to speaker terminal.
SP1—5" Find-All magnetic speaker shield.
I—Hammarlund shield TS-50 for Tube T1.
V1—6C6 type tube.
V2—37 type tube.
V3—12A7 type tube.
2 knobs.
1—Chassis with aluminum panel 6"x6"x4" deep.
1—Screen Grid Clip.
1—Roll of hook-up wire.
1—4-prong socket for plug-in coils T-1.
1—5-prong socket for tube V2.
1—6-prong socket for tube V1.
1—7-prong socket for tube V3.

The Periphone Master

(*Continued from page* 457)

and for ease of cutting holes, tempered pressed wood was used. No placement dimensions for the parts are given because the common parts you may have will vary a bit and we don't want to throw even a straw in your way to hinder you in building this set. Thus we come back to our first idea of compromise—this set is to be built to fit your plan of operation and to grace the appearance of your short-wave table by leaving you some leeway in its construction. Two small ¾" wood screws hold this control panel next to the subpanel by passing into the two end wood cleats underneath the latter-named panel.

Plan Photo of the Receiver

The second picture of this short-wave receiver shows just about everything that goes to make up the set—the two variable condensers, .00035 mf., the filament rheostat, the four plug-in coils in their sockets (where they are never lost and neither can be crushed by accidentally dropping on the floor, only to roll underneath your rocking chair), the Fahnestock clips for power connections, phones, antenna, ground, shifting of tickler connections, etc., and in the rear "seats," the detector tube (Det) to the left, then the grid-leak R1 and condenser C1, the 5-to-1 audio transformer, the antenna coupling condenser with clip for aerial connection and lastly the audio tube (Aud). Both tubes are of the '30 type which to most people has proved the best all-round tube for short-wave sets, considering the many factors which enter into the bargain.

Exclusive of the clips at the ends of this subpanel, all of these parts were mounted on it by means of ½" No. 6/32 round-head machine screws and nuts. The end clips were held in place by using ¾" wood screws. These hold also the wood cleats in place, giving the effect of chassis construction.

Elevation Picture of Importance

The third photo shows some changes made which words would not clearly convey. A better view into what is meant is given through the art of photography. Thus the two tubes are placed on the condensers and the tickler coil is shown centered over the plug-in coil (15-40 meters) with approximately ⅛" spacing between secondary S1 and tickler T.

Furthermore you should note that these coils are wound from this spacing gap—the secondary coils close-wound from the top of the tube-base form *down* through the proper number of turns of wire. The tickler coil also is close-wound.

Just a few words will suffice regarding the construction of these coils. The secondary coils plugged into the four UX sockets "in line" have their windings started in the "G" prong and end in the "F—" prong. We should also mention that two small holes are drilled through these forms closest to the proper prong, the wire passed through and enough pushed through the prong so that when the enamel is scraped off, there is the clean wire ready for the solder job. Without further ado, you know how to solder and so no words need be said about this important conventionality of short-wave radio. Perhaps you too may find a simple method of holding the wire on the tube base, without removing the glass envelope, thereby making your 2-tube short-wave set appear like one with six tubes. Remember that another section of this magazine pays good premiums for short-wave "kinks." And one of these proved to be a god-send to the author in easily boring the large holes for the six wafer-type sockets. Therefore it is greatly advised that you too keep on hand your copies of *Short Wave Craft*. However, that particular issue has passed, but to "drill" these large holes 1½ inches in diameter, a small block of wood has two holes drilled through it at a distance apart of ¾". A nail serves as center and the second hole holds the point of a small

three-cornered file. A few twists of the wrist with the scraping point of the file will cut very quickly through this fibrous subpanel material.

As shown also in this same photo, the tickler coil tube base had the prong-end cut off and three small holes drilled for machine screws. To the diametrically opposite screws were fastened the tickler-coil ends and the flexible leads running back along the dowel and terminating at the two screws just in front of the rotors of the variable condensers. Since this very flexible pigtail wire falls wherever gravity pulls it, these leads never get into the path of the condenser rotors. The winding for the tickler coil is wound in the same direction as that of the secondary coils. The center screw holds the tickler form to the metal strip.

The third flexible pigtail lead is the one which connects the "unclipped" antenna condenser plate to the secondary coil. This can be seen in the "Plan View" photo leading from the machine screw just in front of the rheostat to the end of the dowel pin where it passes under the metal strip to make electrical connection to the secondary coil by means of the Fahnestock clip. The metal strip also supports and rigidly holds the tickler coil steady.

The four clips, one in front of each secondary coil, gives good grip connections when a portion of the metal strip passes between the "thumb-rest" and the small "tongue" of the clip. This is a simple, easily made switching arrangement for changing wavelength.

The antenna condenser plates were made of 1/32" sheet brass with dimensions of 1½"x1¾" with a ¼" of the longest dimension bent at a right angle to it. The effective coupling area was then 1½"x 1½" and the distance apart of the plates was ⅛".

Wiring View of This Periphone Master

The choke coil (R. F. C.) of 600 turns has its layers close-wound with No. 36 DCC copper wire on 3" length of ¼" dowel.

With the batteries connected and filaments burning, no "dead spots" were found with the indoor antenna, strong regeneration was had with each coil, no body-capacity effects noted, no R.F. getting into the audio unit., stations were easily tuned-in, among which were amateur code, 'phone men talking, police announcements, and a couple of broadcast stations which come in when the largest coil is used, but this was at the coil's utmost limit as can be seen from the range of the "Coil Data Listing." Therefore in conclusion we say, build this set and win yourself the Short Wave Craft Trophy.

Coil Data

Tickler and secondary coils are close-wound with No. 26 enamel copper wire on 1⅜" diameter tube base forms.

Tickler has 10 turns.

Secondary Coil	Turns	*Range*
S1	4	15- 40 meters
S2	10	35- 80 meters
S3	23	70-140 meters
S4	36	130-210 meters

List of Parts for "Periphone Master"

Control panel 7"x12"
Subpanel 7"x12"
Subpanel cleats ¾"x1"x7"
11 Fahnestock clips
2—.00035 mf. variable condensers C3, C4
5 megohm grid-leak R1
.00025 mf. grid condenser C1
6—UX wafer sockets
9" length—¼" dowel
50 ft. No. 36 D. C. C. copper wire (RFC)
40 ft. No. 26 enamel copper wire
3 ft. flexible pigtail wire
10 ft. rubber-insulated hook-up wire
9—¾" length brass wood screws
25—½" length 6/32 roundhead machine screws
2—4" dials—¼" shaft
10-ohm rheostat, knob and fastening screws
4" piece of thin metal strip—½" wide
Tubes—2-'30 type
5 tube bases—1¾" dia.
5-to-1 audio transformer
Headphones
2 dry cells (series connected to give 3 volts)
2—45 volt "B" batteries (series connected)

Short Wave Scout Trophy Contest

(*Continued from page* 467)

CGA3—9.330 kc.; phones England afternoons and evenings; Drummondville.

West Indies

COC—6.012 kc.; now COCO, 9:30 to 11:30 a.m.; 4 to 8 p.m.; Havana.
COH—9.428 kc.; now COCH, 10 to 12 noon; 4 to 6:30 p.m. and 8 to 10 p.m., Havana.
HIH—6,814 kc.; irreg., 6:40 to 8:40 p.m. and Sun., 2:40 to 3:40 a.m., San Pedro de Macoris, D.R.
HIX—5.980 kc.; Tues., Fri., 8:10 to 10:10 p.m.; Santo Domingo, D.R.
HI1J—5.865 kc.; irreg., 8 to 9:30 p.m.; San Pedro de Macoris, D.R.
HI3C—5,900 kc.; off air at present; La Romano, D.R.
HI4D—6,590 kc.; 5:40 to 7:40 p.m. ex. Sun.; Santo Domingo, D.R.

Central America

XERT—6,000 kc.; 5 to 12:30 a.m.; Mexico City.
XECR—7,380 kc.; Sun., 6 to 7:15 p.m.; Mexico City.
TGF—14.485 kc.; phones Florida daily; Guatemala City.
HPF—14,485 kc.; phones Florida (WNC) daytime.
HP5B—6,030 kc.; 7 to 10:30 p.m.; Panama City.

South America

HJ1ABB—6,447 kc.; 6 to 10:15 p.m.; Barranquilla, Colombia.
HJ1ABD—7,281 kc.; 7:45 to 9:15 p.m. ex. Sun., Cartagena, Colombia.
HJ1ABE—6,115 kc.; 7 to 9:30 p.m. ex. Sun.; Mon., 10:30 to 11:30 p.m.; Cartagena, Colombia.
HJ1ABJ—6,006 kc.; 7 to 10:30 p.m.; Santa Marta, Colombia.
HJ2ABA—6,200 kc.; irregularly evenings; Tunja, Colombia.
HJ3ABH—6,015 kc.; 7 to 11:15 p.m.; Bogota, Colombia.
HJ4ABA—11,700 kc.; 6:30 to 10:30 p.m.; Medellin, Colombia.
HJ4ABC—6,250 kc.; now 6,080 kc., evenings; Pareira, Columbia.
HJ4ABE—5,930 kc.; 6:30 to 10:45 p.m.; Medellin, Colombia.
YV2RC—6,112 kc.; now 6,108 kc., 4 to 10 p.m.; Caracas, Venezuela.
YV3RC—6,165 kc.; 4:30 to 9:30 p.m.; Caracas, Ven.
YV6RV—6,520 kc.; 5:30 to 9:30 p.m.; Valencia, Venezuela.
PRADO—6,618 kc.; Thursdays 9:15 to 11:15 p.m.; Riobamba, Ecuador.
HC2AT—8,450 kc.; off air at present; Guayaquil, Ecuador.
HC2JSB—7,880 kc.; 8:15 to 11:15 p.m. ex. Sun.; Guayaquil, Ecuador.
HC2RL—6,635 kc.; Sun., 5:45 to 8 p.m. and Tuesdays 9:15 to 11:30 p.m.; Guayaquil, Ecuador.
HCJB—8,214 kc.; daily ex. Mon., 7:30 to 11:15 p.m.; Quito, Ecuador.
CP5—6,080 kc.; irreg., 7:30 to 9:30 p.m.; La Paz, Bolivia.
PRA8—6,040 kc.; 4:30 to 8:30 p.m.; Pernambuco, Brazil.
PRF5—9,501 kc.; 4:45 to 5:45 p.m. ex. Sun.; Rio de Janeiro, Brazil.
OAX4D—5,780 kc.; Wed., Sat., 9 to 11:30 p.m.; Lima, Peru.
OAX4G—6,230 kc.; 7 to 12 p.m. midnight; Lima, Peru.

Europe

CT1AA—9,625 kc.; Tues., Thurs., Sat., 4:30 to 7 p.m.; Lisbon, Portugal.
EAQ—9,860 kc.; 5:15 to 7:30 p.m.; Madrid, Spain.
"Radio Coloniale"—15,240 kc.; 7 to 10 a.m.; Paris.
"Radio Coloniale"—11,880 kc.; 10:15 to 12:15 p.m. and 2 to 5 p.m.; Paris.
"Radio Coloniale"—11,710 kc.; 6 to 9 p.m. and 10 to 12 midnight; Paris.
ORK—10,330 kc.; 1:30 to 3 p.m.; Brussels, Belgium.
HAT—5,400 kc.; off air at present; Budapest.
HAT4—9.125 kc.; Sun., 6 to 7 p.m.; Budapest.
HVJ—15.121 kc.; 10:30 to 10:45 a.m. ex Sun.; Vatican City.
I2RO—6,085 kc.; winter evenings; Rome, Italy.
I2RO—9,600 kc.; now 9,635 kc.; Mon., Wed., Fri., 6 to 7:30 p.m.; Rome.
HBL—9,595 kc.; Sat., 5:30 to 6:15 p.m.; Geneva.
DJA—9,560 kc.; 8 to 11:30 a.m. and 5 to 9:15 p.m.; Berlin.
DJB—15,200 kc.; 8 to 11:30 a.m.; Berlin.
DJC—6,020 kc.; 9:30 to 10:30 p.m.; Berlin.
DJD—11,770 kc.; 5 to 10:30 p.m. and 12 to 4:30 p.m.; Berlin.
DJE—17,760 kc.; 8 to 11:30 a.m.; Berlin.
DJN—9,540 kc.; 3:45 to 7:15 a.m., 8 to 11:30 a.m. and 5 to 10:30 p.m.; Berlin.
DJQ—15,280 kc.; 8 to 11:30 a.m.; Berlin.
RKI—15,080 kc.; phones RIM mornings and relays programs to U.S. mornings; Moscow.
RNE—12,000 kc.; 2 to 6 p.m.; Moscow.

Africa

SUV—10.055 kc.; phones England daytime; Cairo, Egypt.
SUX—7,860 kc.; phones irregularly; Cairo, Egypt.

Asia

JZG—6,330 kc.; relays JOAK winter mornings 2:15 to 7:45 a.m.; Nazaki, Japan.
JVM—10,740 kc.; relays JOAK summer mornings; Nazaki, Japan.

Australia

VK2ME—9,590 kc.; Sun. 12 to 2, 4:30 to 8:30 a.m. and 11:30 a.m. to 1:30 p.m.; Sydney.
VK3LR—9,580 kc.; 3:15 to 7:30 a.m. daily; Melbourne.
VK3ME—9,510 kc.; 5 to 7 a.m. ex. Sun., Mon., Tues.; Melbourne.
ZLT—11,050 kc.; phones VLJ irregularly; Wellington, New Zealand.

Hawaii

KKP—16,040 kc.; phones KWU daytime; Kahuku, Hawaii.

TROPHY CONTEST RULES

(*Continued from page 467*)

will be final. Trophy awards will be made every month, at which time the trophy will be sent to the winner. Names of the contesting SCOUTS not winning a trophy will be listed in **Honorable Mention** each month. From this contest are excluded all employees and their families of SHORT WAVE CRAFT magazine. Address all entries to SHORT WAVE SCOUT AWARD, 99-101 Hudson St., New York City.

FREE BATTERIES TO TROPHY WINNERS!

● **The manufacturers of the well-known Burgess batteries have offered to furnish FREE one year's supply of batteries—all the batteries that the "trophy" winning set will need for a year—and providing it happens to be a Burgess Battery-powered set. A very fine offer indeed, and the editors are glad to pass on the good word to all their embryo trophy contestants.**

Television Stations

(*Continued from page 480*)

2000-2100 kc.

VE9AU—London, Ont., Can.
VE9DS—Montreal, Que.
W2XDR—Long Island City N.Y.
W8XAN—Jackson, Mich.
W9XK—Iowa City, Ia.
W9XAK—Manhattan, Kans.
W9XAO—Chicago, Ill.
W6XAH—Bakersfield, Calif.

2750-2850 kc.

W3XAK—Portable
W9XAP—Chicago, Ill.
W2XBS—Bellmore, N.Y.
W9XAL—Kansas City, Mo.
W9XG—W. Lafayette, Ind.
W2XAB—New York, N.Y.
VE9AR—Saskatoon, Sask., Can.
VE9ED—Mt. Joli, Que., Can.

42000-56000, 60000-86000 kc.

W2XAX—New York, N.Y.
W6XAO—Los Angles, Calif.
W9XD—Milwaukee, Wis.
W2XBT—Portable
W2XF—New York, N.Y.
W3XE—Philadelphia, Pa.
W3XAD—Camden, N.J.
W10XX—Portable & Mobile (Vicinity of Camden)
W2XDR—Long Island City, N.Y.
W8XAN—Jackson, Mich.
W9XAT—Portable
W2XD—New York, N.Y.
W2XAG—Portable
W1XG—Boston, Mass.
W9XK—Iowa City, Ia.
VE9BZ—Vancouver, B.C., Can.
VE9DS—Montreal, Que., Can.
VE9AU—London, Ont., Can.
VE9RC—Quebec, Que., Can.
VE9AG—Walkerville, Ont., Can.

The Barkhausen Oscillator for Ultra-Short Waves

(*Continued from page 466*)

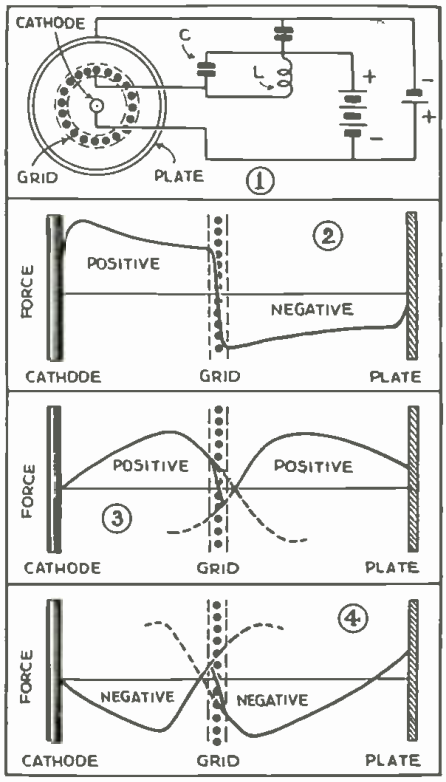


Fig. 1—This general arrangement of tube elements and circuit is used in the production of Barkhausen oscillations.

Fig. 2—When a constant potential is applied to the grid of a vacuum tube constructed as shown in Figure 1, the force exerted on the electron at various points in its trip across the tube is as shown by the curve. The work done on the electron is therefore measured by the area under the curve.

Fig. 3—Because the work done on an electron of the useless type by an alternating force is positive, the electron abstracts energy from the alternating-current transient.

Fig. 4—With an alternating force, an electron of the useful type delivers energy to the transient, at the expense of the battery producing the constant force.

plate with decreasing velocity, coming to rest just before reaching the negative plate and then starting back toward the grid again. As before, a given electron may hit the grid or may miss it again and continue on toward the cathode, when the cycle is repeated.

If the tube were not oscillating, the story would now be complete. A convenient way of seeing what causes the oscillations in the tube is to investigate what happens when a transient oscillation is produced in the LC circuit by some external means. If the forces produced on the moving electrons by this transient deliver energy to the electrons, the transient will die out; but if the electrons, having acquired kinetic energy from the grid battery, can oppose the forces set up by the transient and thus deliver energy to the circuit, the transient will persist or build up as a continuous oscillation instead of dying out.

In the absence of the transient, an electron starting from the filament moves in the direction of the force from the positive grid, and so draws energy from the grid battery. After passing through the grid wires, the electron moves against the force from the grid, thus returning energy to the grid battery. When it comes

to rest in the grid-plate space, the entire amount of energy picked up in the cathode-grid space has been restored to the battery. During the return trip, the same sequence again occurs: the energy which was abstracted in moving toward the grid is restored in moving away from it. The net result is that energy is neither absorbed from nor delivered to the external circuit and batteries by such an electron. This fact is made graphically evident in Figure 2, where the force from the batteries which acts on the electron is plotted as ordinate while the distance the electron has moved from the cathode is taken as abscissa. The area under the curve consequently measures the work done on the electron during its trip across the tube: the positive work done between cathode and grid is just equal to the negative work done between the grid and the plate.

When the transient is introduced into the LC circuit, conditions are considerably changed. Superposed on the force diagrammed in Figure 2 is the force set up by the alternating grid potential. Since the latter force alternates, the resultant forces acting on electrons which start out from the cathode at different times in the alternating-current cycle will be quite different. For purposes of illustration, it is sufficient to trace the history of two electrons only. One of these starts out just at the time when the alternating force begins acting in the same direction as the constant force of Figure 2. The other starts out a half cycle later, when the alternating force begins to oppose the constant force.

In the first case, the alternating force increases in intensity as the electron moves along, then decreases to zero, then reverses and opposes the motion, and finally completes the cycle by becoming positive again. If the electron passes through the grid mesh just before the alternating force returns to its first zero value, the action of the force upon it is as shown in Figure 3. At the instant the electron passes through the grid, of course, the direction of the force acting on the electron reverses, not because of any abrupt change in the grid potential, but because the grid is now located behind the electron instead of ahead of it. As the electron moves on toward the plate, however, the alternating force decreases to zero and then reverses. Thus during both halves of the cycle the force acts in the same direction as the electron is moving, and delivers energy to it, as can be checked by reference to the area under the curve in Figure 3. In other words, the transient in the external circuit has done work on this particular electron, and the electron by taking energy away from the circuit, has produced a tendency for the transient to die out.

There is nothing in this behavior that gives encouragement to the maintenance of oscillations. The only consolation comes from noting that the electron is moving faster when it approaches the plate than it would if no alternating forces had acted on it, and consequently it will hit the plate even though the latter be at a slightly negative potential. Thus this useless, and in fact harmful, electron is at least prevented from doing still further harm by being removed through the plate from the scene of action.

Fortunately the other electron, that leaves a half cycle later than the worthless one just dismissed, is more useful. From the very start the alternating force opposes the motion of the new electron, but cannot stop it because the alternating force is never larger than the constant force of Fig. 2. The electron is therefore doing work against the alternating force, delivering energy to the transient in the external circuit. As the electron progresses, the phase of the force changes as shown in Figure 4. Unlike Figure 3, the reversal in direction occurs before the electron has reached the grid, because the force opposing the motion has decreased the speed. When passage through the grid

mesh again reverses the direction of the force, the agreeable electron continues to deliver energy to the circuit transient, as it approaches the plate. Having lost much of its velocity in transferring its energy to the circuit, the electron comes to rest before hitting the plate, and then, urged by the constant force of Figure 2, starts on its return journey toward the grid. At about the same time, the phase of the alternating force again reverses and again opposes the motion, so that the hapless electron must give up still more of its energy to the growing transient.

Another passage through the grid follows, accompanied by another reversal in the phase of the alternating force, and the tormented electron must again yield energy acquired from the constant force to the hungry transient. The energy loss brings the electron to a halt before it reaches the cathode, the phases again reverse, and the cycle starts over again.

In its round trip, the useful electron of Figure 4 supplies to the transient nearly twice as much energy as the useless one of Figure 3 abstracted in its one-way trip. Moreover, the useful electron reaches the cathode again at just the right time to join with other electrons of the useful type and augment their relative number. The action is consequently progressive, building up more and more useful electrons.

In practice, operating conditions modify somewhat the mechanism described. For example, space charge near the cathode produces more harmful electrons than useful ones and is to be avoided. Space charge near the plate causes a shift between the phase of the grid voltage and the force acting on the electrons, which in general tends to raise the frequency of oscillation. On the other hand, space charge in general makes the electrons move slower. Since the slower motion tends to decrease the frequency, the net result of space charge near the plate is only a small decrease in frequency. The tuning of the external circuit can also modify the frequency by about thirty per cent, but for fixed values of plate, grid, and filament battery voltage, there is a particular tuning adjustment which gives maximum output.

There is a simple approximate expression for determining the proper grid voltage and size of vacuum tube to produce oscillations of a given wavelength. For example, a tube with a plate diameter of one centimeter, and with 100 volts applied to the grid, will produce oscillations with a wavelength somewhere between 100 and 50 centimeters, corresponding to a frequency between 300 and 600 megacycles, depending on the circuit adjustments.

It is interesting to note that the same kind of analysis here used to illustrate the workings of the Barkhausen oscillator can be applied to the well-known feedback oscillators operating with negative grid and positive plate, and shows that the two are not very different from each other after all. The Barkhausen oscillator will probably prove very useful in the fields of ultra-short-wave transmission, which are rapidly coming into commercial application.—*Bell Laboratories Record.*

New RCA 200 K.W. S-W Transmitter

(*Continued from page* 466)

pump, the entire unit being water-cooled.

The rectifier unit alone weighs, with its accessories, approximately 4 tons and some idea of the size of the new apparatus may be judged from the fact that the transformer, which supplies the rectifier unit with current, weighs 13 tons.

In conjunction with the transmitter there will also be new receiving circuits set up to operate in conjunction with the transmitter. As the accompanying diagram shows, there will be provision for the transmission and reception of facsimile photos, drawings, maps, etc.

Big Image Television for Use in Theaters

(*Continued from page* 455)

of transmitting and receiving television is little short of remarkable, and the interesting part of the whole scheme is that we get actual "talkies" transmitted, with practically no delay in time—and *all on a single wavelength!* The average television system, let us remember, requires two distinct and separate wavelengths or frequency channels in order to transmit voice and image, one frequency being used to transmit the image and the other to transmit the voice.

The matter of a minute or two required to develop the film does not make the slightest difference, even where hot news items such as conflagrations or other public-interest happenings are being photographed and transmitted.

The minute or two's delay required for developing and drying the film wouldn't bother us a bit, even though it were such an exciting and fast-moving event as a football game. While undoubtedly this film idea is surely but a temporary means of accomplishing the television results desired, it shows what modern science can accomplish when hard-pressed.

One of the reasons for developing this system is the difficulty encountered thus far in picking up a satisfactory image directly by a television scanner, especially outdoor scenes, but tomorrow this will be accomplished directly and the television image currents, after being sufficiently amplified, will be caused to modulate a short-wave transmitter directly in the same way as we now pick up the voice at a short-wave phone transmitting station and project it out into space *immediately*, without recording the voice on a film record first.

Of course, there is the added advantage in this case that we are accomplishing *both* voice and image transmission on a single wavelength, thanks to the high-speed film developing system which modern science has given us.

This "intermediate film" plan has received high consideration and approval by European experts.

One of the newer schemes which has been tried out to some extent for producing a large image at the receiving station, involves the use of a special cathode-ray tube which projects an image on its screen, and by means of a lens system this image is in turn projected beyond the end of the tube onto a large screen.

Even without any lenses the image from the end of a cathode ray tube scanner has frequently been thrown onto the wall, with a considerable enlargement of the image, by several television experimenters.

New Transformer Casings

● THE Alloy Transformer Co., has recently announced a new type of transformer casing of extremely high permeability. These cases are said to eliminate all traces of hum which may be due to direct pickup by the transformer itself. All types of transformers are available, such as audio inputs, outputs, tube-to-line, line-to-tube, microphone transformers, Class A, Class AB, and Class B, and all other transformers used for audio frequency work. (No. 331.)

Some "Brand New" Ultra High Frequency Ideas By W2AMN! Watch for Them!

Military Uses for Short Waves

(*Continued from page* 454)

scrambling or mixing up of the words and syllables will be done so thoroughly by *double* or even *triple scrambling*, that it will take some tall genius, indeed, to unscramble the combination.

One of the principal uses of ultra-short waves in the next war will be undoubtedly the locating of enemy planes, as well as ships on the water. Announcements were recently made from Germany and army experts in this country regarding the use of ultra-short waves (U.S.W.) for this purpose. The U.S. experts held a private demonstration for military men only, at which time it was proved that a ship fifteen miles at sea could be accurately located in the dark. When a searchlight was later turned on, having been previously set to the proper angle by locating the ship with the U.S.W. detector, the searchlight beam fell full on the ship. The principle of this system lies in the reflection of the ultra-short waves from the ship, the reflected wave or beam being picked up on a sensitive detector, connected to either an aural or a visual indicator.

In the German system for locating enemy planes flying overhead in the dark, for example, a series of transmitters send up a number of U.S.W. beams. If a plane should fly along and strike one of these beams, there would be a momentary reflected beam sent down toward the earth, which would be detected or intercepted by one or more of a series of sensitive receivers placed on the ground in the manner shown in Fig. 7. The German system also involves the use of a special indicating panel or annunciator as shown, so that the passage of a plane could be noted by watching the indicator board, and the direction and also the velocity of the plane quickly determined.

Micro-waves will most probably be used widely in the war of tomorrow. Fig. 8 shows one application of these micro-waves, for transmitting important information, either by phone or telegraph signals, the beam of micro-waves being directed or focused exactly onto the receiving reflector. The reflector at the transmitter focuses the micro-waves, and helps to radiate them in a fairly concentrated beam. At the receiver, the antenna, and sometimes the tubes also, are mounted in the focus of a parabolic reflector.

Numerous dispatches in the daily press have contained startling reports of a new "mystery" ray, which has been credited to none other than Senator Marconi. This ray, it was claimed, could put airplane engines out of commission in mid-air. It seems from some of the later reports, that Senator Marconi refused to have anything to say one way or the other, when questioned about the matter, and while it is theoretically conceivable that ultra-short waves might be directed in a powerful beam toward an enemy plane, and "kill" the engine ignition, it is rather douhtful if such practical results have been obtained thus far. If the plane had its ignition system properly shielded, or if the plane was fitted with a Diesel oil engine of the Packard or other type, which employs no electrical ignition system, the effects of any such concentrated short-wave beam would most probably be nullified.

In view of the fact that the energy in a short-wave signal falls off inversely as the square of distance, it can be seen at once, that only a very small amount of energy would be picked up hy the metal wires, frame, and engine of a plane six to ten thousand feet above the earth, and it would probably prove cheaper in the end to direct anti-aircraft guns on the enemy plane, aided and abetted by the newest type airplane detectors or locators, one of which was reputed to have proven so sensitive that it could detect a plane fifty miles away.

FREE S-W DATA SERVICE

Joseph Calcaterra, Director

Short Wave Craft Data Service,
99 Hudson Street,
New York City, N. Y. SWC-1235

Please send to me, without charge or obligation, the catalogs, booklets, etc., the numbers of which I have circled below.

2 3 4 5 25
28 57 72 74 75 76

My radio connection is checked below:

( ) Short-Wave Set Builder
( ) Short-Wave Experimenter
( ) Short-Wave Listener
( ) Service Man operating own business
( ) Service Man for manufacturer
( ) Service Man for jobber
( ) Service Man for dealer
( ) Service Man for servicing company
( ) Dealer
( ) Jobber
( ) Experimenter
( ) Professional Set Builder
( ) Amateur Set Builder
( ) Licensed Amateur
( ) Station Operator
( ) Radio Engineer
( ) Laboratory Technician
( ) Public Address Worker
( ) Manufacturer's Executive
( ) Student

My age is years.

I have been interested in radio for years.

I buy approximately $ .00 of radio material a month. (Please answer this question without exaggeration or not at all.

(Please Print Name and Address)

Name.....

Address.....

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

AVOID DELAY. The catalogs and booklets listed are now in stock and will be sent promptly as long as the supply lasts. Only the items listed are available. Please make your selection from the current issue of *Short Wave Craft*.

● THE catalogs, booklets, and folders listed in this department contain a wealth of information and data which will help you in your *short-wave* work.

These catalogs, booklets, and folders may be obtained by *Short Wave Craft* readers (without the trouble and expense usually involved in writing individual letters to the various organizations which publish them) through arrangements which have been made by *Short Wave Craft* magazine with the publishers of the literature listed.

To obtain any of the material listed in this department, simply draw a circle around each Booklet Number on the coupon, corresponding to the numbers of the items you would like to have, fill in the rest of the coupon and mail it to the *Short Wave Craft Data Service*.

A complete stock of these catalogs and other literature is kept on hand and will be sent to you promptly, as long as the supply lasts. There is no limitation on the number of items you may ask for, but to avaid waste, please do not ask for material in which you are not interested or of which you already have a copy.

Only the literature listed in this issue is available. Please do not ask for catalogs which are not listed. Do not include letters asking for information from other departments with your request for catalogs as that will cause delay in answering your inquiries.

2. HAMMARLUND 1936 CATALOG. Short wave fans and set builders will find a flock of

new low-loss parts such as variable condensers, coil forms, sockets, transformers, chokes, shields, and other precision products especially designed for short-wave and ultra-short-wave work described in this catalog. Information on short-wave sets is included.

3. THE HAMMARLUND SHORT-WAVE MANUAL. No short-wave fan who is interested in short-wave set design should be without this 16-page manual, which contains constructional details, wiring diagrams and lists of parts of 12 of the most popular short-wave receivers of the day. A circular giving a description and list of contents of this manual is available free of charge to *Short Wave Craft* readers.

4. THE HAMMARLUND "COMET PRO" SHORT-WAVE SUPERHETERODYNE. This receiver is still holding its own as one of the leading short-wave receivers available for professional operators and advanced amateurs, for work on 15- to 250-meter code and phone reception. It is especially adapted for laboratory, press, police, airport and steamship use.

5. ELECTRAD 1936 VOLUME CONTROL AND RESISTOR CATALOG. No short-wave set can function properly unless the volume controls and resistors are of the best. This catalog of resistors features the latest developments in the resistor art. Fundamental volume and tone control circuit diagrams are given.

25. LYNCH NOISE-REDUCING ANTENNA SYSTEMS. No use trying to get world-wide short-wave reception if your aerial picks up more noise than signals. This folder, by Arthur H. Lynch, gives complete instructions on how to build noise-reducing antenna systems for short-wave reception and contains a special supplement covering Ham Antenna Design for transmitting and receiving on the amateur bands as well as the ultra-high frequencies.

28. LYNCH SUPER-FILTASTATS FOR AUTO RADIO INSTALLATIONS. It isn't necessary to put up with ignition noise in auto radio installations. The new Lynch Super-Filtastats eliminate ignition noise without the necessity of using the conventional suppressors.

57. RIBBON MICROPHONES AND HOW TO USE THEM. How do your phone signals sound to the fellow at the receiving end? If they sound as though you're talking with a bunch of marbles in your mouth, the chances are a good microphone, properly hooked up, would help "to beat the band." This folder describes the Amperite Velocity Ribbon Microphone and gives information and circuit diagrams on how to connect up the microphone.

72. HALLICRAFTERS' SKYRIDER SHORT-WAVE RECEIVERS. If you don't want to bother building your own short-wave receiver, but want to be sure of having a set that has all the new wrinkles, the Hallicrafters' Skyrider Short-Wave Receivers should fit the bill. These receivers have such features as a range of 13 to 200 meters with broadcast or 10-meter band as an extra, built-in feature, automatic wave-change switch, continuous bandspread, high-fidelity audio and lots of other features.

74. SPRAGUE ELECTROLYTIC AND PAPER CONDENSER CATALOG. You can't very well build a short-wave set without fixed condensers for filtering and by-passing. You'll find complete specifications of all the condensers you'll need for building or improving your short-wave set in this catalog. A description of the Sprague Capacity Indicator, for making tests on condensers, is included.

75. SPRAGUE TEL-U-HOW CONDENSER GUIDE. If you are ever puzzled regarding the proper kind, capacity and voltage of condenser to use in any given place, you should have a copy of this free chart which gives data on just that very subject. This folder also gives valuable hints on how to locate radio troubles due to defective condensers and includes helpful data on condenser calculations.

76. FACTS YOU SHOULD KNOW ABOUT CONDENSERS. If you have any wrong ideas or notions as to the effect of certain condenser characteristics on the filtering efficiency or suitability of a condenser for a given application, this little folder will straighten you out.

$20.00 Prize Monthly for Best Set

● THE editors are looking for "new" receiving circuits—from 1 to 5 tubes preferably. A $20.00 monthly prize will be awarded to the best short-wave receiver submitted. The closing date for each contest is 75 days preceding date of issue (Nov. 15 for the Feb. issue, etc.). In the event of a tie, an equal prize will be given to each contestant so tieing. Address all entries to: Editor, SHORT WAVE CRAFT, 99 Hudson St., New York City.

Short Wave League

(*Continued from page* 481)

general educational program now being offered as aforementioned.

It has been found, from considerable experience with clubs of various types, whether radio, scientific or simply community clubs, that in order to keep such an organization in a good live condition, that at least once a month, from September to May inclusive, a monthly feature must be provided in order to attract the old members as well as the new ones. One imperative rule can be laid down and that is that the Executive Committee (including all of the officers, the president, vice-president, and secretary, together with the chairmen of all the committees) should meet either in the club's quarters or at one of the officers' homes, at least two weeks before the next meeting is due, in order to discuss and arrange all of the details for the coming meeting.

Club Transmitter

There are two ways in which clubs operate an amateur transmitting and receiving station. The first plan involves the use of a "Ham" station already in operation and owned by one of the club's members.

The other angle of the problem is where the club is an up-and-going organization and desires earnestly to have a club station "all its own." In this case, application can be made for a "station license" to the Federal Communications Commission.

Raising Funds for Transmitter

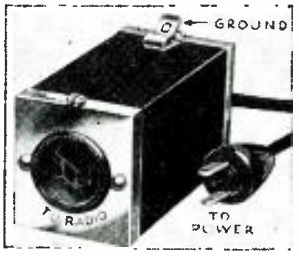
If a special fund has to be raised for installing such a club station, one of the usual ways to obtain money for the purpose is for the club to put on a show. In some cases these club shows (of the minstrel or play type) are put on in the club's quarters if they are large enough, but with a little diplomacy, the use of a larger auditorium in a local school or church, or even a lodge, can usually be obtained—even though a small fee has to be paid for the use of such a hall. Where the committee in charge does not think it is advisable to go to the trouble of training members to put on a show of their own, a very excellent way of raising funds is to arrange a special performance at a local movie theatre.

(The next paper will deal with methods for keeping the club alive, entertainment features, etc.)

New Line Filter Choke

● ELIMINATION of high frequency disturbances from power supply lines is accomplished by a new line filter choke developed by the J. W. Miller Company, Los Angeles, Calif., for use with receivers, transmitters or any source of interference.

Duo-lateral wound for minimum distributed capacity, the newly designed choke is available in various wire sizes of 2, 5, 10 and 20-ampere carrying capacity.



Appearance of new "Line Filter Choke." (No. 329.)

Use of a duo-lateral wound choke makes a radio receiver more selective by bypassing the station signals picked up through the electric wiring. Used with a transmitter, the Miller line filter keeps the signal in the antenna and out of the A.C. line.

In general, the filter choke may be used for radio receivers, transmitters, vibrating and rotating machinery, mercury arc, mercury rectifiers and wherever it is desired to eliminate interference from either A.C. or D.C. supply lines. It is housed in a metal case finished in black, with chromium plated ends.

When to Listen In

By M. Harvey Gernsback

(All Schedules in Eastern Standard Time)

LONDON

● The BBC stations at Daventry will operate as follows in November: Trans. 1, 2:15-4:15 a.m. (till Nov. 9), 3-5 a.m. after Nov. 9 on GSD and GSB. Trans. 2, 6-8:45 a.m. on GSG and GSF. Trans. 3, 9-10:30 a.m. on GSF and either GSG or GSD; 10:30 a.m.-12 noon on GSD and either GSF or GSB (a third transmitter may be used experimentally on GSI or GSE). Trans. 4 (Part 1.) 12:15-4 p.m. on GSD and GSB. A third transmitter operates experimentally as follows: 12:15-2:15 p.m. on GSI; 2:30-4 p.m. on GSL. (Part 2) 4:15-5:45 p.m. on GSB and either GSC or GSA. Trans. 5, (for North America) 6-8 p.m. on GSC and GSL. Trans. 6, (for North America) 10-11 p.m. on GSC and GSL.

BERLIN

The German station is now operating with a beam for North America experimentally from 10:30-11:30 a.m. on DJB (15,200 kc.) in addition to the regular North America program on DJC (6020 kc.) each day from 5:05-10:45 p.m. DJB commences transmission at 8 a.m. but uses a beam aerial for Asia until 10:29 a.m. when a quick change to the North America beam aerial is made.

VENEZUELA

YV2RC at Caracas (6112 kc.) has been testing its new 1 kw. transmitter on 5800 kc. in an effort to determine whether a permanent shift in frequency would give better results. It is probable that other waves will be tried before a definite change is made.

ROME

2RO at Rome, Italy, is operating as follows at present: On 11810 kc. daily from 8:15-9, 9:15-10:15 a.m., 12 n.-1 p.m., and 1:45-5 p.m. It is likely that the 1:45-5 p.m. program will be shifted to 9635 kc. for the winter months. On Monday, Wednesday, and Friday from 6-7:30 p.m., a program for North America with English announcements is sent out on 9635 kc. This program will be shifted to the 49-meter band (probably 6085 kc.) in November. A program for South America is broadcast from 7:31-9 p.m. on Monday, Wednesday, and Friday. (in November this will be shifted to 7:45-9:15 p.m.) on 9635 kc.

JAPAN

The special broadcast programs from Tokio now occur as follow: For N. America daily, 12 m.-1 a.m. on either JVM, 10740 kc., or JVT, 6750 kc. On Monday and Thursday an additional broadcast takes place from 4-5 p.m. on JVH, 14,600 kc. For Europe there is a program on Wednesday and Friday from 2-3 p.m. on JVH or JVM. In addition JVM or JVT relay the Tokio station program daily from 4-8 a.m.

MOSCOW

RNE on 12000 kc. operates daily from 12:30-6 p.m. However, RV59 on 6000 kc. will replace RNE for the period from 3-6 p.m. in a short time. On Sundays RNE operates in addition from 6-8:45 and 10-11 a.m. On Wednesday, RNE also is on from 6-7 a.m.

MOROCCO

CNR at Rabat on 12825 and 8036 kc. has apparently been off the air, as far as its Sunday broadcasts are concerned for some time. It has not been heard for nearly a year. A late report claims that it has just returned to the air on Sundays but no one has heard it so far. The station is still active in the telephone service to Paris, however.

BELGIAN CONGO

OPM at Leopoldville on 10140 kc. was reported broadcasting frequently on Saturdays from 3-4:30 p.m. and has been heard clearly on numerous occasions.

JAVA

The 49-meter station at Bandoeng, YDA, on 6120 kc. was closed down as mentioned last month in order to rebuild the equipment. The new 10 kw. YDA at Tandjongpriok on 6040 kc. has been operating only from 10:30 p.m.-1:30 a. m., a time when it is inaudible in North America. PLP and PMN, 11000, and 10260 kc., have been broadcasting the YDA programs on Sunday from about 5:30-11 a.m. while YDA is being rebuilt. YDA on 3040 kc. has not been affected by all these changes.

BRAZIL

PRF5 at Rio de Janeiro on 9501 kc. has been changing its schedule around recently. The latest schedule is not known. Brazil is planning to build several new short-wave stations using the following frequencies: At Pernambuco, 6015 kc.; at Rio, 6150 kc.; at Bahia, 17830 kc.; at Bello Horizante, 15150 kc.; at Porto Algere, 11875 kc.; at Sao Paulo, 9565 and 11800 kc.

CZECHOSLOVAKIA

A new 34 kw. short-wave broadcasting station is being erected near Prague. This station will be used to publicize Czechoslovakia much as the German station is used. The following frequencies will be employed by the new station when it is completed: 6055, 11745, 11875, and 15230 kc.

AUSTRALIA

VK2ME at Sydney on 9590 kc. operates on Sundays from 1-3, 4:30-8:30 and 9-11 a.m. in November.

W9XBS

A new experimental station on 6425 kc. is W9XBS of the National Broadcasting Co., Daily News Building, Chicago, Ill. It operates irregularly during the afternoon hours.

MEXICO

A new Mexican, XEJQ or XBJQ, on 11200 kc. is reported testing in the evening. The address is P.O. Box 2825, Mexico City.

2-Way Broadcast from Speedboat

● SPEEDING over the waters of Lake George at 60 miles per hour in a motorboat, Bennett Hill, of Detroit, one of the entries in the *Gold Cup* race, broadcast the event from his boat by *short wave* radio. In the judges' stand at Bolton Landing, General Electric engineers set up equipment not only to receive his signal but a *short-wave* transmitter made it possible to carry on a *two-way* conversation while the boat was in action.

So far as known this has never before been done and the same engineers with the same equipment used by General Electric when it broadcast from a flying bobsled down the Olympic run on Mt. Van Hoevenberg last winter, was utilized for this unique short-wave broadcast.

In addition to using the two-way radio circuit in the *Gold Cup* race, Mr. Hill also used his craft to report the other races held the same day.

New National Products Bulletin Ready!

The new National "Radio Products Bulletin," No. 250, has just been released, and contains all the well-known parts manufactured by the National Company, together with dozens of new items; among these, their new "One-Ten" Receiver, which is a 1 to 10 meter receiver, employing Acorn and Metal tubes. Request Cat. No. 508; Address Service Dept., Short Wave Craft, 99 Hudson St., New York City, N.Y.

Short Waves and Long Raves

Good News from South Africa

(*Continued from page* 460)

the success of your fine magazine in the future.

W. Lawrence Rew,
234 Frere Rd.,
Durban, Natal,
South Africa.

(Thanks very much for your fine letter on the Duo-Amplidyne, W. L. R., and your success with this circuit bears out some of the other excellent reports we have received concerning it. Thanks for your suggestion concerning prices on our various publications for export.

A "Live" Ham Station

(*Continued from page* 461)

I "key" with my left hand and write right-handed, so that makes everything work out O.K. I am located 16 miles south of Birmingham at Camp Andrews, Birmingham Boy Scout Camp, and keep 2 "skeds" daily with the Birmingham Scout Office to keep scouts camping here in touch with their parents through the local Scout Office. I am very glad to relay messages at any time and always deliver the Q.S.P's.

I am a Scoutmaster here and Eagle Scout and always enjoy a F.B., Q.S.O's, with any Ham and especially "Boy Scout" Hams. I am caretaker of the Camp here and live here the year round.

Trusting you will give this your consideration and hoping for many, many years of continued success for *Short Wave Craft*, I remain, Cordially Yours,

Emmett Smith, Opr. W4DEO.
Camp Andrews,
Bessemer, Ala.
R.F.D. No. 2, Box, 340B.

(More power to you, Emmett. You certainly have a "live" short-wave transmitting and receiving station. Thanks for your kind words regarding Short Wave Craft and we shall be pleased to hear from you again.—Editor)

He Finds Indoor Aerials Fine!

(*Continued from page* 461)

and I am fairly sure that certain stations are likely to be better on certain ones of the four but the combination is doing so well that I doubt that I shall go to the expense of putting up the outdoor most strongly recommended by local dealers. It occurs to me that your strong stand against indoors may be due to experience with particular receivers.

I was using a 7-tube Patterson last spring and wanted something more up-to-date. I tried an 11-tube Philco, 11-tube Crosley, 9-tube Grunow and some other receivers and stuck to my Patterson because they were not enough better to interest me. Apparently they did not suit for indoor antennas. However, I tried the R.C.A. double doublet on the Patterson and got less than with my 9-inch. I have a "Breting 12" designed by Ray Gudie who designed the Patterson. His design may be more favorable for indoor antennas. I have had Melbourne and Sydney on the 9-inch.

I do not get much DX because I do not try for it. Most of my listening is between 6 and 9 p.m. here and there is little DX listed then, so I suppose it is not there. I am writing this because I am sure that some people would be pleased to know that they could use indoor antennas for short wave under some conditions at least.

W. E. Allen,
Box 68, La Jolla, California.

(Thanks for your letter, W. E. A. Of course, there are exceptions to every rule, and in the recent article that you mention, we do not wish to be understood as declaring ourselves 100 percent against "indoor" aerials. Some very excellent results have been obtained with indoor antennas, as your experience proves, and we are glad to pass this information on to other readers.—Editor)

S-W Scout News

(Continued from page 484)

knowledgment from this station, the old, old question of confirmations arises. For argument's sake I present the letter in full:

Rikisutvarp Islands
(Icelandic State Broadcasting Service)
Box 547

Reykjavik, 26 Aug. 1935.

Dear Sir:

We beg to acknowledge receipt of your letter of July 31. It is interesting to know that you have received us so well, as we were using a sharply directional antenna toward east. The power of our transmitter is 7½ kw. to the aerial.

Yours sincerely,

Rikisutvarpid
(signed)

Is this an acknowledgment or a verification by inference? You decide.

CEC, the pride of Santiago de Chili, continues to send out a very good signal each Sunday and Thursday evening from 8:30 to 9:00 p.m., E.S.T. The frequency is 10,670 kc.

CO9JQ, located in Camaguey, Cuba, is heard very well nightly, on 8665 kc.

TGX, Guatemala City, was heard several times with fine volume. Freq. 5940 kc.

HJ1ABJ, La Voz de Santa Marta, disseminating on a frequency of 6000 kc., is heard quite consistently.

HJ4ABC, La Voz de Pereira, is a frequent visitor in the congested 49-meter band. They broadcast on approximately 6070 kc. and can be heard almost nightly.

LSY was heard testing with CP7, La Paz, Bolivia, on one occasion. LSY used a frequency of approximately 18,110 kc. and CP7 was heard on 15,300 kc.

ORG was also heard testing with OPL. The Belgian Congo station uses a frequency of 20,040 kc. and ORG, 19,200 kc.

Verifications this month also include cards from PMA, CO9JQ, and HJ4ABA.

GEO. D. SALLADE,
Sinking Spring, Pa.

Report from Oliver Amlie

● AMATEURS who relayed my messages about my WCAU-W3XAU broadcast in October.

W9NFA, Chester B. Franz, 521 N. Second St., St. Louis, Mo., handling Cuba, Ecuador, Canada, Germany, S. Africa, S. America.

W8LED, J. M. Clarke, 937 Washington Blvd., Pittsburgh, Pa., handling England.

W8KQQ, R. S. Bailey, Centri Hall, Pa., handling ZL2OZ, N.Z.

W5EWB, V. U. Blake, 1613 Ave. A, Lubbock, Tex., handling England.

W2EFZ, A. L. Moss, 1518 Walton Ave., Bronx, N. Y., handling 3 Australian messages.

W8LVV, Chle Balvin, 56 Hollbaugh Ave., Akron, Ohio, Bolivia, S. America.

W8DPE, Eugene P. Jennings, 466 Miller Ave., San Francisco, Calif., handling Fiji Islands.

EV2IL, Jerry McMullen, 567 Querbes Ave., Outremont, Quebec, Canada, handling France, Norway.

W9DFE, Don Anthony, 920 N. 4th St., Terre Haute, Ind., handling Australia.

W3ETE, Robert O. Semmer, 1 Evergreen Terrace, Cumberland, Maryland, handling Shain.

Detroit, Mich., Report

● THE following heard here this month:

JVH, Nazaki, Japan, 14,600 kc. has changed their time midnight to 1 a.m.

VP5MK, Kingston, Jamaica, 7200 kc. heard near 5 p.m., irregularly broadcasting music.

TIRCC, San Jose, Costa Rica, 6550 kc. Sundays 12:45 p.m. to 2:30 p.m., 6 p.m. to 7 p.m. and 8 p.m. to 9 p.m., E.S.T. Operated by Mr. Cespedes of NRH fame.

COCD, Havana, Cuba, 6130 kc. 10 a.m. to 1 p.m. and 6 p.m. to midnight.

CEC, Santiago, Chile, 10,670 kc. heard here from 8:30 p.m. to 9 p.m., E.S.T., irregularly.

YV5RMO, Maracaibo, Venezuela, 5650 kc. Daily from 5:30 p.m. to 10 p.m., E.S.T.

HJ1ABE, Cartagena, Columbia, 6.13 meg. Daily 7:30 to 9 p.m., E.S.T.

HJ1ABD, HJ3ABF, LSX, HJ1ABB, also heard very well.

The 49-meter band will be very good from now on.

CHARLES GUADAGNINO,
15226 Mack Ave.,
Detroit, Mich.

Frank Hogler, Brooklyn, N.Y., Reports

YVR—9.15 mc., Maracay, Venezuela, test with EHY, Madrid, around 4 p.m.

YV2RC—6,112 kc. is testing new transmitter, also putting on the air special programs Tuesdays 8:30 p.m.

YV3RC—6,150 kc. Caracas, Venezuela. They are also heard on 9,510 occasionally, 8:30 p.m.

PRF5—9.5 mc. Rio de Janeiro, Brazil. They test with WOK in the eve., 9 p.m.

LSX—10.35 mc. Buenos Aires, Brazil, was heard testing with W2XAF around 3:30 p.m.

GSJ—21.53 mc. Daventry, England. "J for Justice" was first heard during July, heard 6-9 a.m.

CT1AA—9600 kc. Lisbon, Portugal, was heard on 11,840 kc. Aug. 17.

RIM—15.25 mc. Tashkent, U.S.S.R., is heard often 6-9 a.m.

VP3FS—Nassau, Bahamas, is heard 8:30 to 9:30 p.m. irregularly.

COCD—6.13 mc. Havana, Cuba, is often heard until 2 a.m.

VE9BK—4.79 mc. Vancouver, B.C., is heard testing with airplanes, 7 to 9:30 p.m.

All time given E.S.T.

FRANK HOGLER,
222 Wyckoff Ave.,
Brooklyn, N.Y.

Wade Chambers, Tulsa, Okla., Reports

● HEARD all of the European locals, G's, D's, and F's and 2RO, EAQ daily.

HAT—4 Budapest, Hungary, on Sunday 6:00 p.m. to 7:00 p.m. is heard on 9.12 mc.

OPM—Leopoldville, Belgian Congo, S. Africa, heard irregularly on 10.14 mc. around 1:45 a.m.

JVH—Nazaki, Japan, 14.60 mc. at 12:40 a.m. broadcast.

JVF—Nazaki, Japan, 15.61 mc. at 12:50 a.m. phone.

JVM—Nazaki, Japan, 10.75 mc. at 1:40 a.m. broadcast.

JVN—Nazaki, Japan, 10.66 mc. at about 2:50 a.m. broadcast.

VK2ME—Sydney, Australia, 9.59 mc. on schedule.

VK3LR—Melbourne, Australia, 9.58 mc. 2:15 a.m.

VLK—A commercial phone on 10.52 mc. anywhere from 1 a.m. to 8 a.m.

VPD—Suva, Fiji Islands—heard on schedule time 12:30 a.m. to 1:30 a.m. or 1:45 a.m. on 13.07 mc. daily except Saturday and Sunday.

WVD—Seattle, Wash., on 8.65 mc.—heard talking with Alaska.

HJ4ABE—Medellin, Colombia — heard nightly on 5.93 mc.

CEC—Santiago, Chile—10.67 mc. Can be heard on broadcast irregularly at about 8:30 p.m. This station now verifies correct reports.

HJB—Bogota, Colombia, 14.96 mc. A phone can be heard with a loud signal, irregular during the day.

OCJ-2—14.86 mc. located in Lima, Peru, also phone heard during the day.

OCI—18.68 mc. Lima, Peru, heard also during day. Both stations verify.

LSL—A phone in Buenos Aires heard most any time daily. It is on 21.16 mc.

LSX—On 10.35 mc. Irregular during the evening, testing, sending music, etc.

ZFB—A phone on 10.05 mc. located in Bermuda. Heard daily, working New York and ships.

WADE CHAMBERS.
Tulsa, Okla.

Dr. Alan Smith, Chester, Vermont, Reports

CO9JQ, at Camaguey, Cuba, has been heard on approximately 8,665 kc. They send a veri card.

HI1J, on 5,880 kc., located at San Pedro de Macoris, D.R., was heard two evenings.

COH and COC announced their new call letters as COCH and COCO respectively.

YV8RV at Barquisimeto, State of Lara, Venezuela, was heard on 5,880 kc.

HCK, Quito, has been heard several evenings on 5,900 kc.

HJ4ABJ, Ecos del Combeima at Ibague, Colombia, was heard on a frequency of 6,460 kc., just above HJ1ABB, A1 volume.

ALAN E. SMITH, M.D., Chester, Vt.

Radio Amateur Course

(*Continued from page 473*)

nected to the antenna, and the power from our oscillator, or a goodly part of it, is radiated.

What Determines Frequency of the Oscillator

The frequency of the oscillator is largely determined by the tuned circuit L1 and C, that is, in all diagrams except the first. In this circuit the frequency is controlled by L2 and C.

It takes a certain length of time for an oscillation or one complete cycle (reversal of current) to take place in any circuit, which consists of inductance and capacity, due to the electrical inertia of the circuit itself. This inertia or lag is readily apparent when we consider what has been studied previously regarding inductances. When a current is passed through a coil, it sets up a field within the wire which, starting at the center of the wire itself, expands outward in ever increasing diameters. These lines of force not only cut the wire going outward, but cut adjacent wires. This cutting induces a current in the conductor or inductance in the opposite direction to the original current, tending to oppose the increase in current flow, thus prolonging the length of time, between the application of current and the time when the current is flowing at maximum amplitude. Now, if we decrease the current flow, the lines of force contract and again cut the wires, causing a current to flow in an *opposite direction to the field*, but in the *same direction as the original receding current;* thus tending to prolong the current flow and preventing its decay.

Ethiopian Short-Wave Station at Addis Ababa

● THE Ethiopian short-wave transmitting station—call letters ETA—located at Addis Ababa, has been picked up by many American short-wave listeners. In checking up this station with the commercial radio companies, we find that ETA is not a short-wave *broadcasting* station, but is classified and registered as a "point-to-point" short-wave communication station. In checking up with several different authoritative sources, it was learned that ETA is registered on the Berne list under the following transmission frequencies: 18,270, 11,955, 7,620 and 5,880 kilocycles. Other frequencies have been reported in newspapers and by readers who have telephoned the editors on what frequencies the Ethiopian station had been heard; due to the special conditions at present, this station is liable to transmit on most any frequency, according to one official source.

ETA uses a new RCA transmitter rated at 12 kw.

The Three-Tube Super-Gainer

(*Continued from page 470*)

But here again regeneration is used to increase gain to any desired degree, and selectivity up to single-signal proportions —where it is in terms of cycles, not kilocycles.

The first section of a 79 dual triode is used as the regenerative second detector. Regeneration is provided by connecting the I.F. transformer secondary between grid and cathode, with the impedance of R.F. choke L1 between cathode and B-, or its plate return. This makes a conventional oscillator circuit, oscillation and regeneration being controlled by rheostat R2 shunting L1.

The second triode section of the 79 tube is the audio amplifier, resistance coupled to the first 79 triode section (second detector), and terminates in the tip jacks for headphones. A magnetic loud speaker may be used satisfactorily on fairly strong signals, but this is no disadvantage since the serious C.W. operator will always use headphones.

Latest TUBE DEVELOPMENTS

METAL TUBE DATA

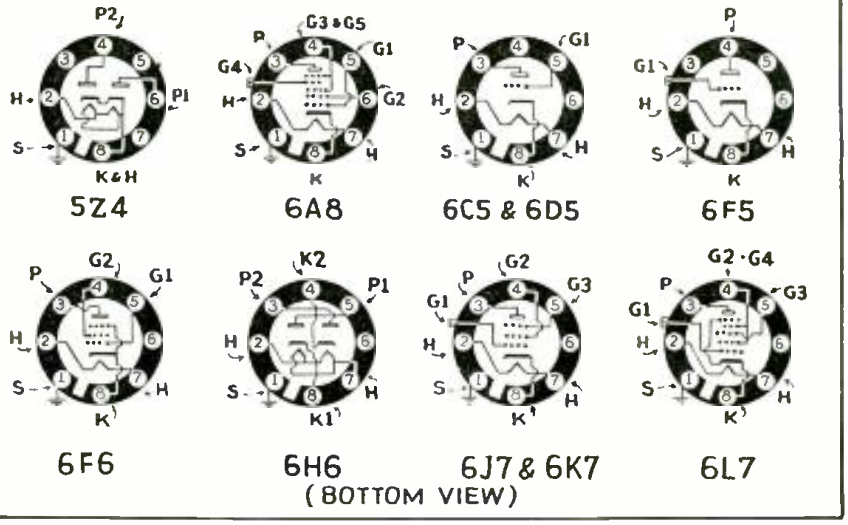
● MANY of our Short-Wave "Fans" have written us for information regarding the new all metal tubes, the characteristic data and socket connections. Below we have in tabular form the essential characteristics and functions of the various metal tubes and also a chart showing base connections for each of the ten different types.

Only standard metal tubes are shown. Various companies have introduced combination glass-metal tubes of entirely different types but at the present time they are not well enough known to warrant publication, because they are only repeats of the regular glass type bulbs.

R. C. A. Parts Bulletin

A very interesting "parts" catalog has just been released by the Radio Corporation of America. It contains a complete listing of all parts manufactured by R. C. A. and used in their receivers, together with a complete line of replacement parts. It has also listed a wealth of equipment designed especially for the serviceman who has an up-to-date service shop. Diagrams, together with tables showing various sizes of condensers, etc., are also given and a complete classification of all tubes. Request Bulletin No. 507, Service Dept. Short Wave Craft, 99 Hudson St., New York City, N.Y.

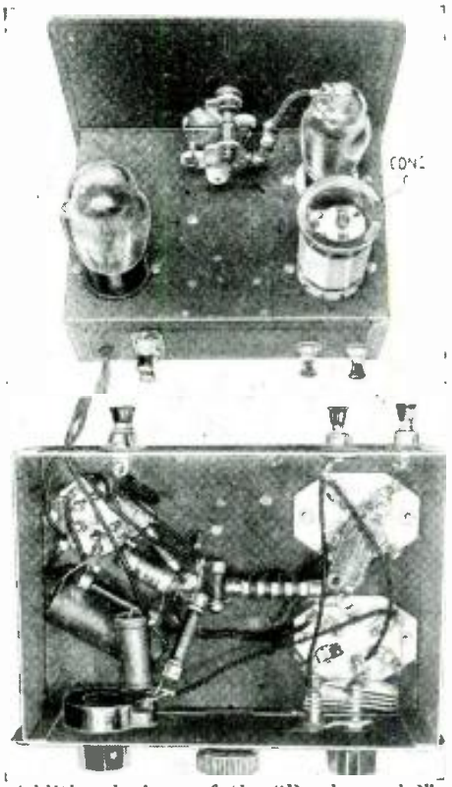
~ STANDARD METAL TUBE BASING ~



TUBE TYPE	Fil. or Heater V.	Fil. or Heater A.	Max. Pl. V.	Max. S.-G. V.	Grid V. Neg.	Pl. Ma.	Cath. Ma.	Amp. Factor	Plate Load	Output Watts	Equiv. Types	No. of Pins	Function
6A8	6.3	0.3	250	100	3.0	4.0	14	.....	.....	.....	6A7	8	Pent. Converter
6C5	6.3	0.3	250	.....	8.0	8.0	.....	20	.....	.....	76	6	Triode Amply
6D5	6.3	0.7	275	.....	40	31	.....	4.7	7,200	1.4	45	6	Triode Amp., Class A
6D5	6.3	0.7	300	.....	50	23	.....	.....	5,300	5.0	45	6	Triode Amp., Class AB
6F6	6.3	0.7	250	250	16.5	34	.....	200	7,000	3.0	42	7	Pentode Output, Class A
6H6	6.3	0.3	100	Direct	Current	2 Ma.		(max.)			none	7	Duodiode Detector
6J7	6.3	0.3	250	100	3.0	2.0	2.5	1,500+	.....	.....	6C6	7	Pentode Det.-Amp. (Non-var. Mu.)
6K7	6.3	0.3	250	100	3.0	7.0	8.7	1,160	.....	.....	6D6	7	Var. Mu. Amplifier
6L7	6.3	0.3	250	150	6.0	3.5	.....	.....	.....	.....	none	7	Pentagrid Mixer-Amplifier
5Z4	5.0	2.0	400	.....	.....	125 Max.	.....	.....	.....	.....	5Z3	5	Full-wave—H.-V. Rectifier

"Ham" and "Fan" Band-Spread-2

(*Continued from page* 463)



Additional views of the "Bandspread-2"

BOOK REVIEW

Fundamentals of Radio—Second Edition, by Professor R. R. Ramsey, Ph. D. Size: 6¼ x 9¼", 426 pages, stiff cloth covers, illustrated with numerous line cuts and half tones. Published by Ramsey Publishing Company, 1935.

Professor Ramsey's excellent treatise on radio has recently been enlarged and brought up-to-date, and 380 problems are included in the text. This book has been highly recommended by numerous schools as an excellent course of reading, as it constitutes a very complete treatment of the subject. The subjects covered include—Batteries, Alternating Current, Resonant Circuits, the action taking place with hard and soft tubes, measuring various effects occurring in tube circuits, Oscillator Circuits, Antennas, V.T. Transmitters, Negative Resistance, Filters, Match Impedances, Talkies and Television.

The "Radio Handbook," by the technical staff of *Radio Magazine*. Stiff paper covers, 296 pages, profusely illustrated with diagrams and halftones, printed on good quality paper, size 6 by 9 inches, price $1.00. Published by *Radio Magazine*, San Francisco, Calif.

Every short-wave ham and also the student and fan will find this Handbook very valuable and a source of much short-wave information. The opening section of the book deals with an analysis of the amateur transmitter, amateur or ham superheterodyne, autodynes, a quartz crystal filter, fundamentals of radio, etc. A number of constructional articles are given on transmitters and receivers, including a 25-watt phone, a 47 oscillator and 210 amplifier transmitter, 5-meter transmitters and receivers, the simplest 5-meter superhet, a 1-tube, 5-meter transceiver, transmitting antennas and coupling systems, antennas for receiving, filter chokes, rectifiers and filters, high-frequency measuring equipment—including the cathode ray oscilliscope, a ¾-meter transceiver using a 955 Acorn tube, etc.

CLASSIFIED

Advertisements are inserted at 5c per word to strictly amateurs, or 10c a word to manufacturers or dealers. Each word in a name and address is counted. Cash should accompany all orders. Copy for the January issue should reach us not later than November 5th.

BOOKS

ARMY-NAVY GIVES FREE radio operators' training for service on aircraft, ships. Salary, expenses paid. Information pamphlet, how to apply, 20c. Continental, Box 344, Dept. 4, Indianapolis, Ind.

ELECTRICAL SUPPLIES

INSULATION, WIRE, VARNISHES—complete line of materials and parts. Send 10c for new, 60-page, wholesale catalog. Autopower, 411 S. Hoyne Ave., Chicago.

GENERATORS

TWENTY NEW PRACTICAL changes for automobile generators. See our advertisement at bottom of page 493. Auto Power, Inc.

"HAM" OFFERS AND WANTS

SELL: ELEVEN TUBE ALL wave super $20. Short wave converter, Dayrad oscillator, ohmmeter, set analysers, pam amplifier. Swap for or buy 52 or 854 tubes. Riley Parsons, 8BXY, Old Forge, N. Y.

BUY, SELL OR TRADE HIGH quality short wave receivers, public address equipment, cameras, lenses, binoculars, etc. Wells-Smith Radio Corp., 26 N. Wells St., Chicago.

FOR SALE DOERLE BANDspread AC-5 complete, with attachment for optional battery operation $25.00. W8CPG, Harrison, Michigan

FOR SALE: ALL STAR ALL Wave Sr. complete, nearly new; in perfect condition. B. Bugajski, 2635 E. Ferry, Detroit, Mich.

SKYRIDER 5, 12-200 METERS, Complete, Perfect, $18.00. Also will buy or trade for Scott. Bill Lyun, 4151 Jackson, Chicago.

GOOD A.C. RECEIVER COMplete $15.00. Low power Xmitter complete $10.00. Charles Pflueger, Crystal Lake, Ill.

1935—2 TUBE AC DOERLE, SUBmit offer. W9VGS, Hutchinson, Kans.

.00035 VARIABLE CONDENSERS—3 for $1.00. W8RW, Bluffton, Ohio.

INSTRUCTION

RADIO ENGINEERING, BROADcasting, aviation and police radio, Servicing. Marine and Morse Telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Colt St., Valparaiso, Ind.

MISCELLANEOUS

OHM'S LAW CALCULATOR—Lightning Slide Rule; solves all problems of Voltage, Current and Resistance, Power, Wire Sizes, etc. Range: 1 micro-amp. to 1000 amps.; 1 micro-volt to 10,000 volts; 1 micro-ohm to 10 megohms; 1 micro-watt to 10 megawatts; wire sizes 0 to 36 B. & S. gauge. Introductory price $1.00 prepaid. The Dataprint Co., Box 322, Ramsey, N.J.

PATENTS & INVENTIONS

HAVE YOU A SOUND PRACTIcal invention for sale, patented or unpatented? If so, write Chartered Institute of American Inventors, Dept. 92 Washington, D. C.

PATENTS, REASONABLE TERMS. Book and advice free. L. F. Randolph, Dept. 711, Washington, D. C.

QSL—CARDS—SWL

SHORT WAVE LISTENER'S VERification Cards. Reply getters. Very attractive. QSL's. Samples? (Stamps.) WSESN, Toledo, Ohio.

QSL's. SWL's. SNAPPY! BRIGHT! Different! 200 Two colors $1.00. Samples? W5AFB, Tupelo, Miss.

QSL CARDS, NEAT, ATTRACtive, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

SHORT WAVE COMPONENTS

NEW PRECISION, LOW PRICE, decimal scale, D.C. Multi-Meter. Ranges: 0-.001-.01-.1-1-10 Amps., 0-.1-1-10-100-1000 Volts, 0-30,000-3,000,000 Ohms. For details write, S hooley Engineering Company, Terril, Iowa.

PLUG-IN COILS, WRITE FOR prices. Noel, 728 Birch, Scranton, Pa.

SHORT WAVE RECEIVERS

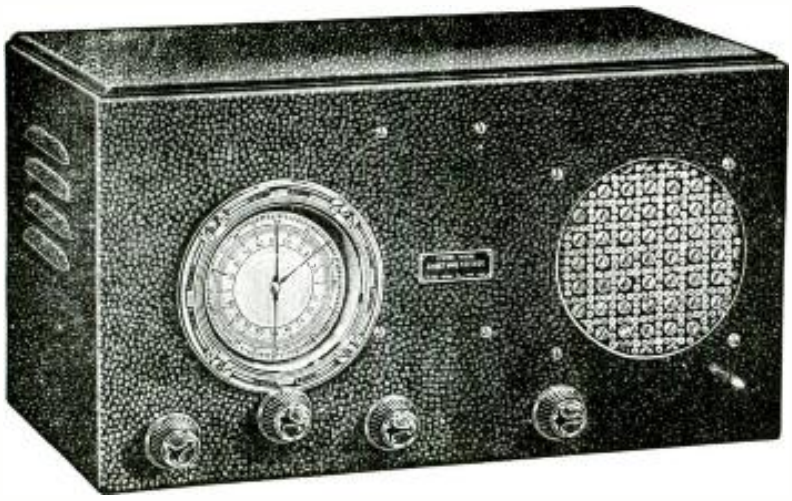
BLUEPRINT "HOW TO BUILD 18 Long Distance Crystal Receivers"—record 2100 Miles; "Setbuilders Data" year; 25c. Laboratories, 151-A Liberty, San Francisco.

1935 DOERLE KIT, TUBES, CABinet, $6. Complete line of parts for set builders. Chas. Brand, 1063 Lafayette Ave, Brooklyn, N. Y.

TRANSMITTING EQUIPMENT

ONE TUBE FONE XMITTER, complete diagram: 25c; W6MJS, Oakland, Calif.

AMATEUR EQUIPMENT DEsigned on order. Reasonably priced. W1IBY, West Hartford, Conn.



take notice!—

CONTINUOUS BANDSPREAD

on all bands

THE OFFICIAL

DOERLE BANDSPREAD

5-TUBE DE-LUXE A. C. SHORT-WAVE RECEIVER

NATION-WIDE *TESTIMONIALS* PRAISE THIS SET

Dear Sir:

I want to tell you that the radio which I bought from you recently is working fine. I have received California on long-waves, and on short-waves have logged about 93 stations. Three from the greatest distance are VK3LR, VK2ME and VK3ME, all located in Australia. And I get them consistently, not just once in a great while, at great volume, on a small window-sill aerial.

The set certainly has some "kick" to it.

Ernest J. Orishek, 118 White St., Westfield, Mass.

Dear Sirs:

Just a line or so to give you an idea of what My Doerle A. C. 5 hauled in during a 2 weeks listening test. All of the G and D stations were received also TIEP, W9XF, PRADO, HJ4ABE, W8XAL, W2XE, W8XK, CJRO, YU2RC, CJRX, COC, HJ4ABB, HJ1ABB, YU5RMO, YP3RC, WCRCT, CT1AA, W1XAL, W9XAA, W1XAZ, EAQ, WE9GW, HC2RL, HJ3ABD, KEJ, HJB, HP5B, HJ1ABD, WNB, YUIRC, HIZ, JYK, FYA, YU4RC, OA4AD, RNE, PHI, RKI, WNC, YNA, COH, PRF5, WON, XEBT, W2XAF, LSL, 12RO, IRM, JYS, UK3LR. All stations come in with strong carriers with a QSA4-5—R9 plus. "Hams" in 48 states and foreign countries besides practically all Police Radio Stations were received.

Frances Kmetz, 213 Linden St., Allentown, Pa.

Gentlemen:

The Doerle "AC-5" arrived all O.K. Had it going in about ten minutes after unpacking. It sure seems to be fine, we enjoy it very much. I am new at short-wave tuning but the bandspread dial makes tuning a real pleasure. I only have a short wire aerial so cannot give you any long list of stations received, but have received many foreign stations. I think Rio De Janeiro about the best distance at about R8 volume.

Ralph C. Rathbun, 9 Seward Ave., Bradford, Pa.

Gentlemen:

Here is a list of Short-Wave stations I have received in a short time with my "DOERLE AC5", with a very poor aerial for short-wave work. EAQ—Madrid, Spain; WIXAZ, Springfield, Mass.; W2XAF—Schenectady, N.Y.; COH, Havana, Cuba; COC—Havana, Cuba; VE9GW—Bowmanville, Ontario, Canada; CT1AA—Lisbon, Portugal; PRF5—Rio De Janeiro, Brazil; HJ1ABB—Barranquilla, Col., S. A.; PRADO—Riobamba, Ecuador, S. A.; DJC Berlin, Germany; XERT—Mexico City, Mexico; YV3RMO—Maracaibo, Venezuela, S. A.; CJRO—Winnipeg, Canada; W2XE—New York, N. Y.; W8XK Pittsburgh, Pa.; HP5B—Panama City, Panama; FYA—Paris, France; GSC & GSL—Daventry, England.

EAQ—Madrid, Spain and COD—Havana, Cuba come in every night on the loud speaker regardless of weather conditions. This is the third and best receiver I have owned in the short time I have been interested in Short Waves.

Emerald H. Delbrugge, Rose-Mary Dahlia Gardens, Martins Ferry, Ohio.

Original letters plus others may be seen at our office.

Complete Price

$27.59

WITH 5 TUBES

Ready to plug into 110 Volt AC line

- Doublet Antenna Input or Standard Antenna input
- 8-Low Loss Bakelite Plug-in Coils
- 15-200 Meters
- Fully Shielded
- Bandspread Dial
- Dynamic Speaker
- Headset Jack
- Beautiful Cabinet
- 5 Matched Raytheon Tubes

BEFORE you buy any other Short-Wave Receiver, be sure to take advantage of our FREE five day trial offer explained below. Satisfy yourself, in your own home and at your leisure that this IS one of the greatest values in radio, and that it DOES have features which are found in more expensive receivers.

A powerful 5-tube "rig" complete with its self-contained hum-free power pack and dynamic speaker; all mounted on a single chassis and contained in a large handsomely finished black crackle cabinet with patterned screen speaker grill.

Two tuned stages—regenerative detector, 3AF stages with powerful 41 pentode output and perfectly matched dynamic speaker; all these features contribute to the great power and fine performance of this Doerle short-wave receiver.

CONTINUOUS BANDSPREAD ON ALL BANDS. A special double-pointer, double-scale, airplane dial having a tuning ratio of 125 to 1 is employed.

Many fine features that you would expect to find in more expensive receivers are incorporated in this "ACE TOP-NOTCHER" of the entire Doerle line.

Either a short-wave doublet or standard antenna may be used. A new antenna-adjusting scheme permits perfect alignment of both tuned circuits without appreciably affecting the setting of the tuning dial. Provisions are made to use headphones if desired, with a switch to cut out the dynamic speaker.
All parts and workmanship fully guaranteed.

LOOK AT THIS DX-QSL LIST!

During its initial test, in New York City, this receiver pulled in on its loud speaker, at good room volume, the following enviable log: W1XAL, W1XAZ, Boston; W3XAL, Boundbrook, N.J.; W8XAL, Cincinnati; W9XAA and W9XF, Chicago; GSC, GSD, GSE, GSF, Daventry, England; DJA, DJB, DJC, DJD, Zeesen, Germany; HBL, HBP, Geneva; VE9GW Ontario; V9DN Quebec; GE9DR Montreal; VE9HX Halifax; XETE Mexico City; YV1BC, YV3BC Caracas CP5 Bolivia; LSN Buenos Aires; COC Havana; EAQ Madrid; WQO and WEF, testing with the Byrd Expedition and a whole flock of amateurs in practically every radio district of the United States. After that, we could no longer keep our eyes open so we "signed off" to bed.

The testimonials printed on this page testify that, in actual use, our customers are attaining even greater success. Uses a simple regenerative circuit—so simple as to be entirely fool-proof. Tubes: 1—6D6, 1—6F7 (actually two tubes in one), 1—37, 1—41 power output tube and 1—80 full-wave rectifier. Two gang tuning condenser; single dial control; FULL-VISION ILLUMINATED BAND SPREAD AIRPLANE DIAL. Ship. wt. 35 lbs. No. 5000. "DOERLE AC-5" Short-Wave Receiver, Complete with 5 Tubes, Speaker and 8 coils 15 to 200 meters. Completely wired and tested. (NOT SOLD IN KIT FORM) YOUR PRICE..... **$27.59**

Set of 2 Broadcast coils $1.75 additional

7 PAGES of Instructions and Diagrams Included with each SET

USE THIS COUPON for—

FREE 5 DAY TRIAL

RADIO TRADING CO., 101A HUDSON ST., NEW YORK

Gentlemen: 12-35

I enclose ..... dollars..... cents, for your new Doerle 5-Tube De-Luxe Short-Wave receiver on a five day free trial basis. I am to prove to my own satisfaction that it will give me world-wide reception and that your guarantee means exactly what it says. If, at the end of five days after receipt of radio, I am not perfectly satisfied, I will write you accordingly, whereupon, you will send shipping instructions. Upon receipt of the radio, you will refund me the full purchase price. I agree to pay express charges one way, and you the other.

C.O.D. SHIPMENT. I enclose ..... dollars..... cents deposit, balance of ..... dollars..... cents C.O.D.

PRINT Name .....

Address .....

Town ..... State.....

FREE

SPECIAL BARGAIN BULLETIN FOR RADIO DEALERS, SERVICE MEN, EXPERIMENTERS AND SHORT-WAVE FANS

Two Colors. Profusely Illustrated

Up-to-the-minute bulletin containing low prices which save you money. Contains radio sets, parts, public address equipment, short-wave receivers, etc. etc.

Don't Delay—Write Today!

Send post card or letter. Bulletin sent by return mail. See pages 490 and 500 for our other "ads."

RADIO TRADING CO., 101A Hudson St., New York City

● Index to Advertisers ●

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

Statement of the Ownership, Management, Circulation, etc., Required by the Act of Congress of August 24, 1912.

Of Short-Wave Craft published Monthly at Mt. Morris, Ill., for Oct. 1, 1935.

State of New York, } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Hugo Gernsback, who, having been duly sworn according to law, deposes and says that he is the Editor of Short-Wave Craft and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher Popular Book Corp., 99-101 Hudson St., New York City; Editor Hugo Gernsback, 99-101 Hudson St., New York City; Managing Editor H. Winfield Secor, 99-101 Hudson St., New York City; Business Managers None.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and address of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Popular Book Corp., 99-101 Hudson St., New York City; D. Gernsback, 99-101 Hudson St., New York City; H. Winfield Secor, 99-101 Hudson St., New York City.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

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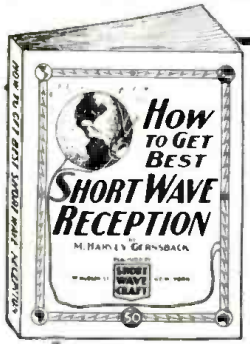
Maurice Coyne,
(Seal)
(My commission expires March 30, 1936.)

Here are the Six BEST SHORT-WAVE RADIO BOOKS!

Without doubt you will have to go a long way to buy better books on short waves than you find on this page. Each book is written by a well-known authority on short waves . . . each book has been carefully illustrated with photographs and diagrams to make the study of this field of radio much simpler. The volumes on this page are the finest books on short-waves which are published anywhere today. Order one or more copies today . . . find out for yourself how fine they are. Prices are postpaid.



How to Get Best Short-Wave Reception

By M. HARVEY GERNSBACK

This book tells you everything you ever wanted to know about short-wave reception.

The author, a professional radio listener and radio fan for many years, gives you his long experience in radio reception and all that goes with it.

Why is one radio listener enabled to pull in stations from all over the globe, even small 100 watters, 10,000 miles away, and why is it that the next fellow, with a much better and more expensive equipment, can only pull in the powerful stations that any child can get without much ado?

The reason is intimate knowledge of short waves and how they behave. Here are the chapters of this new book:

1. What are Short Waves and what can the listener hear on a short-wave receiver or converter?
2. How to tune and when to listen in on the short waves.
3. How to identify short-wave stations.
4. Seasonal changes in short-wave reception.
5. Types of receivers for short-wave reception.
6. Aerial systems for short-wave receivers.
7. Verifications from short-wave stations.

The book makes excellent reading matter. There are many tricks in short-wave reception that even some of the "old-timers" do not know. Be sure to get it.

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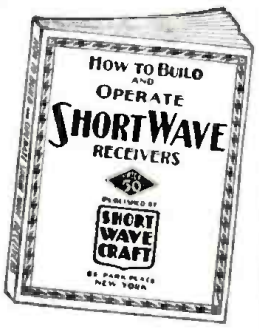
HOW TO BUILD AND OPERATE SHORT-WAVE RECEIVERS

THIS is the best and most up-to-date book on the subject. It is edited and prepared by the editors of SHORT WAVE CRAFT, and contains a wealth of material on the building and operation, not only of typical short-wave receivers, but short-wave converters as well. Dozens of short-waves sets are found in this book, which contains hundreds of illustrations; actual photographs of sets built, hookups and diagrams galore.

This book is sold only at a ridiculously low price because it is our aim to put this valuable work into the hands of every short-wave enthusiast.

We know that if you are at all interested in short waves you will not wish to do without this book. It is a most important and timely radio publication.



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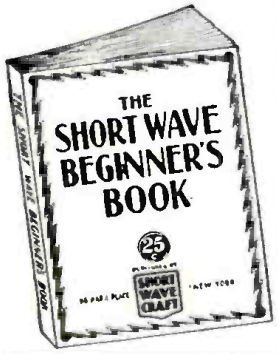

HERE is a book that solves your short wave problems—leading you in easy stages from the simplest fundamentals to the present state of the art as it is known today. It is the only low-Priced reference book on short waves for the beginner.

The book is profusely illustrated—it is not "technical." It has no mathematics and no technical jargon.

It also gives you a tremendous amount of important information, such as time conversion tables, all about aerials, noise elimination, all about radio tubes, data on coil winding and other subjects.

Partial List of Contents

Getting Started in Short Waves—the fundamentals of electricity. Symbols, the Short Hand of Radio—how to read schematic diagrams. Short Wave Coils—various types and kinds in making them.

Short Wave Aerials—the points that determine a good aerial from an inefficient one.

The Transposed Lead-in for reducing Static.

The Beginner's Short-Wave Receiver—a simple one tube set that anyone can build.

How to Tune the Short-Wave Set—telling the important points to get good results.

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Learning the Code—for greater enjoyment with the S-W set.

Wave length to Kilocycle Chart.

Wire Chart—to assist in the construction of coils.

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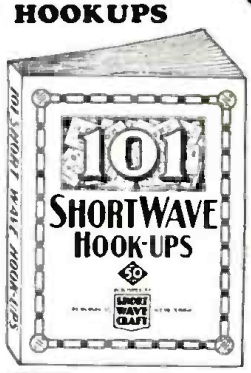
101 SHORT-WAVE HOOKUPS

Compiled by the Editors of SHORT WAVE CRAFT

EACH and every hook-up and diagram illustrated is also accompanied by a thorough explanation of what this particular hook-up accomplishes, what parts are required, coil-winding information, values of resistors, etc., in fact, everything you want to know in order to build the set or to look up the data required.

To be sure, all of the important sets which have appeared in print during the last five years are in this valuable book. Sets such as the Doerle, Dimmore, the "12" Twinplex, Oscillodyne, Denton "Stand-by," Meradyne Triplex 2, "Globe-Trotter," 2-Tube Superhet, Minidyne, "Loop" Receiver, "Doerle" 2-tube Battery, "Doerle" 3-tube Battery, "Doerle" 2-tube A.C., "Doerle" 3-tube A.C., Doerle "Signal Gripper," Duo R.F. 4-tube Receiver, The Sargent 9-33 Tapped Coil Receiver, Globe-Giriller 7, The 2-Tube "Champ"—2 Tubes Equal 3, Ham-Band "2-Tube Tee-Wee" Wyeth All-Way 6, Denton Economy 3, 2-Tube "Regenerative-Oscillodyne" will be found here, with full descriptions. In many cases, we have also included a picture hook-up for those who do not wish to follow the regular symbolic hook-up, but wish to have a regular wiring diagram.

This is a very handy volume, especially for those "fans" who wish to study the best sets in the short-wave art, from one tube up to ten tubes.



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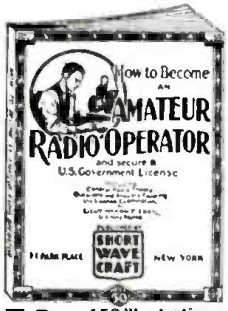
HOW TO BECOME AN AMATEUR RADIO OPERATOR



WE chose Lieut. Myron F. Eddy to write this book because his experience in the amateur field has made him pre-eminent in this line. For many years he was instructor of radio telegraphy at the R.C.A. Institute. He is a member of the I.R.E. (Institute of Radio Engineers), also the Veteran Wireless Operators' Association.

If you intend to become a licensed code operator, if you wish to take up phone work eventually—this is the book you must get.

Partial List of Contents

Ways of learning the code. A system of sending and receiving with necessary drill words is supplied so that you may work with approved methods. Concise, authoritative definitions of radio terms, units and laws, brief descriptions of commonly used pieces of radio equipment. This chapter gives the working terminology of the radio operator. Graphic symbols are used to indicate the various parts of radio circuits. General radio theory particularly as it applies to the beginner. The electron theory is briefly given, then waves—their creation, propagation and reception. Fundamental laws of electric circuits, particularly those used in radio are explained next and typical basic circuits are analyzed. Descriptions of modern receivers that are being used with success by amateurs. You are told how to build and operate these sets. Amateur transmitters. Diagrams with specifications are furnished so construction is made easy. Power equipment that may be used with transmitters and receivers, rectifiers, filters, batteries, etc. Regulations that apply to amateur operators. Appendix which contains the International "Q" signals, conversion tables for reference purposes, etc.

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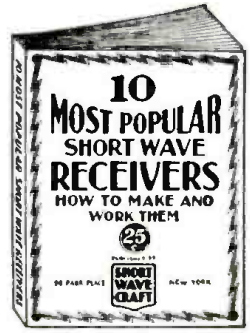

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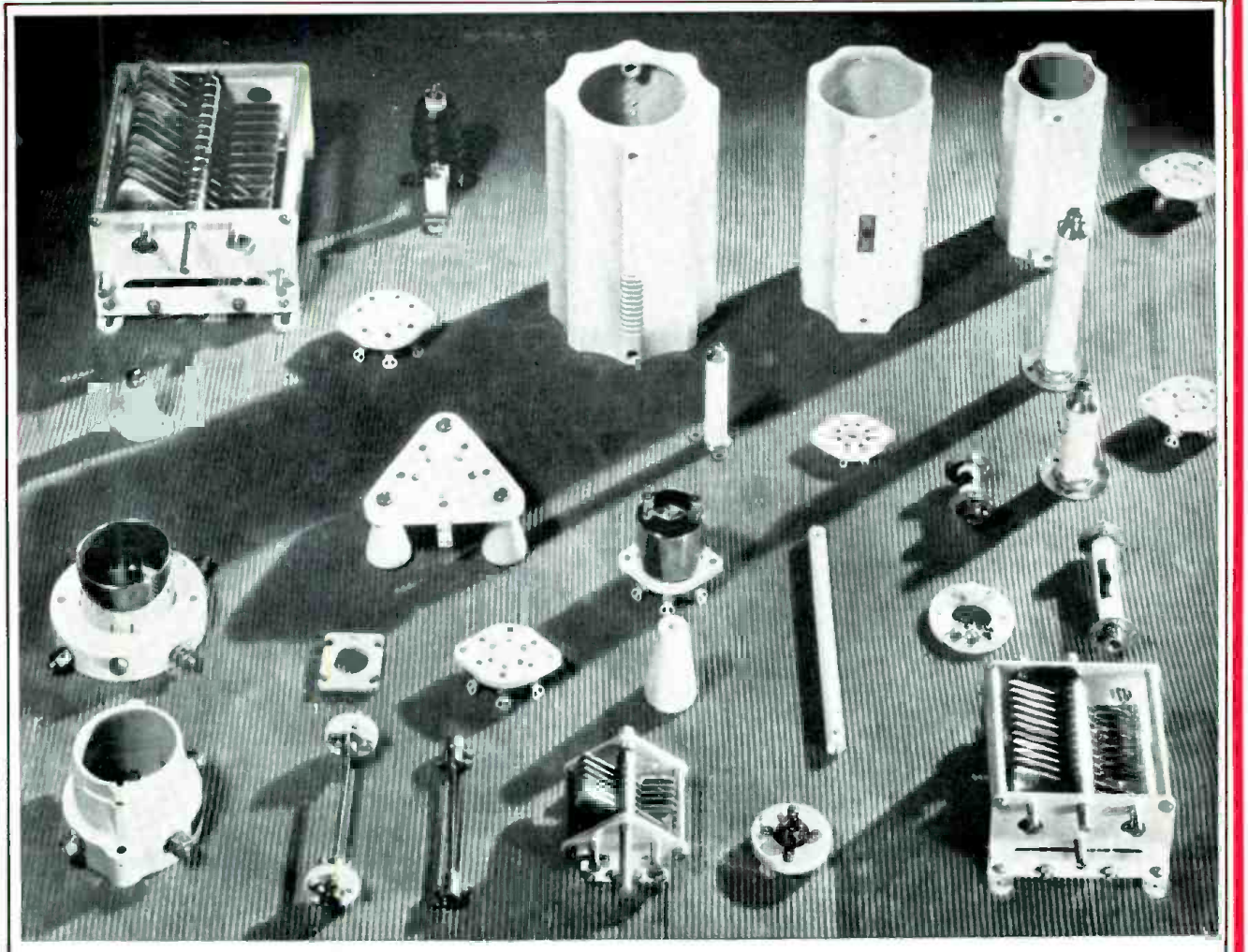

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