THE RADIO EXPERIMENTER'S MAGAZINE

HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

October 34

WORLD'S LARGEST SHORT WAVE CIRCULATION

THE "Trans-Atlantic 2"
4-TUBE PERFORMANCE WITH 2 TUBES!
See Page 330

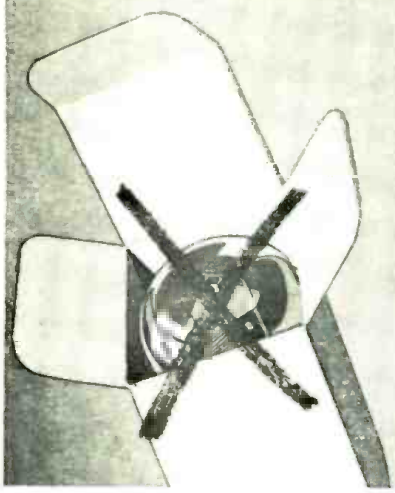
25c IN CANADA 30c

The new RCA SEALED CARTON

to protect you against buying old radio tubes disguised as new

BE CAREFUL

Hundreds of thousands of used radio tubes are being sold as new by "gyp" dealers—slipped into new open-flap cartons—so you can't tell the difference.



BE SAFE

Charles Winninger as CAPTAIN HENRY

The new RCA Sealed Carton guards every tube from factory to your set. Proof that every tube is *really* new!

Insures your getting genuine RCA Micro-Sensitive Radio Tubes

RCA has smashed "gyp" sales of hundreds of thousands of second-hand radio tubes repolished and sold as new. The new RCA NON-REFILLABLE CARTON assures you of getting a new, factory-fresh tube... not just an old tube slipped into a new-looking open-flap carton. This sealed carton is your only reliable guarantee that a radio tube is new—for even an expert radio engineer can't tell a new tube from a used tube by looking at it.

To get the finest reception be sure you get these remarkable new Micro-Sensitive RCA Radio Tubes. For true-to-life reception, a radio tube must be sensitive enough to pick up a microscopic electrical impulse—the millionth part of a volt. Only in RCA Radio Tubes will you find such "Micro-Sensitive" accuracy. Guaranteed by the RCA Radiotron Company to give you these five big improvements. 1. QUICKER START. 2. QUIETER OPERATION. 3. UNIFORM VOLUME. 4. UNIFORM PERFORMANCE. 5. SEALED CARTON PROTECTION.

RCA RADIO TUBES · AUTHORIZED AGENT

Look for this Sign in your neighborhood. It identifies a dealer selected by RCA to serve your radio tube needs.

TUNE IN Radio City Studio Party Sat., 9 to 9:30 P. M., E. S. T. N. B. C. Blue network. Big stars of radio interviewed by John B. Kennedy.

RCA Cunningham Radiotron RADIO TUBES

IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Kahlert . Shuart . Heise . Palmer . Van Alstyne

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

Contents for October, 1934

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New 5-Tube Super-Het—Full Working Details.
Improving the "Victor 2-Tube Super-Het." by W. A. Woehr. W9PTZ.
Best Aerial for "EUROPEANS." by Heinie Johnson.
More Power From a Triode Below 2.5 Meters, by the "Staff".

Certified Circuits

• SHORT WAVE CRAFT goes to a large expense in verifying new circuits published in this magazine. Whenever you see the seal shown here in connection with any of the sets published in this and future issues of SHORT WAVE CRAFT, this will be your guarantee that this set has been tested in our laboratories, as well as privately, in different parts of the country to make sure that the circuit and selected parts are right. Only "Constructional-Experimental" circuits are certified by us.

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

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

OUR COVER

• THE Cover painting this month shows the "Trans-Atlantic 2"—an extremely clever new short-wave receiver, in which two of the NEW type tubes do the work of four of the OLD type tubes. Read all about its simple construction on page 330

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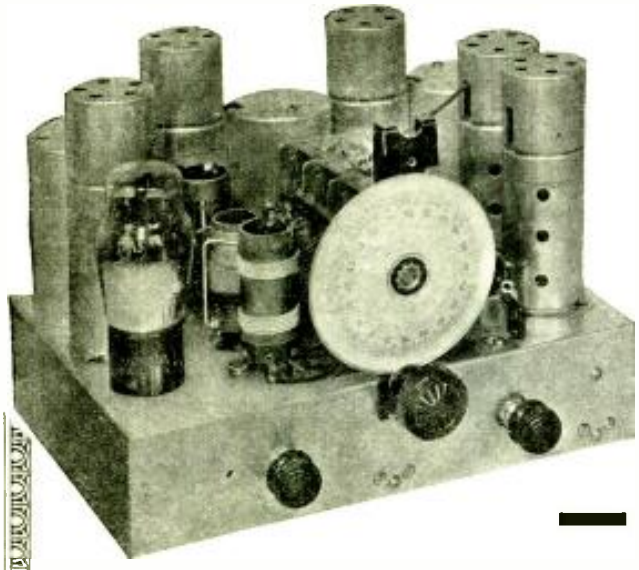
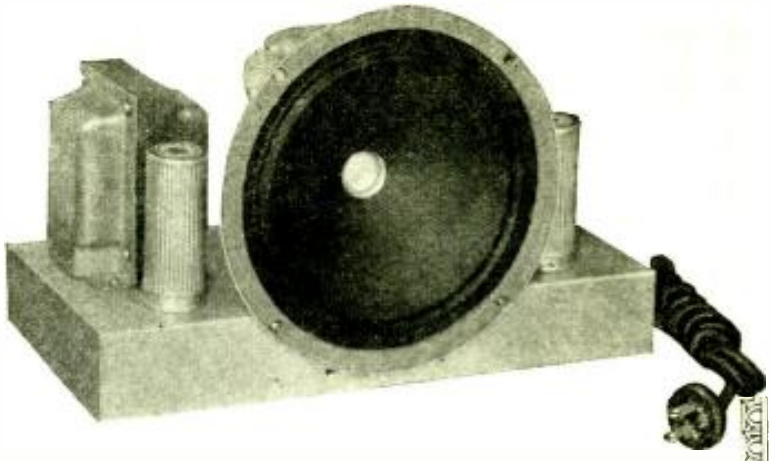




LABORATORY MODEL
Constructed with the Coil Kit as described below.

—MILLER—

All-Wave Super-Heterodyne COIL KIT—Model 711

Even the novice can build an all-wave super-heterodyne of advanced design by following the simple instructions supplied with the New Miller No. 711 All Wave Coil Kit. The principles employed are the result of years' experimentation in this field and are of proven merit. Prepared with the usual thoroughness for which all Miller kits are noted, it contains the essential parts required to insure proper results of the completed receiver.

You would not expect a plumber to repair a fine watch, yet this is just as reasonable as to suppose a coil manufacturer whose entire attention has been focused on mass production of cheap broadcast coils is capable of offering time-tested short wave inductors.

The name Miller has been synonymous with High Grade coils for years, yet modern production methods plus the sensible design employed brings the price of Miller coils and coil kits within the reach of anyone.

All wave receivers built with Miller coil kits are today in operation in every part of the civilized world, giving consistently reliable world-wide reception. Please note we do not state this is possible, but is actually being done, as numerous letters in our files testify.

OUTSTANDING PERFORMANCE ASSURED

NOTE THESE FEATURES:

FREQUENCY RANGE: 550 to 25,000 KC (550 meters to 12 meters).
PRE-ADJUSTED COILS: Miller coils have been supplied pre-adjusted for years. Competitive manufacturers are now offering this as a new feature.
AC OPERATION: OF COURSE. Designers who offer AC operation as a feature simply admit their antiquated ideas are being modernized.
TWO UNIT CHASSIS: Most flexible arrangement and allows up-to-date servicemen to install all wave tuning units in customers' cabinets whose amplifier and speaker are of the high fidelity type.
NO PLUG-IN COILS: This is a modern receiver kit.
SENSITIVITY: High sensitivity provided by the two stage intermediate frequency amplifier insures consistent reception from weak distant stations.
SELECTIVITY: The Intermediate Frequency Transformers of the tuned grid and tuned plate type have been especially designed for use in this circuit to provide the proper selectivity and gain. The name MILLER is sufficient assurance they are the best available.
LOW NOISE LEVEL: Every precaution has been taken in the design of the coils and circuit to assure the greatest amplification with the noise level reduced to an absolute minimum.
TRUE TRACKING: All bands are individually trimmed and padded. No panel operated trimmer required.
LOW IMAGE RESPONSE: The use of highly efficient signal tuning plus a high frequency intermediate amplifier (465 kilocycles) practically eliminates undesirable image response, and at the same time increases the sensitivity.
FULL WAVE DETECTION: The 55 type tube, serving the triple purpose of detector, automatic volume control, and first stage audio, is fed from a specially designed full wave I.F. transformer, providing greatest efficiency in demodulating the carrier wave, thus allowing the high quality of present day transmitters to be reproduced with excellent fidelity.
SIMPLICITY: To be really successful any product must be fundamentally sound and simple. Complete absence of complicated circuits to confuse the constructor and cause difficulty in proper alignment of the completed receiver.

The following items are supplied in the Miller No. 711 Coil Kit:

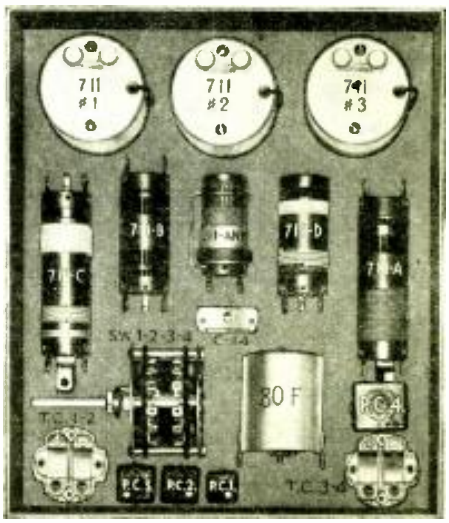
1 B.C. Antenna Coil No. 711 Antenna
1 B.C. Translator Coil No. 711 A
1 75-200 Meter S.W. Coil No. 711 B
1 35-75 Meter S.W. Coil No. 711 C
1 12-35 Meter S.W. Coil No. 711 D
1 Input I.F. Transformer No. 711-1
1 Inner-stage I.F. Transformer No. 711-2
1 Output stage I.F. Transformer No. 711-3
2 Dual Detector Trimmers (TC-1-2-3-4) Catalog No. 35
4 Accurate Padding Condensers PC-1-2-3-4
1 Rectifier Plate Filter Choke Assembly No. 80F
1 Oscillator Coupling Condenser C-14
1 Wave Band Selector Switch
1 Full size Blue Print (12x18 inches)

We can supply the two unit chassis as pictured above, at the following price

Receiver Chassis, list price	$2.50
Power Supply Chassis, list price	$2.50
3 Gang Variable Condenser, list price	$3.00

Quality manufacturers whose products are recommended for this receiver: Meissner, Oaks, Ineca, Muter, Hygrade-Sylvania, Magnavox, Crowe.

Jobber's Proposition Available in Some Localities



Miller No. 711 Coil Kit, List Price, $16.00

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5917 S. Main Street, Los Angeles, California

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Short-Waves and the Next War

An Editorial By HUGO GERNSBACK

● IT IS NOT pleasant to talk about the next war, but all authorities are pretty well agreed upon the fact that war is with us to stay and that, for many thousands of years to come, war will be with us. The next large conflict is probably not so far away as many think, and it behooves us, in view of the circumstances, to look ahead a bit and see where short waves will fit in during the next struggle.

In 1912, several years before the World War started, I found it necessary to talk in a similar vein, and I was then mindful of the radio amateur and how he would fit in with the then coming struggle. At that time there was no broadcasting; so amateurs contented themselves with code and, when war finally came and the United States entered the conflict in 1917, my publications were responsible for recruiting many amateurs for military services abroad and at home.

Today, the amateur short-wave experimenter and the fan are in a similar position. The knowledge which they are gaining today may be priceless in a future struggle. Technical knowledge in short waves is most important because, in war, communication is of paramount importance.

In the World War, short waves, as such, were not very well understood. Signalling was crude because the vacuum tube was still imperfect, and radio was not the precise science that it is today.

In the future war, short waves will play a tremendous rôle —especially micro-waves, *which can be directed like a searchlight*.

It will become possible for armies to be in constant touch with each other without the enemy being able to overhear the signals, for by means of reflectors the waves will be directed, so that the signals cannot possibly go over into the enemy's camp. These micro-waves, also called "centimeter" waves, are of utmost importance for communication, and they will be used in portable sets not only by the infantry, but by men on horseback, by machine-gun platoons, by tanks, by airplanes, etc. Remember that the war of the future will, in many respects, be a machine war. Not so many human beings will be sacrificed. Tanks, airplanes, and other armaments, will be dispatched toward the enemy *without a single human being on board the machines!* All the movements of these war machines will be conducted by *radio telemechanics*—a new radio art, whereby it is possible to direct not only the movement of the machine itself, but the sighting and firing of guns, all from a distant point, and by radio short-wave control.

It is possible today, to blow up fortifications or mined land, as well as explode sea mines, by means of short waves, to harass an advancing enemy.

Not so many years ago, the United States Navy sent out an obsolete battleship into the open sea without a single human being on board. Yet, the ship went through all the usual maneuvers: it would advance in any direction, it could even run in a circle or cut a figure eight. The boilers were stoked, guns were discharged, all without a single human being on board the ship. All this was accomplished by means of radio waves and radio telemechanics.

In the coming war, the same thing will be accomplished on a much vaster scale, and not only will we be enabled to send *unmanned* tanks into the enemy's camp, but we can do the same thing with torpedoes in the open sea and with submarines, all of which can be guided by short waves, without the loss of a single human being.

Such heroic exploits whereby a one-man torpedo, piloted by a single man against an enemy vessel and then exploded, resulting in the death of the operator, are no longer necessary. Such single torpedoes can be readily steered along a given course, without any human being on board, all by short waves. There are, of course, hundreds of other similar applications for war purposes, which will come about in the next war. Many of these instrumentalities are now being experimented with by various nations.

For communication between the different units, should they become separated, there is always the short-wave radio telephone using micro-waves, which waves are directed in such a manner that they do not reach the enemy. Thus, different regiments or platoons can keep in constant touch with each other. Such an episode as that of the "Lost Battalion," which happened in our own forces, during the World War, is therefore, unlikely to happen in the next war. By means of short-wave telephony, the forces would always be in touch with each other; and it should be noted that these short-wave transmitters and receivers are not cumbersome affairs, but weigh only a few pounds, and can be readily strapped around the waist or carried on the back, without encumbering the soldier on foot or on horseback.

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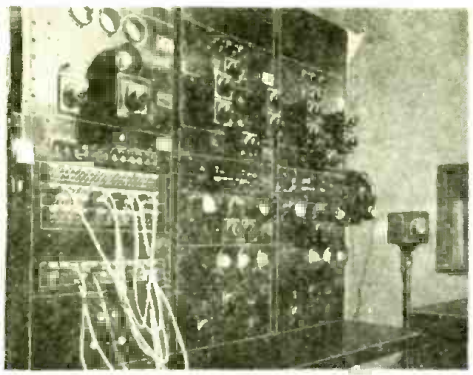
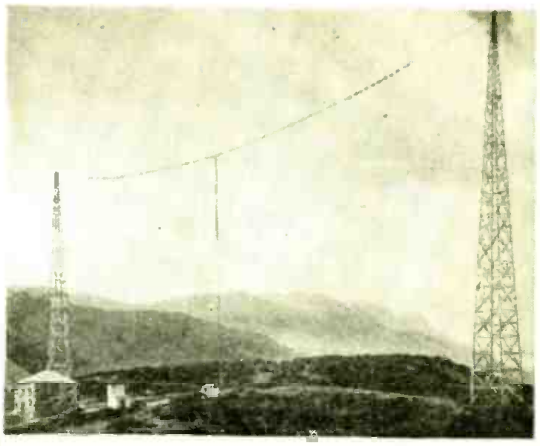
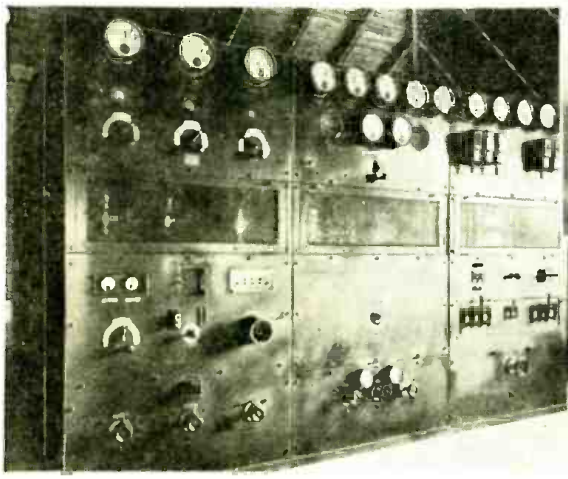


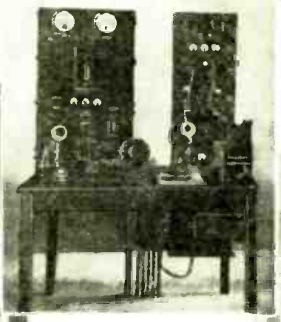
Above—The studio control room at YV2RC, Caracas, Venezuela. Here the operators, constantly on duty while programs are being broadcast, switch in and out the various microphones in the different studios and also regulate the microphone current.

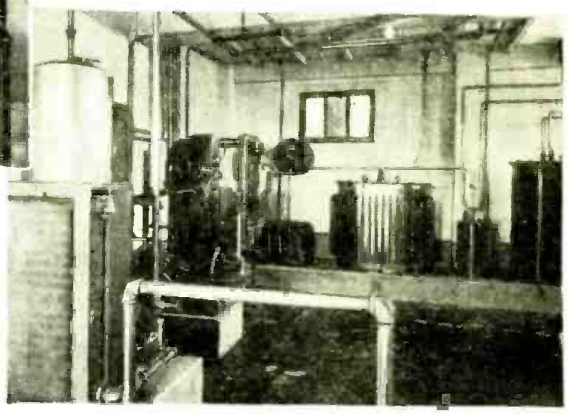
To the right we note the unusual location of YV2RC's transmitter and antenna system, which is located on top of a mountain at an elevation of 3,930 feet above sea level. The antenna system and transmitter are about 4.5 miles distant from the broadcast studios in the city of Caracas. A magnificent view is afforded to those who journey to the top of the mountain to see the antenna and transmitter and the beautiful Caribbean Sea can be seen clearly at a distance of 5.5 miles in a straight line from the mountain tops.



Below—Part of the power plant and engine room in the transmitter building of YV2RC. Note the powerful transformers, visible in the background of the picture. It represents no small piece of engineering to cart all of this apparatus up a mountain side and then to reassemble it.







Above — Special control room in the transmitter building of station YV2RC. Left—The powerful transmitter of the Caracas station. The panels are replete with the latest control devices and indicating instruments.

YV2RC—The S-W Voice
From Caracas, Venezuela

One of the best-known short-wave stations in South America is YV2RC, located at Caracas, Venezuela. They send out quite an elaborate booklet to all those who hear their station and write for a verification card. The booklet contains pictures and histories of their leading artists and also pictures of the station. Their powerful transmitter has been heard regularly, even through the summer static. The station transmitter and antenna are located on top of a mountain four and one-half miles distant from the studio located in the city of Caracas. The short-wave transmitter is rated at 200 watts and a regular 5-kilowatt "broadcast" transmitter also radiates programs locally on a wavelength of 312.3 meters.

• THE official name of the short-wave broadcasting station located at Caracas, Venezuela, and known to thousands of listeners all over the world by its call, YV2RC, is "*Broadcasting Caracas.*" This station has its transmitter proper located 4½ miles from the studios, which are on the second floor of a building situated in the center of the city of Caracas. The apparatus installed is thoroughly modern and the way in which this station "steps out," is the best proof that the station location and apparatus has been well-chosen, particularly in view of the fact that the short-wave transmitter, operating on 49.08 meters (6,112 kc.) uses but 200 watts! This station also broadcasts locally on long waves for the benefit of Venezuela, Central America and other countries. Programs are broadcast from a 5 kilowatt modern type transmitter on a wavelength of 312.3 meters. The transmitting apparatus, including the antenna steel towers, which rise 200 feet in height, is located on top of a mountain. The two antenna masts are located 492 feet apart and the 312.3 meter broadcast antenna is of the "T" type. The elevation at which the transmitter and antenna are situated on top of the mountain is 3,930 feet above sea-level and about 5½ miles in a straight line from the shore. On clear days the intense blue of the Caribbean Sea can be plainly seen—a most beautiful sight. The engineers of the station relate that many visitors are quite charmed at the fountain which they see just outside the station, but it happens that this is a part of the cooling system for the large vacuum tubes used in the transmitter. The Caracas station has been heard in practically all parts of the world. The general business policy of the station is similar to that followed in this country and *commercial* programs are sponsored by business firms, while there are also *sustaining* features which comprise entertainment as well as educational programs. Caracas is an ideal spot in which to live as the maximum temperature is 84 degrees F., while the minimum never goes below 50 degrees F.

The entertainment features presented by the short-wave section of the Caracas station and enjoyed by thousands of listeners in various parts of the world, represents some of the very best thought in this direction. A widely varied type of entertainment is presented and Venezuelean popular airs are

(*Continued on page* 368)

Newest Short-Wave Developments

Short-Wave "Mail" for Greenland Traveler

● ROCKWELL KENT, noted New York artist and writer, who, together with his thirteen-year-old son, Gordon, plans to spend the next two years in the Eskimo village of Igdlossuit, will receive his "mail" from home via short waves broadcast from W2XAF, the General Electric station at Schenectady. Igdlossuit is on the island of Ubekjent, 600 miles within the Arctic Circle. This unique situation has led to plans for a series of radio broadcasts, beginning on September 23. The first half hour will be devoted to Admiral Byrd, in latitude 78 degrees *south;* the second half hour to Rockwell Kent in latitude 75 degrees, *north*. To receive these radio messages, Mr. Kent will use a General Electric all-wave receiver of the same type as that used by Admiral Byrd, except that his set will be battery-operated. This is the first all-wave battery set developed by this company and it is an advance model released for Mr. Kent's use.

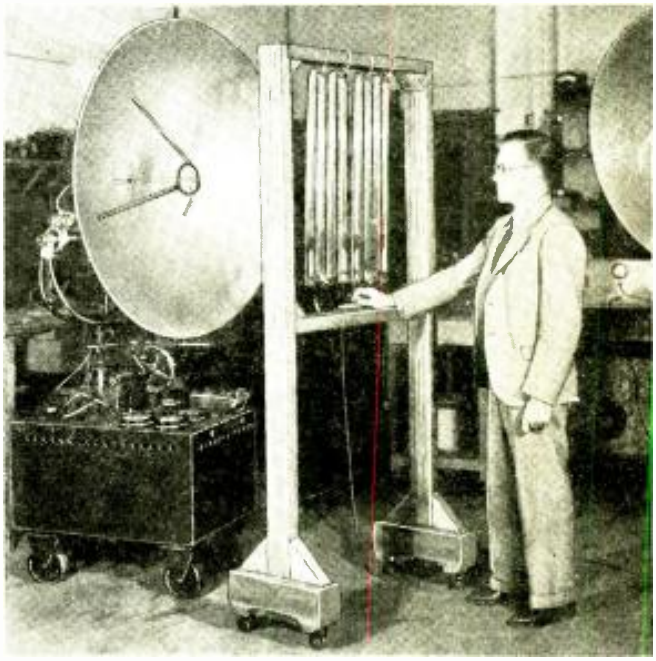
Two-Way Radio for Boston Police

Left—Close-up of new radio police test car recently demonstrated, the equipment permitting "two-way" talk

Right — Police officer inspecting the short-wave radio transmitter which is installed in the rear trunk of the car. Tests demonstrated excellent two-way conversation possible.

● A MOBILE two-way radio system developed for use by the Boston police department was demonstrated recently in Schenectady. A radio "prowl" car was fitted with apparatus for carrying on a conversation with headquarters while traversing the city streets. For the demonstration a light sedan, bearing no tell-tale evidence of an antenna or other special equipment, was used. The transmitter was installed in its rear trunk. A French-type telephone was installed in a convenient position on the instrument panel, where it could be used by the passenger, or even the driver, if necessary. For the other half of the two-way system, a transmitter was located in a nearby office building converted into a temporary "headquarters". When the car was called by headquarters the mobile transmitter on a different wavelength began to function immediately.

Centimeter Waves Like Light Beams

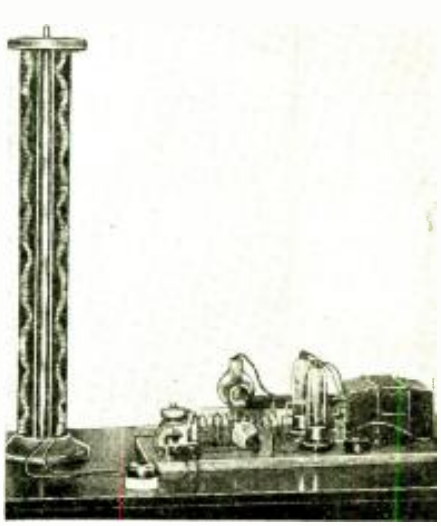


● THE picture above shows the latest ultra short-wave generator, together with glass ionic tube by means of which the Heaviside layer was artificially demonstrated, and which was caused to modulate the four inch waves produced by the transmitter. This apparatus was demonstrated by a group of research engineers of the R.C.A. Victor Company before an Institute of Radio Engineers meeting in Philadelphia. The demonstrations showed that these ultra short waves are reflected from metal surfaces like ordinary light, the parabolic reflectors used serving to concentrate the waves in a narrow beam. The glass tube shown contains mercury and argon.

Visible Radio Waves

● A SHORT-WAVE radio transmitting set is here used to create the effect of a visible radio wave. The output wires, instead of being connected to an aerial and ground, run to two vertical coils about 3 feet long and wound with fine wire. The wire rods are just discernible on either side of the glass tube. When the transmitting set is energized, the tube becomes lighted with a series of light and dark bands as the photograph indicates. The glass tube contains helium at a reduced pressure. Since the two coils are connected respectively to aerial and ground, a phase difference exists. At any instant while a wave is moving out along one coil, a wave is also moving in in

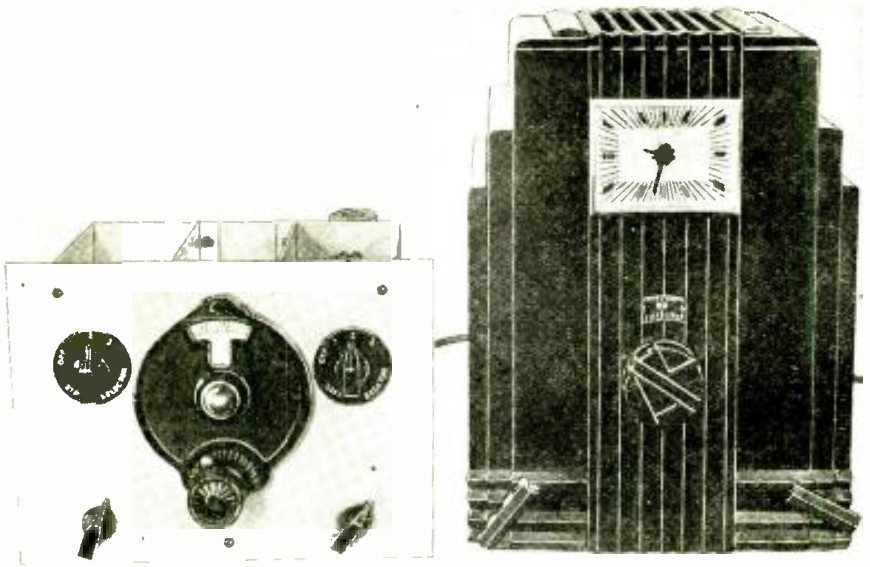
(*Continued on page* 374)



Simple apparatus which renders radio waves visible; fine for students.

The Mono-Coil Short-Wave

By GEORGE W. SHUART
W2AMN

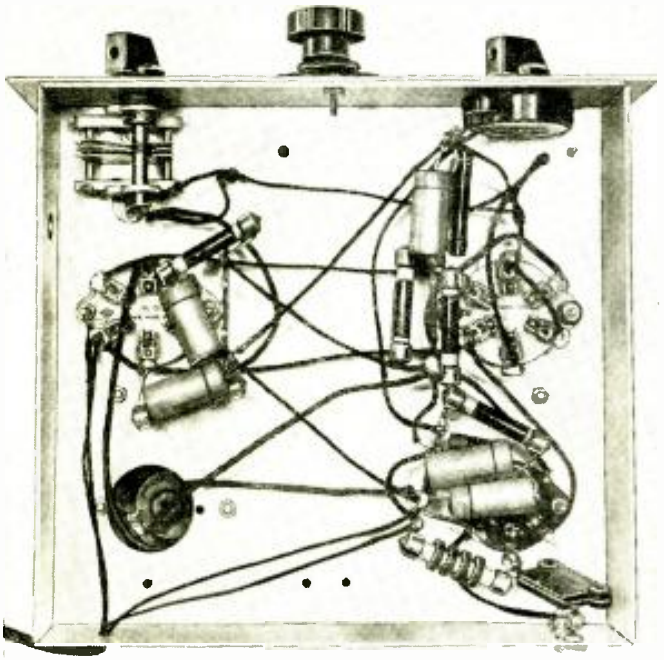


The "Mono-Coil" S.W. converter appears at the left of the photo, and when connected to a broadcast receiver (right), excellent short-wave reception was enjoyed.

● FOR the short-wave fan who is only interested in the reception of *phone* or *broadcast* stations, a good converter is the answer to his prayers. A well-designed superheterodyne converter used in conjunction with a fairly up-to-date broadcast (200 to 550 meter) receiver will provide really enjoyable short-wave reception for several well-known reasons. First, we usually have a good audio amplifier and speaker, which will give nice tone and volume, in the "BC" set. Second, the "BC" sets usually have tone-control and the later models have automatic volume control; these two features alone improve reception on the short waves more than can be imagined. The tone control can be used to lower the hiss and back-ground noise usually encountered in S-W reception, while the automatic volume control will go far to reduce the fading which has spoiled many a program.

Why Converters Fail

It is just as easy and some times more economical to build a converter than a regular receiver. This *Mono-Coil* converter will cost no more to build than a good three-tube receiver and the results will be far more gratifying. Many S-W fans have lost faith in converters because of the poor results they have obtained with them, having either built or purchased small one- or two-tube converters (or adapters) which yielded discouraging results. Well, a two-tube converter, unless carefully designed, will not work satisfactorily on all "BC" sets. If the "BC" set is not so sensitive no signals will be heard. A one-tube converter is hopeless unless in the hands of a magician and then he will probably get grey hair trying to pick up even the strongest stations.



Here's how the under-side of the "Mono-Coil" S.W. converter looks—pretty simple wiring, isn't it?

Works on Any Broadcast Set

The *Mono-Coil* converter will give excellent performance on any broadcast receiver having at least one stage of tuned radio frequency amplification. It was designed to give full loud speaker volume on the "weakest" *foreign* station, when used in conjunction with an A.C.-D.C. receiver having one stage of T.R.F., detector and one audio. These sets are known to have poor gain especially on the low frequency end of the tuning range (around 550 meters) where it has to be tuned to work with this converter. It was possible to bring in stations with enough volume to completely over-load the midget and it was necessary to turn the volume control nearly all the way off to get good tone!

When used with a set having two stages of T.R.F., the combination provided one of the most sensitive "SW" *superheterodynes* we have had the pleasure of working. The fine results produced by this converter is due to its efficient coil design and the use of the stage of I.F. *which is incorporated right in the converter*. The use of this I.F. stage makes it possible to use the converter on any set, even an old style battery receiver. For those living in districts where there is no 110 volt power supply, the substitution of 6.3 volt battery tubes for those shown in the diagram, will solve the problem. They should be a 6C6 for the detector, a 6C6 for the oscillator and a 6D6 for the I.F. amplifier. A six-volt storage battery together with 135 volts of "B" batteries will give excellent results. No change in the wiring of the converter is necessary when using the 6.3 volt tubes.

Separate Tubes Used

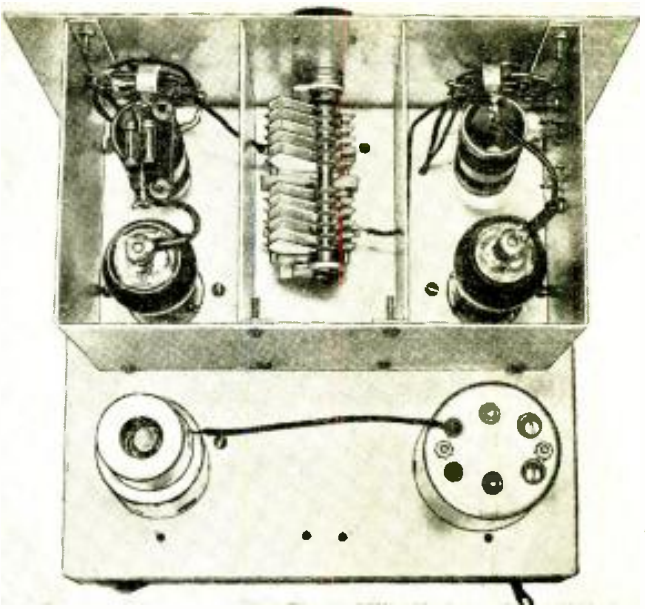
Separate tubes are used for the first detector and the high frequency oscillator. A 2A7 pentagrid converter could, of course, have been used but the same efficiency cannot be expected for one reason and that is that it is difficult to lay out the parts so as to provide short leads and still have ample shielding. Using two separate tubes it is possible to get an almost perfect layout and one that will allow the best possible shielding. The chassis used in building the converter is the same as used for the T.R.F. Mono-Coil set last month. This chassis was used, as we said before, because it permits a perfect layout with the best shielding, and the builder should by all means adhere to this design for best results.

The coils used are almost identical to those used in the T.R.F. job last month. In fact the detector coil is exactly the same, but the oscillator coil requires a slight change in the number of turns, it requiring slightly less grid turns than the detector coil. Complete details are given in the coil drawing.

The three-turn tickler coil used last month has been increased to four turns

Converter

By a few simple connections, as outlined in the article, this converter receives its power directly from the broadcast receiver. No separate eliminators or power supplies are necessary. The use of the new "Mono-Coils" together with a very efficient circuit design permits reception on all major stations with exceptionally great volume. Three tubes are used—one for the first detector, one for the high frequency oscillator, and another as the I.F. amplifier. Tests showed remarkable reception.



Note the extremely neat and effective layout of the apparatus in the "Mono Coil" S.W. converter.

and the cathode coil now has five turns. The number of turns were increased to allow a stable oscillator because the grid-leak has been decreased in value. The few turns used last month would not provide even output over the entire tuning range covered by the oscillator.

Circuit

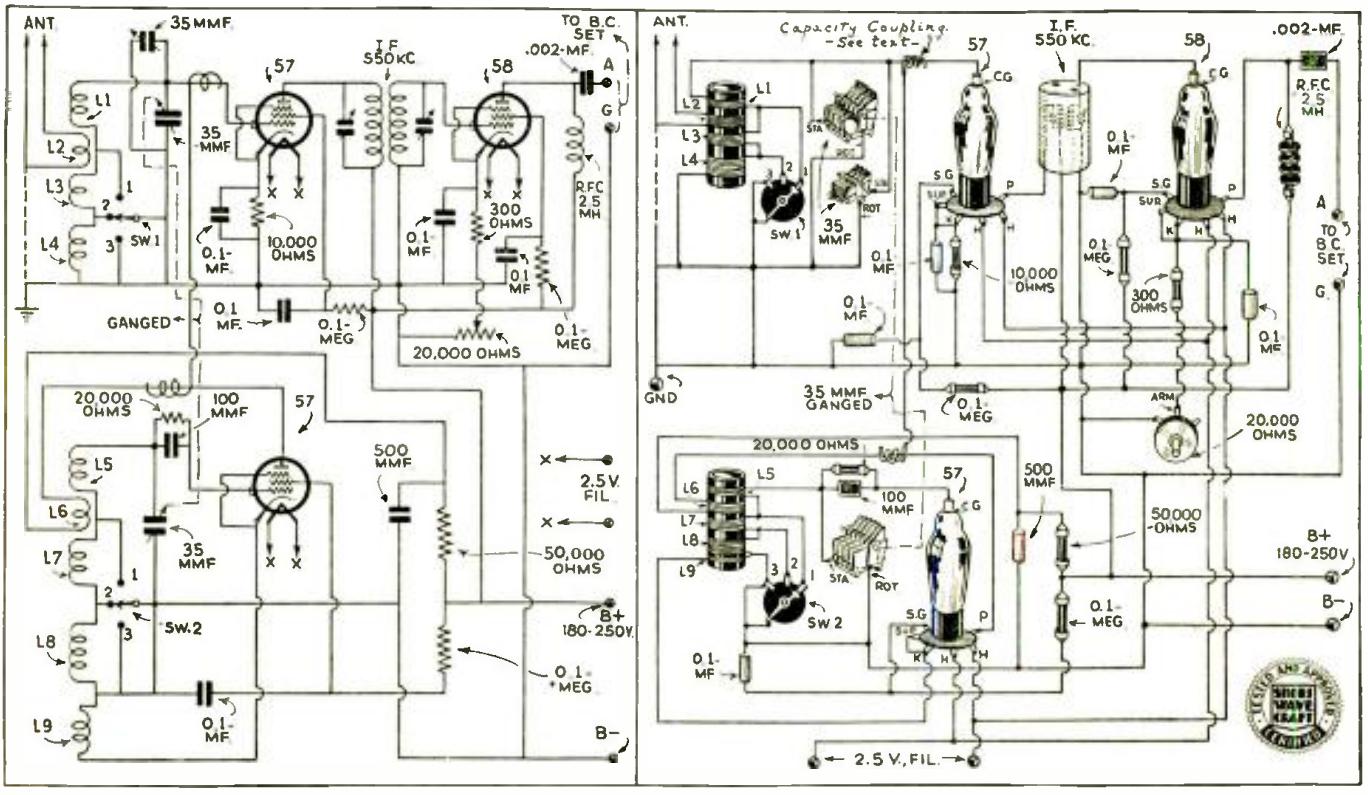
The first detector is of the power type with the grid-bias being provided by the cathode resistor. Its tuned grid circuit is gauged with the oscillator grid circuit to provide single-control tuning. A small trimmer condenser is used to allow a fine adjustment of the detector circuit and to keep it in proper alignment with the oscillator. This trimmer need only be set once for any one of the bands covered by the converter.

The I.F. stage used in the converter is provided with a volume or gain control. This is very helpful as one does not have to turn to the broadcast set while tuning and at times a better signal-to-noise ratio can be obtained with the adjustment of this control.

Coupling between the oscillator and first detector is accomplished by a small capacity between the oscillator plate and the detector grid. The best amount of coupling was obtained by using a short length of hook-up wire and twisting it three times around the connecting wire right at the plate of the oscillator tube. The other end of the short wire is wrapped around the grid lead which connects to the stator of the trimmer condenser of the detector stage, three turns are also used here. This coupling method is clearly shown in the diagram.

The Mono-Coil, as explained in previous issues, is designed to eliminate plug-in coils and to provide high effici-

(*Continued on page* 369)



Schematic and picture wiring diagrams for building the "Mono-Coil" Short-Wave converter. The cost of building this converter is nominal. This is a "Certified" circuit.

The "Trans-ATLANTIC

The "Trans-Atlantic 2" in operation. Music from a foreign station is providing entertainment for the person listening in.

● HERE is a set almost Spartan in simplicity, yet with plenty of sensitivity and gain; enough to drive a magnetic speaker with pretty fair volume. Of course it is easy to build and this appeals to the beginner who is yet unaccustomed to set construction. The more advanced enthusiast also will find delight in a set of this type. Simplicity means low cost too.

Double Purpose Tubes Used

A 6F7 is used as untuned R.F. stage and regenerative detector with condenser control of regeneration for smooth, noiseless operation without the least detuning. A 79 is used as a two-stage resistance coupled audio amplifier and provides very fine tone quality. The use of the 79 with its extremely high mu, which was designed to operate without bias as a class B tube, puts the audio gain upon a level with an ordinary two-stage transformer coupled amplifier using such tubes as O1-A's and 230's.

For tuning, a set of Alden six-prong coil forms is used in conjunction with a .00014 mf. midget. The Alden Coil switch used is unique and ruggedly built, designed to last and makes absolutely noiseless contact, the same as new after being rotated thousands of times.

Chassis Construction

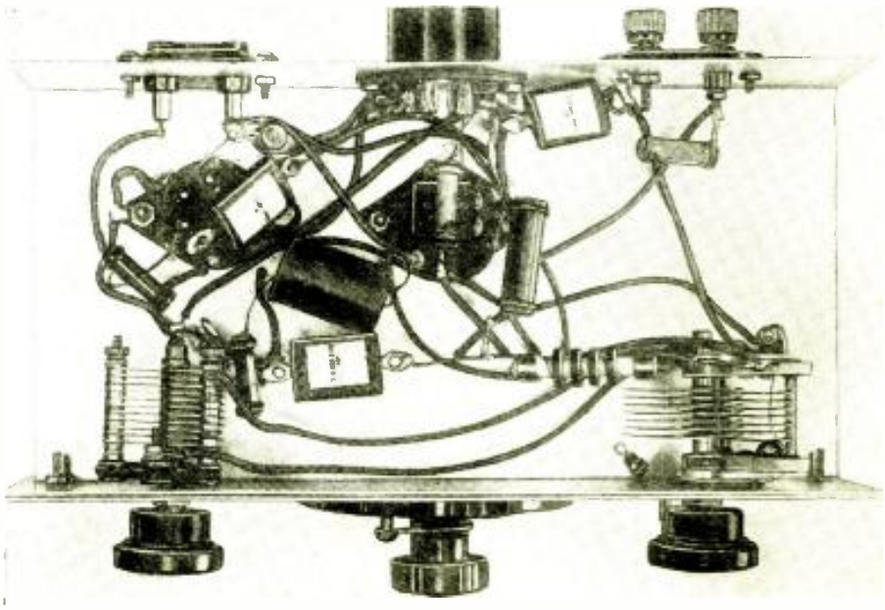
The panel is a piece of 3/64ths-inch aluminum 7 by 11 inches and the subpanel a piece the same thickness whose original dimensions were 9 by 11 inches. The subpanel is folded so there is a depth of 5 inches with two 2-inch sides. Folding is accomplished by placing a ruler (preferably steel) along the line where the bend is to be made and scoring heavily on both sides with a sharp knife taking care that one line is made and not several. If the sheet is now placed on a table with a sharp edge, the scored line coincident with the edge of the table, it will be possible to make a sharp bend without trouble. The aluminum should be bent slowly and bent back slightly every now and then. A file will take off any burrs on the edges. It is best to do all the drilling at once with both pieces flat and with a bit of forethought is easily done; this is a great time saver. After drilling, and before bending, the aluminum can be given a hot lye bath resulting in that pleasing silver finish of aluminum oxide.

(NOTE: If the aluminum is left in the solution for any length of time a leaden colored deposit will probably be found on the surface. This should be rubbed off with the fingers under running water.) Looking from the front the tuning condenser is in the center of the panel and the coil switch at the left. The two regeneration condensers are at the lower left and the lower right respectively. Looking from the top it is seen that the coils and tuning condenser are closely grouped with the audio tube to the right. The grid condenser and grid leak are mounted right on the bottom of the detector tube socket. In mounting the coil switch a small metal washer is used to hold the switch about 1/16 inch away from the panel. The panel is held to the subpanel by two bolts.

The set is a very smooth operator, the action of the regeneration control being particularly agreeable. It is, of course, possible to use any size antenna without affecting the tuning range or regeneration and one can instantly return to a logged station.

Untuned R.F. Stage Used

The untuned RF stage is a real advantage and has plenty of wallop attested by the fact that there was interference with any type of choke. If a small pie-gridleak type of choke was used B.C. station background resulted while with a smaller homemade choke short wave commercial code interference became greatly annoying. With the 400



Above we have the bottom view of Mr. Kahlert's dandy little receiver in which 2 tubes do the work of 4.

2"- By ERNEST KAHLERT

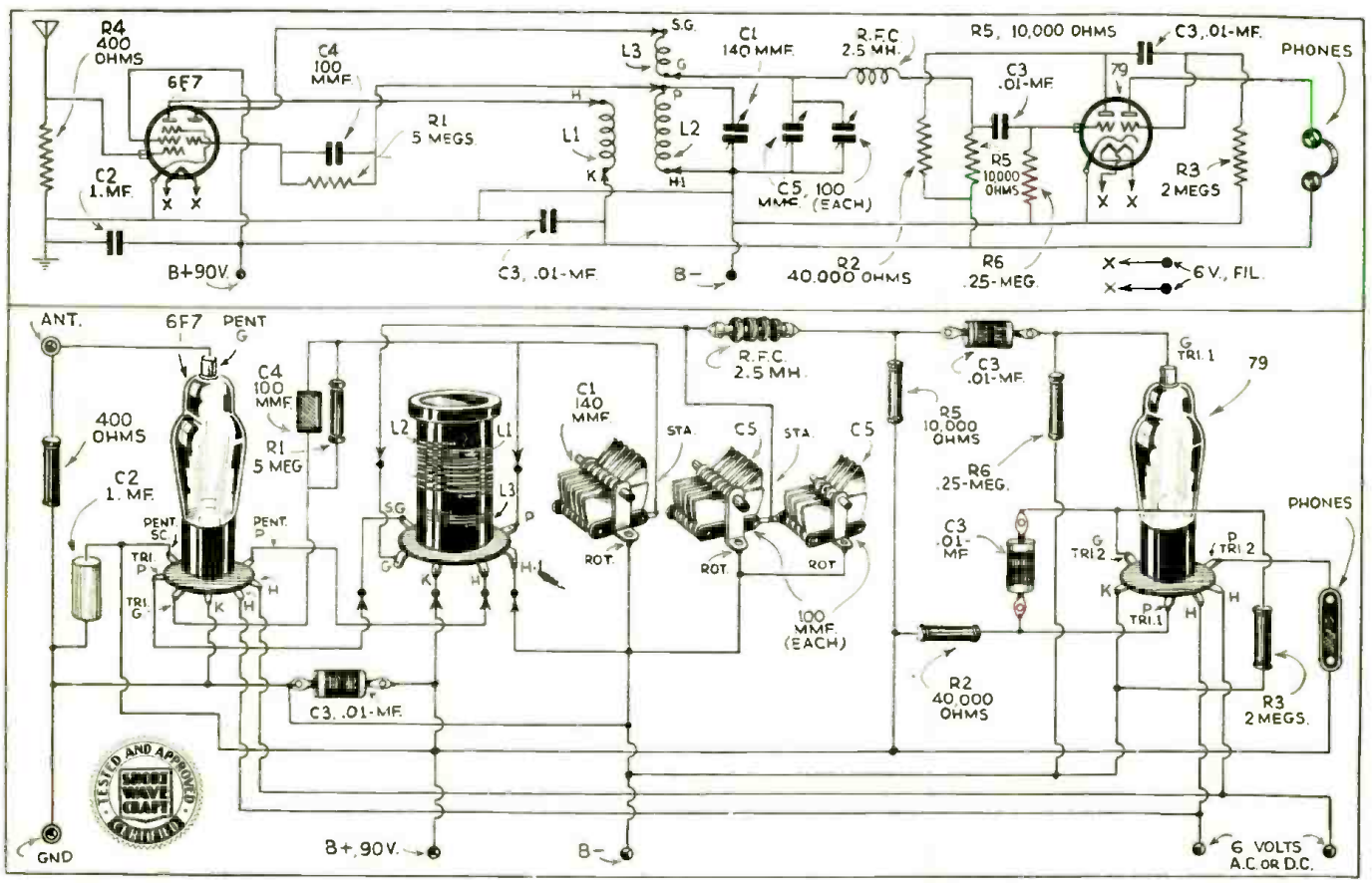
The "Trans-Atlantic 2," designed and built by Mr. Kahlert, is truly a marvelous receiver. Two tubes are used and actually produce volume comparable to that given by a 4-tube receiver. "Music" and "speech" emanating from foreign short-wave stations was clearly picked up in New York City with enough volume to actuate a magnetic speaker. Either batteries or an A.C. power pack can be used with this receiver as the tubes are the type designed to be worked with either A.C. or D.C. A 6F7 is used to provide a pentode untuned R.F. stage together with a triode regenerative detector. A 79 twin triode functions as two stages of resistance coupled audio. Due to the use of an untuned R.F. stage there is no need for a tricky adjustment of an antenna trimming condenser. Dead spots are conspicuous by their absence and tuning is extremely smooth.

Here we have the rear view of the Trans-Atlantic 2 showing how the various parts are placed.

ohm carbon resistor, however, the gain did not take a landslide and there was not the slightest interference. Tuning this stage would, of course, increase the gain but would be going past the point of simplicity and then trouble from internal coupling in the 6F7 would most likely defeat our ends anyhow. The 6-prong coils with three windings are made for R.F. stage work. Any coupling between the R.F. and detector other than inductive is poor at best, as the plate voltage then appears at the tuning condenser and grid leak and no matter how good the grid condenser there is bound to be leakage and however slight will cause cankerous and aggravating noise. Then, too, the inductive coupling provides the correct impedance match. One might believe that the presence of the other coils in the switch would have a detrimental effect on operation but this is not so as taking the other coils out has no effect whatsoever except a slight raising of frequency on any one coil. Homemade coils can be used with equivalent results as they do not have to have a very high standard of accuracy, if any, as there is only the one tuned circuit. The dimensions of the Alden coils are given for those who wish to wind their own.

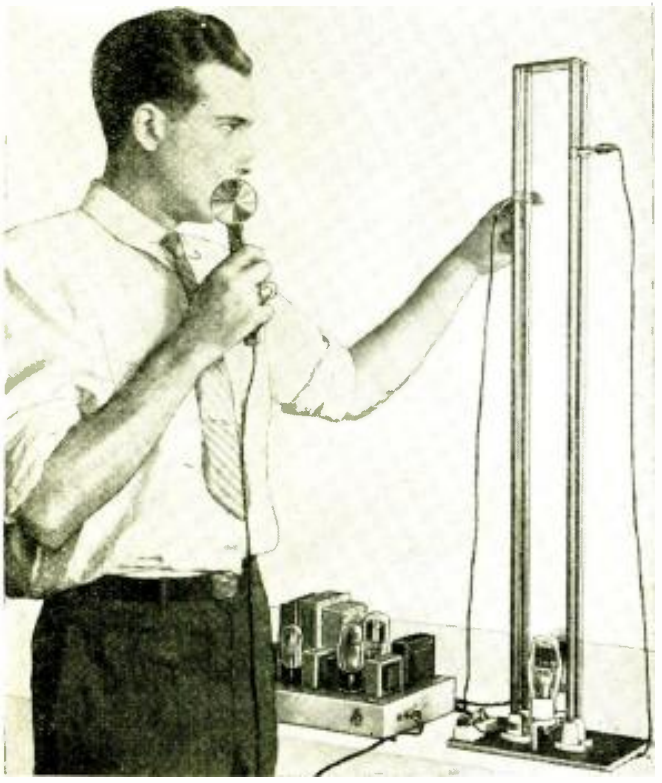
No bias is necessary at 90 volts of "B" battery as used in this set. The

(*Continued on page* 375)



Schematic and physical diagrams clearly showing the various connections of the Trans-Atlantic 2. Physical diagram is given for the inexperienced fan who cannot easily follow schematic diagrams.

New High Impedance



The new ultra high frequency transmitter being demonstrated by Mr. Shuart, its designer.

We have all been waiting for an improvement in the efficiency of 5-meter transmitters. In this article, Mr. Shuart describes a very unique transmitter in which efficiencies as high as 50 per cent can be obtained! Stability better than that provided by an M.O.P.A. is obtained with this new type of transmitter. Aside from being more efficient than other types of ultra high frequency transmitters, this one actually costs less to build than the old style affairs using parallel tuned circuit.

● ● ●

● WITH the constant increase in activity on the ultra-high frequencies among the transmitting amateurs, there is a dire need for improved transmitter and receiver design. Especially now that the amateurs are permitted to use any frequency above 110 megacycles.

It might be well to state the facts of this latest amateur privilege; the new ruling of the F. R. C. is as follows:

Rule 374a. The licensee of an amateur station may, subject to change upon further order, operate amateur stations on any frequency above 110,000 *kilocycles, without separate licenses therefore, provided*:

(1) *That such operation in every respect complies with the Commission's rules governing the operation of amateur stations in the amateur service.*

(2) *That records are maintained of all transmissions in accordance with the provisions of Rule* 386.

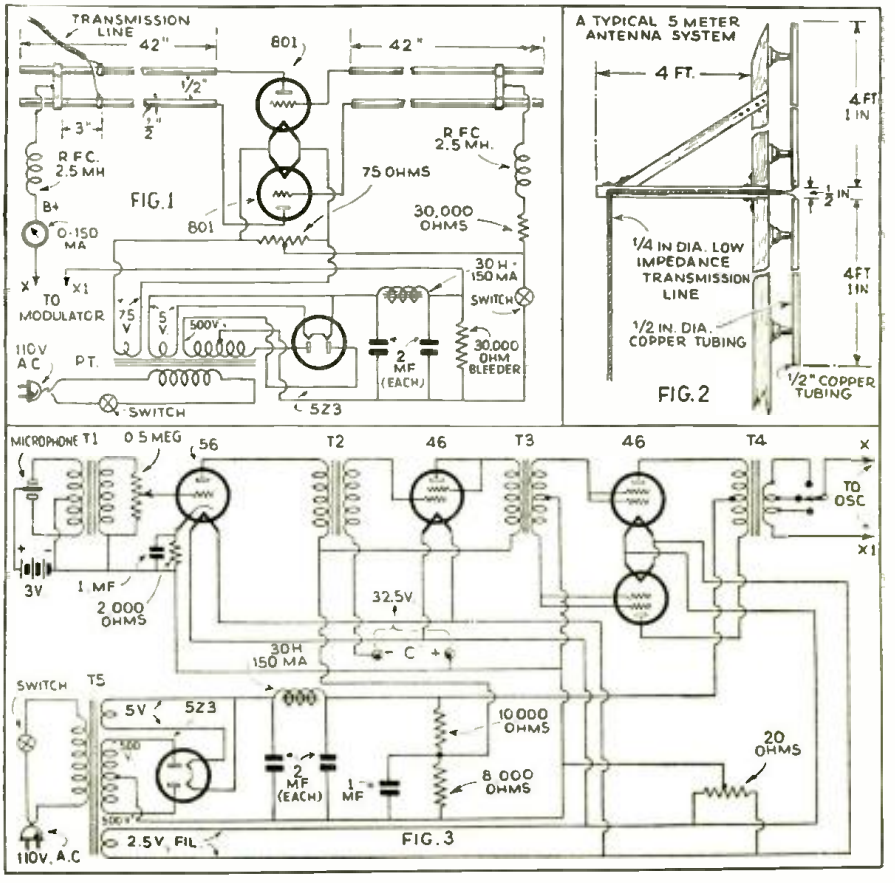
The apparatus to be described in this article is, in the opinion of the writer, the simplest and most efficient for general amateur use. It is highly recommended that every "Ham" now transmitting on the ultra-high frequencies give it a try.

It is a well-known fact that the parallel tuned tank circuit is very inefficient above 14 megacycles. And as we approach 56 megacycles it becomes impossible to obtain anywhere near the rated input and output of the present-day vacuum tubes; even those designed particularly for ultra-high frequency work.

With "*high-impedance resonant transmission lines*" used to replace tuned circuits in the plate and grid circuits of a standard push-pull oscillator, it is possible to obtain *stability* comparable to an ordinary crystal circuit and besides this, outputs very nearly approaching the rating of the tube can be obtained.

For instance, it is possible to get nearly the same output on five meters, that can be obtained with the same tubes in an ordinary oscillator, running with the same voltages and input on 80 meters. This really means something, because the plate dissipation of the tubes will be much lower for a given output and the tubes are bound to last much longer. The power output, when using "long lines," has been found to be as much as 100 per cent greater than that obtained with regular parallel tuned circuits with the same input. Not only that, but *this percentage of efficiency over parallel tuned circuits continues to become greater as the frequency gets higher.* This means that we can reach frequencies much higher than we can with the old method. From this it will be seen that for the frequencies above 110 MC (megacycles), the new system becomes a necessity.

"Long lines," which is the most convenient term for them, have been in use at W2AMN for several months and



Above, we have the circuit diagram of a transmitter using "long lines" together with its power supply and a recommended modulating system.

Lines Replace Coils

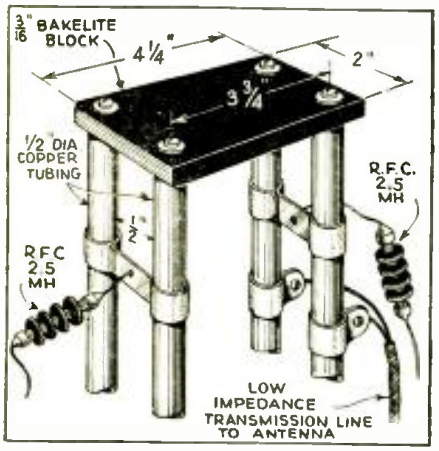
By GEORGE W. SHUART W2AMN

have proven themselves to be the ideal thing. On *five meters*, changing from parallel tuned circuits to "long lines," increased the strength of the signal tremendously and it was possible to put a strong signal into places where it could not be heard with the old units: all this with not a volt more on the plates of the tubes and with a 20 *per cent decrease in plate current! The frequency was reported as "absolutely steady" and the modulation much improved in quality; the latter undoubtedly due to less frequency modulation.*

Improved Stability

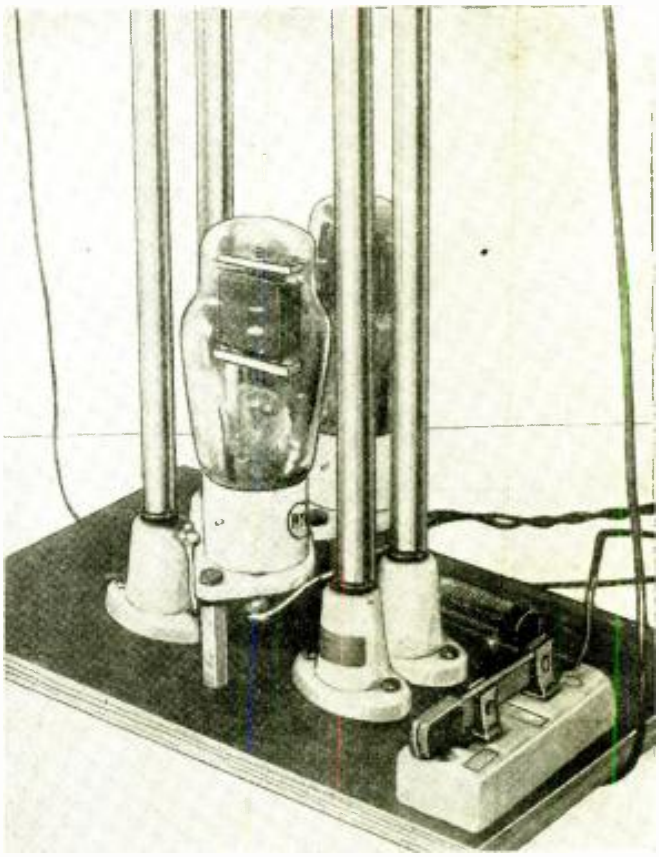
An auto-dyne detector was constructed in order that the frequency stability could be more closely checked, super-

(*Continued on page* 364)



At the right, we have a close-up of the new transmitter which uses the new R.C.A. 801 tubes.

The drawing to the left, Fig. 4, shows the construction of "transmission lines", together with the top support and the various sliders.



"April Fool" Transmitter Works On 600,000,000 Megacycles

By R. R. RAMSEY*

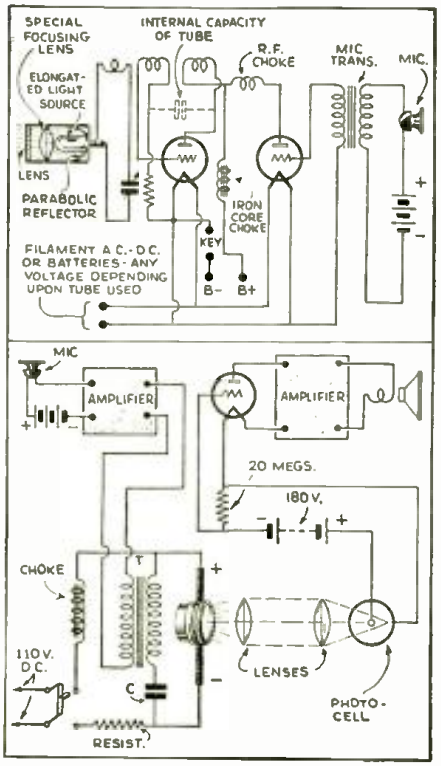
* Professor of Physics, Indiana University, Author of "Experimental Radio" and "The Fundamentals of Radio".

● ABOUT one year ago I published a short account of transmission of voice on a beam of light. (*Science*, p. 105, Aug. 4, 1933), in which an ordinary arc lamp was used as the transmitter, the voice frequency being superimposed on the D.C. which actuated the arc lamp.

Last fall one of my students, Mr. Andrew Wylie, did the same thing, except that an ordinary flash lamp was substituted for the arc lamp. In these set-ups there was considerable cutting and trying in order to find a suitable transformer for the modulating transformer in the lamp circuit.

In glancing over the article by G. W. Shuart and N. H. Lessem, "152 Miles on 600,000,000 Megacycles" (SHORT WAVE CRAFT, p. 11, May, 1934), I was very much chagrined to think that they had done the same thing in a much simpler manner. I was very much chagrined until I suddenly came to the "April Fool," then I realized that the diagrams would not work and were purposely "thrown" together.

In Fig. 1, I have taken the transmitter diagram from SHORT WAVE CRAFT and made changes and additions until we have the ordinary Heising or plate modulation radiophone transmitter. For more detailed explanation of this circuit see "Experimental Radio," page 152 (described in SHORT WAVE CRAFT, page 4, May, 1934).



Above—The diagram of the "April Fool" Transmitter, which now becomes a REAL working model. Voice can be transmitted on a "light beam" with this transmitter.

The circuit consists of an oscillating tube with modulating tube, by means of which the voice frequency is superimposed onto the oscillating circuit. Perhaps better luck will be had if the oscillating circuit is made a Hartley circuit, instead of the one shown in the diagram. The flash lamp is an ordinary wave meter circuit which is coupled loosely to the oscillator. The tubes should be small power tubes such as '45, '10, or any oscillating tube which will furnish sufficient power to light a flash lamp in a wavemeter.

The receiver is a photo-electric cell connected to an amplifier so as to operate a loud speaker. A Weston Photronic cell works very well and is much more simple to set up, inasmuch as light sets up an electro-motive force in the cell. The exact set-up will depend upon the amplifiers which one may have at hand.

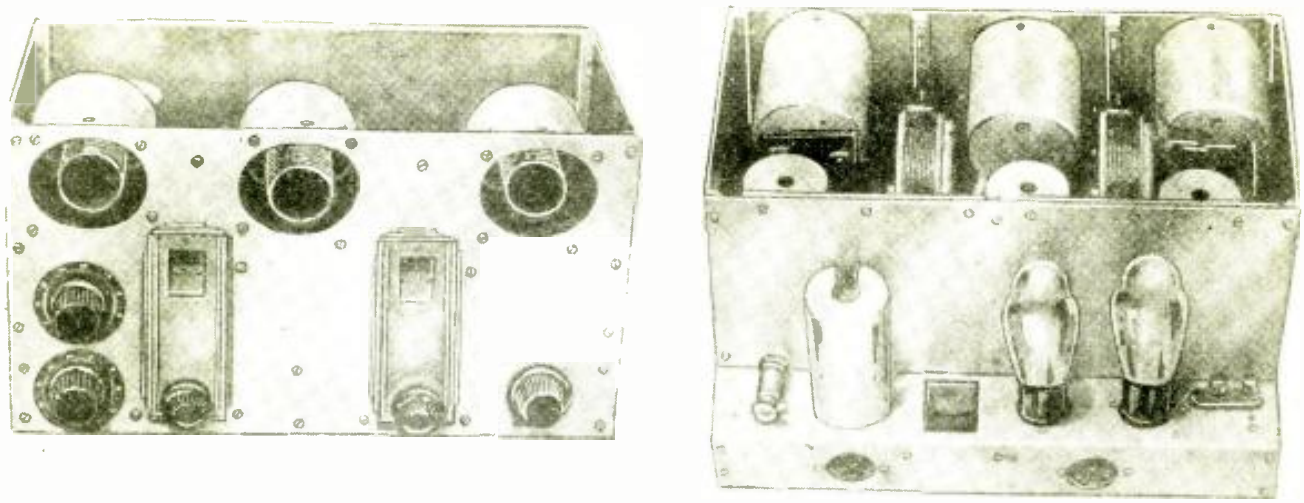
Fig. 2, at left, shows the circuit used at the Indiana State Fair exhibit of voice transmission on a beam of light.

A flash lamp substituted for the arc lamp gives the diagram as used by Wylie.

In the above description it will be seen that the lamp is lighted with ordinary radio frequency current. The exact frequency of this current can be that of any oscillator. (Referring to Fig. 1.)

One should arrange this oscillator to operate in the amateur phone band. Care should be used to keep out of the

(*Continued on page* 363)



Front and rear-top views of the specially designed 110 volt D.C. short-wave receiver.

The TRAVELER'S D.C.6

By ADOLPH HEISE

This Month's $20.00 Prize Winner

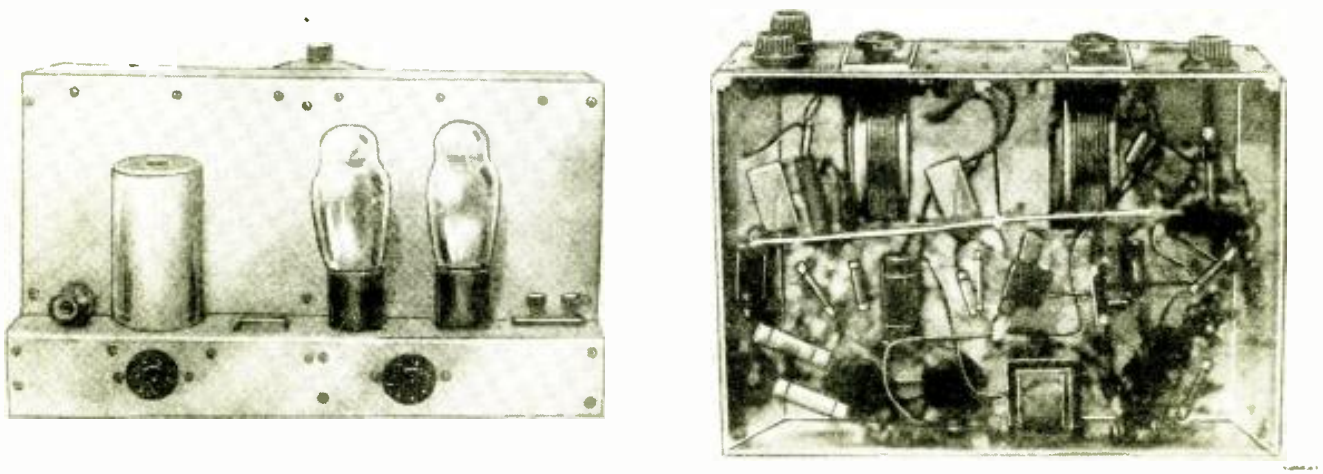
The Editors have received many requests for a 110 volt D.C. short-wave receiver. Here it is—and a fine job too. It uses 6 tubes: the plate current is supplied by the 110 volt D.C. line. If adopted for 6 volt battery operation the plate supply is to be "B" batteries.

• THE short-wave receiver here described has been tried out for the last eight months and gave excellent results in DX (long distance) reception, selectivity, fidelity and tremendous loud-speaker volume. The receiver "outperformed" a number of commercial multi-tube A.C. short-wave receivers under extremely adverse atmospheric conditions in the tropics of South America, and gave equally good performances during gales at sea.

The receiver is a combination and adaptation to this special service of the outstanding features of several SW sets which have appeared in past issues of SHORT WAVE CRAFT. There is one field of SW radio reception which has been neglected by manufacturers of SW receivers, that is *SW receivers capable of operating efficiently and directly from the 110 volt direct current line without the medium of a D.C.-A.C. motor-generator.* There are thousands of *ships* and *many city districts* whose electrical supply is limited to 110 volts D.C. and although the writer tried a number of commercial SW sets on the market, none of them would perform satisfactorily direct from a 110 volt D.C. line, so he started out "to roll his own".

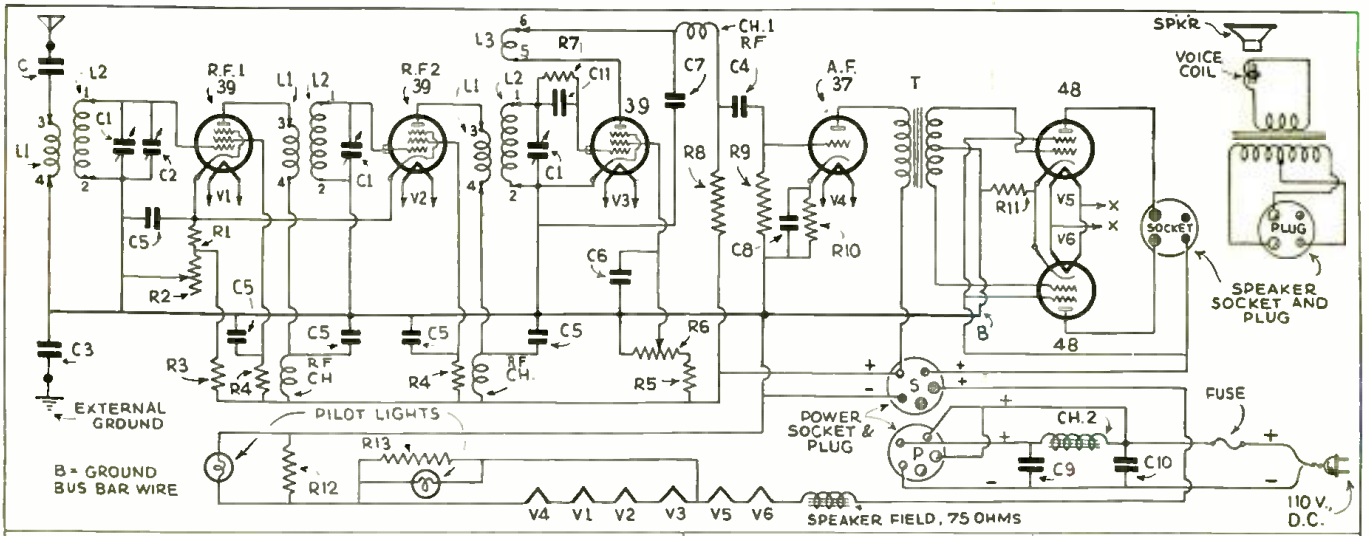
Only the appearance of the heater type of automobile tubes of 6.3 volts and especially the type 48 D.C. *power output* tube, which uses 30 volts on the heater, made the outstanding performance of this SW receiver possible. The *two R.F. stages and the detector circuit* are taken from Mr. Currie's R.F. de Luxe SW receiver, which appeared in SHORT WAVE CRAFT, January, 1933; an additional R.F. bias-volume control was incorporated to control the R.F. gain of both R.F. stages and to prevent "overloading" of the detector. The A.F. amplifier, consisting of a 37 booster stage and two 48 type D.C. power output tubes in push-pull, is identical to the amplifier described by Mr. Vilkomerson in his Savil D.C. 748 B.C. set in *Radio Craft* of December, 1932.

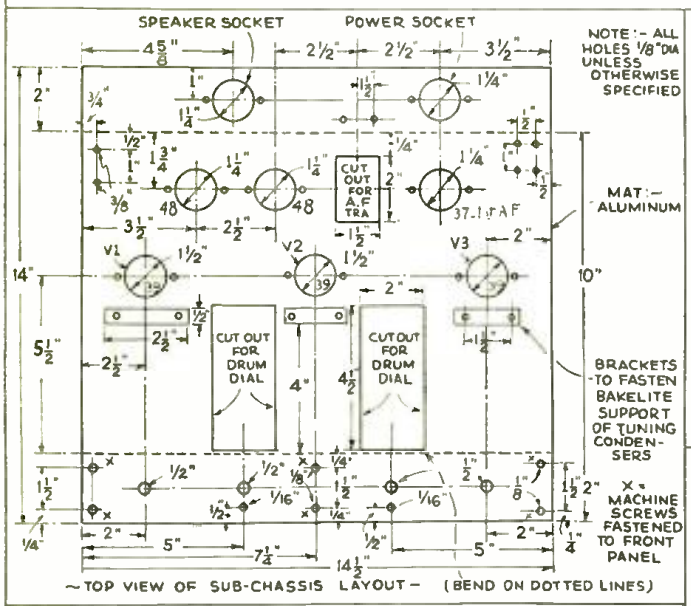
(*Continued on page* 359)

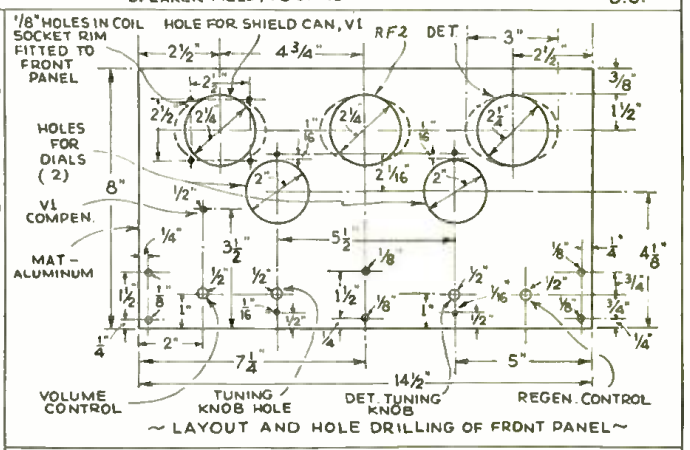


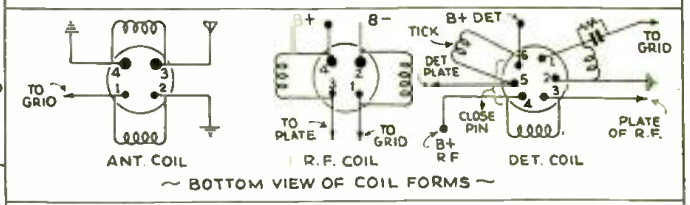
Rear and bottom views of 110 volt D.C. short-wave receiver. It uses 6 tubes and works a loud-speaker.

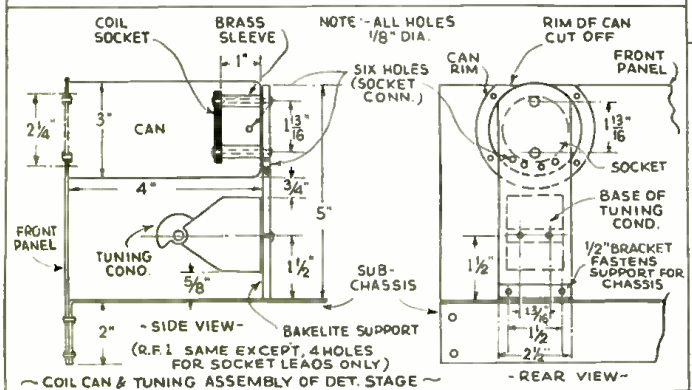
Circuit and Mechanical Details of the D.C. 6

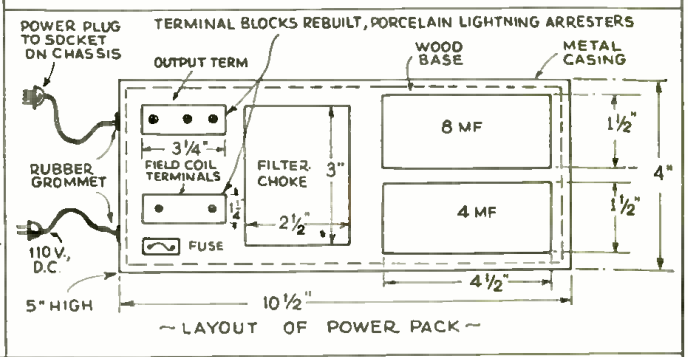


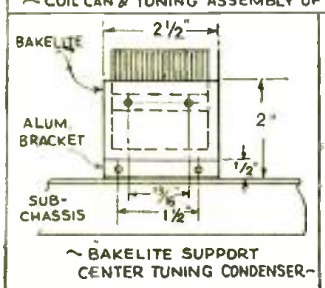


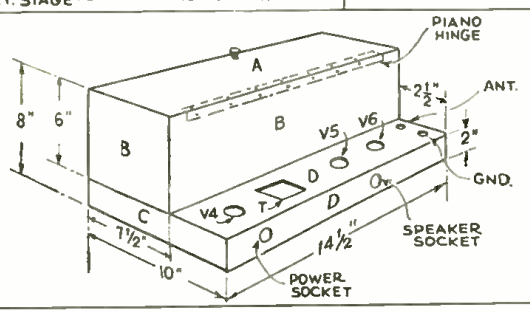












A = TOP COVER HINGED WITH PIANO HINGE, 14 1/2" X 7 1/2"
B = SIDES & REAR, IN ONE PIECE ------ 29 1/2" X 6"
C = COVER & SIDES OF SUBPANEL ------ 10" X 2"
D = SUB-PANEL ------ 14 1/2" W, 10" DEEP, 2" HIGH.

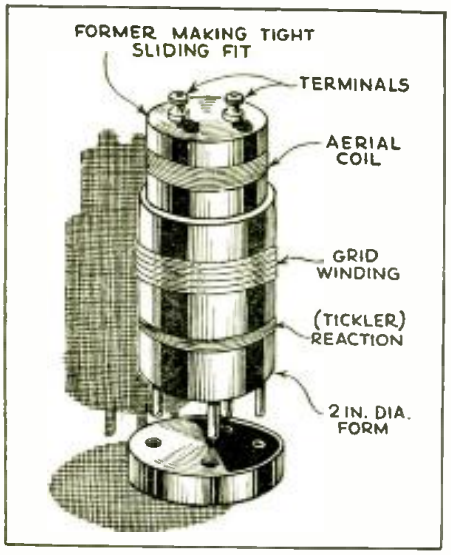
~ OTHER PARTS ~
4 - CORNER POSTS - 1/2" X 1/2" X 6" LONG, TO FASTEN B TO FRONT PANEL & D.
4 - CORNER POSTS - 1/2" X 1/2" X 2" LONG, TO FASTEN C TO FRONT PANEL & D.

THE SHEET ALUMINUM IS NOT FITTED INTO SLOTS OF CORNER POSTS, BUT FASTED OUTSIDE OF POSTS WITH SMALL MACHINE SCREWS.

~ CONSTRUCTION OF RECEIVER BOX ~

Circuit diagram and other details for building the "Traveler's D.C. 6"—It's a 6 tube 110 volt D.C. short-wave receiver; easily adaptable to battery operation.

WORLD-WIDE SHORT-

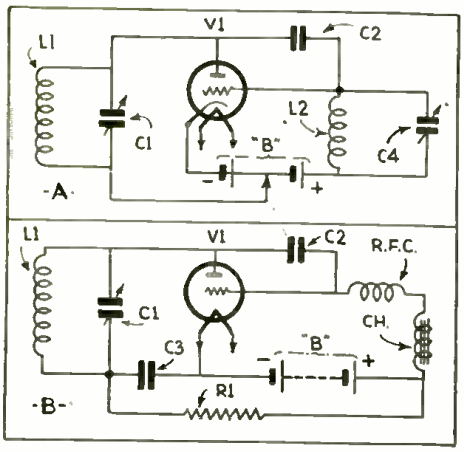


Drawing showing how to construct a variable antenna coupler.

An Adjustable Aerial Coupling Means

● THE advantages to be gained by variable aerial coupling short-wave receivers, especially of the regenerative type, have been exploited in numerous articles. There is little doubt that some means of accomplishing this variable coupling is worth while, but most arrangements devised up to this time have been complicated and unwieldly when plug-in coils are utilized.

The arrangement shown in the accompanying illustration, however, is quite simple and has the advantage that individual aerial coils can be used for each wave band so that maximum efficiency can be achieved. As you will note from the illustration the aerial coil is wound on a form that will just slide inside of the coil on which the other windings are placed. If this sliding fit is rather tight, the primary will remain in any position in which it is placed. If tight coupling is desired two methods can be employed. The first of these is to slot the aerial coil form so that the wire will not be above the surface of the form which will permit it to slide completely inside of the main coil form. The second method would be to place the grid winding at the top of the main coil form so that the aerial coil will be close to the secondary winding when it is pushed down as far as it will go. A little experimenting with the number of turns on the primary will often make a worthwhile difference in the operation of the set.—*Popular Wireless.*



Circuit in which the signal is fed into the plate. The grid is used for output.

● 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.

Using Tubes Backwards

● WE have become so accustomed to think of the grid of a tube as the input and the plate as the output terminal that it comes as rather a shock to find that tubes are actually used in a reversed manner, *i.e.*, with the plate as the input. Yet, actually this is being done in connection with the transmission and reception of ultra-short-wave signals such as the commercial service recently inaugurated across the English channel.

A recent article which appeared in *Amateur Wireless* described the operation of this retarded field or brake action as it is sometimes called, from a practical standpoint. The electrical arrangement is shown in the two circuits here. Naturally there are a certain number of electrons flowing from the filament to the grid due to the positive "B" potential on the latter. If we place a positive potential on the plate, as well, some of the electrons will be drawn through the grid just as they are in ordinary tube action, and the grid current itself will be reduced.

If on the other hand we make the plate negative, we tend to repel any electrons which get through the grid, and thus cause the grid current to rise. Thus the grid current can be controlled by varying the voltage on the plate, which acts as a brake or retarding device. Hence the name.

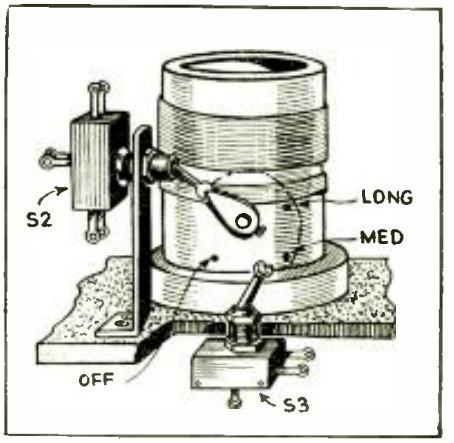
At first the arrangement seems to have no advantage, but it is found that the grid current is very largely independent of the external impedance, which can be made very high (one-half to one megohm) without appreciatively affecting the variation of current produced by the brake action. Consequently quite a large amplification can be obtained, the exact extent depending upon the tube used. Paradoxically enough, modern tubes having oxide coated filaments are not the best for use in this manner because they have too high an emission. What is required is a tube which will saturate quite easily. Then a relatively small change in the plate current will exercise a powerful influence on the current flowing into the grid which gives us the equivalent of a high step-up. It is claimed that with certain triodes, a voltage amplification of about five hundred can be obtained in the detector stage. This brake action is not limited to ultra-high-frequencies but is, in fact, even more pronounced on longer wavelengths.

International 10 Meter Tests

● OF interest to those who operate short-wave transmitters is a recent announcement of the "Radio Society of Great Britain" in which it is explained that this society is sponsoring a series of tests on the ten-meter amateur band. The winner of the contest which is open to every amateur transmitter in the world will receive a trophy for the greatest distance covered.

The contest starts on October 1st and continues for twelve months. This unusual period of time was allowed since the object of the competition is to learn as much as possible about transmission on this band. The announcement in *Wireless World* states that a contest of short duration would yield little, as conditions continually vary on that wavelength.

American amateurs who are interested in obtaining further details about the contest may communicate with *Wireless World Magazine*, Stamford St., London SE1.



A clever "wave-changing" kink in which rotation of the tickler throws the switches.

A Wave-Change Kink

● *Wireless Magazine* recently contained a novel suggestion for simplifying the panel of a short-wave set using a switch for changing from one band to another. Instead of having a special knob for changing bands, the regeneration control knob was employed. In this particular receiver the regeneration was controlled by rotating a tickler coil at one end of the grid coil. This tickler was provided with stops to prevent it from being turned more than 180 degrees. Changing from one wave band to another was accomplished by shorting portions of the grid and plate coils in order to reduce their effective inductance.

The kink consists of placing snap switches at convenient points around the circumference of the tickler shaft as shown in the accompanying illustration. Then, by turning the tickler to the end of its excursion, an additional pressure applied to the knob changes the wave band. This provides, with the two switches shown, three short-wave bands.

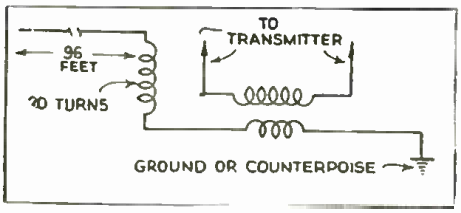
WAVE REVIEW •• Edited by C. W. PALMER

A Wide Frequency Antenna

● A RECENT issue of RADIO-REF, a French publication, contained an interesting description of a short-wave antenna system used by the French amateur station, FSGQ.

The antenna has a length of 32 yards, which supplies a fundamental wavelength of approximately 125 meters which can be used satisfactorily for working on the 40 meter band, by applying the third harmonic. As shown in the accompanying illustration a coil is connected in the antenna lead-in, consisting of 20 turns on a form about 4 inches in diameter with turns spaced about ⅛ inch. The number of turns on this coil may be more or less than the number mentioned, depending on the length of the ground lead. The ground wire may be replaced by a counterpoise about 30 ft. long, and under these conditions the antenna can function as a ¾ wave radiator at 7 megacycles.

In addition to the above operating frequencies the antenna may be made to operate on other amateur bands. For the 80 meter band an antenna of 21 yards and an antenna coil of two turns in the ground lead will be satisfactory. This same radiator can be used on the 40, 20 and 10 meter bands by the use of harmonics.



A wide frequency antenna arrangement used by FSGQ.

Short-Wave Therapy

● AFTER the first experiments with ultra-short-wave therapy, investigators in this field thought that wavelengths below five meters would be the most active for their purpose. For this reason therapeutic generators were built to operate on five meters, despite the fact that the construction of such high-power generators are attended with numerous technical difficulties.

However, it has recently been proven by a series of precise investigations that the heating effect on the wave band between three and ten meters is only slightly greater than for the wavelengths immediately above ten meters. It is pointed out in a recent issue of *Physikalische Zeitschrift*, a German publication, that it is much more rational, for the reason mentioned above, to operate on a somewhat longer wavelength and thus increase the efficiency as well as simplify operating conditions.

Above is the ultra high frequency receiver used to pick up signals from the portable transmitter shown to the right. The transmitter and receiver are so light, that either can be carried conveniently on one's back.

Ultra Short Waves Aid Horse Show

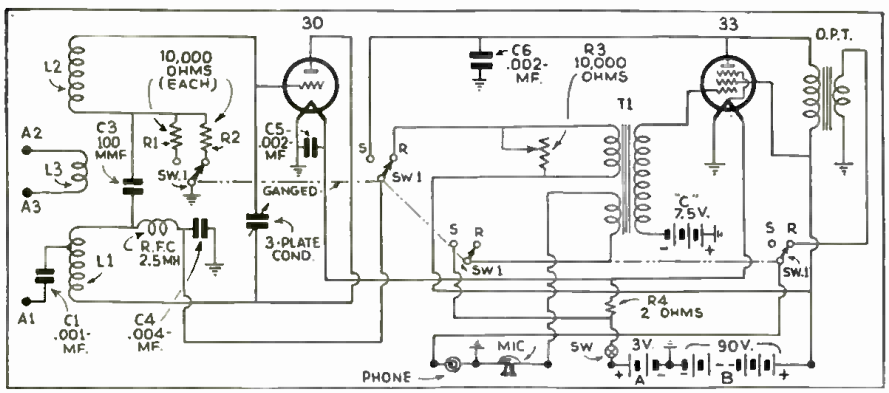
● IN a recent issue of *Wireless World* several interesting photos appeared showing how portable short-wave transmitters and receivers were used to keep the judges at a horse show, held at "Olympia," in touch with the offices behind the stands.

We are reprinting two of these photographs which show the ultra-short-wave phone transmitter and the receiver in operation. These two devices are a product of the Marconiphone Co.

With the development of practical portable equipment many novel and useful applications for the wavelengths below ten meters will no doubt be found. In connection with the particular apparatus shown, it is interesting to note that the half-wave transmitting antenna consists of a "flexible-rigid" rod which rolls up on a small reel at the top of the container and yet remains upright when withdrawn from the reel. Apparently the Marconi Engineers have made use of the bent steel ribbon which is used in the form of rulers and measures in this country. It is said that transmission with this device is possible over a distance of several miles, consistently, while distances up to seven or eight miles have been reached in tests.

An Interesting Mexican Transceiver

● IN the stack of magazines which the editor perused this month in the search for interesting foreign items, a new magazine attracted attention. This magazine is entitled "C-Q-X-2" and is published in Torreon, Mexico. It is the official publication of the *Union de Radio Experimentadores de la Laguna*.



Above—Circuit-diagram of Mexican "transceiver."

In this interesting magazine appeared the circuit of an interesting 56 mc. transceiver which has possibilities for portable use on the 5 meter amateur band. The values of all the parts are listed on the diagram with the exception of transformer, T1. This transformer is an ordinary A.F. unit which has an extra winding to permit its use as a "modulation" transformer. This extra winding consists of 300 turns of fine wire such as No. 34 or No. 36 wound over the regular windings of the unit. Most transformers have some space between the windings and the core "window" and this space can be enlarged by the moving of several of the layers of insulating paper or empire cloth which protect it. It will be necessary to remove the core laminations to add this extra winding.

The second transformer is an output transformer taken from a dynamic speaker, having a primary of 7000 ohms and a secondary of about 15 ohms impedance.

The coils L1 and L2 consist of 5 turns of No. 14 wire wound to a diameter of ⅝-in. and spaced twice the diameter of the wire. Coil L3 contains two or three turns of this same wire and is situated between coils L1 and L2.

●

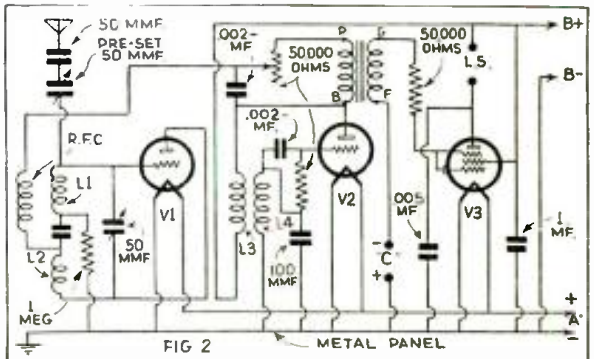
Right — Two diagrams showing the connections for 5-meter receivers.

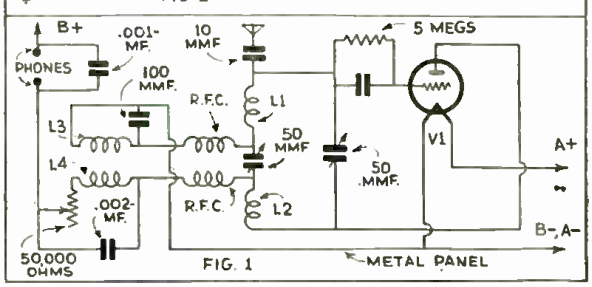
●

Two Hundred Miles on Five Meters

● EVER since a prominent English amateur raised the five meter transmission record to over 200 miles, five meter transmitters and receivers have been becoming more and more popular in English magazines. These are limited almost exclusively to super-regenerative sets since ordinary regenerative circuits seemed inefficient on this band and the transmitters are not sufficiently stable at this time to permit the satisfactory use of superheterodyne circuits.

(*Continued on page 367*)





Short Wave SCOUT NEWS

O. L. P. Report of Heinie Johnson, Big Spring, Texas.

(First Winner of the Scout Trophy Cup.)

● JULY has turned out to be the most erratic month of 1934 to date, as regards short-wave reception in the Central States district. We have encountered all of the various forms of storm and atmospheric conditions, and we have enjoyed a few hours of exceptionally fine receiving conditions also. For instance, during the third week of the month, Texas was visited by a series of "spotty" thunder-storms. One of these was so severe during a whole afternoon at this location, that we could not receive the powerful Eastern States' signals at all, using our high antenna, and found static bad even when listening by the aid of our "underground doublets," which, of course,, always prove to have the lowest *noise-level*. But there is always a "silver lining to every cloud" and, as a rule, we enjoy our best reception immediately after a storm has cleared up—so said storms furnished the inspiration that sent me "dial twisting" that evening and furnished me with the thrill of catching CNR, Rabat, Morocco, and CRAX of Villa Paiva, Mozambique.

These are my first African "catches." We do not count a station caught until we have succeeded in hearing it in "first class" style and on this particular occasion we really got 'em. CRAX was not as good as CNR. Their signal came in strong for a minute, then faded out only to return strong again in about one minute swings. They were quoting market reports, with no musical numbers, while CNR was heard coming on the air at 1:05 A.M. C.S.T., which was about 9 A.M., there. This was rather confusing to the writer inasmuch as we have been trying to hear them during our afternoons, comparing to their evenings—we have also been dialing for them on 32 and 37 meters as listed in most station "listings" and the signal frequency was announced over the air as 31.38 meters at time call CNR was given. Loud-speaker volume was had on both signals. For some reason these signals are hard to bring in here and we welcomed the exceptional condition which produced their reception. No doubt other listeners heard the same programs.

Did you know Vienna, Austria, had a mighty fine station on about 19.90 meters? While trying to locate the signal of that balloon flight Saturday morning, July 28, the writer heard someone calling New York on the above-mentioned frequency and it turned out to be Vienna! As soon as they contacted New York they let us hear a series of chimes covering a period of about 5 minutes. Then they sent the funeral program of Dr. Dollfuss, following it with an announcement in English.

The signal is new to this listener. Volume was good, about equal to DJB, who came in a little lower on the dial. And about that DJB signal, we notice it holds up to a better standard during bad reception weather than do either GSF or FYA on 19 meters. On the other hand when conditions are fair all three are about equal.

Several listeners wrote me concerning hearing a new S.A. signal on the 19 meter band. They are right: our old friend PRADO at Riobamba, Ecuador has been testing out reception on this band; mostly in the late afternoon hours. I suggest that if a few listeners would write them, asking them to try this band around 4 P.M. to 5 P.M., C.S.T. or 3 to 4, E.S.T. we would probably be rewarded with better reception of the signal.

For those who find it convenient to listen after midnight, we want to mention the fact that England is represented now with a fine program over GSB on 31.55 meters around 1 A.M. C.S.T. and Japan never fails to send out some fine musical program at some time between 2 A.M. and 5 A.M. C.S.T. Maybe you'll get tired of listening to the long talks in Japanese, but when they turn on the music it is worth listening to. Their best signal is on 27 meters at these hours. You will probably hear them say JOAK in a flat expressionless tone of voice but that is not their call, rather, it is the call of the *broadcast* station being relayed. The only way to get their 27 meter call is to wait till around 5 to 7 A.M. when they "sign off" and then you will almost have to be able to understand Japanese. We have heard it often but are not sure yet whether it is JEM, JYM, or JCM and maybe it is N instead of M. The signal is fine. Good, even volume, no station hum, and a smooth silent carrier with real good modulation, but awful hard to get call letters just the same.

The Canadian signal on 25 meters continues to reach this "post" over-modulated. Also is "broader" than goes for good reception. The same can be said of their 49 meter signal, although the summer static is terrific on this latter frequency and we don't listen much thereon.

Concerning that stratosphere balloon flight, the writer only had time to listen a short while and while the ground station at Indian School, S. Dak., call, WIOXCX was heard quite well on 6350 kc. here, the balloon transmitter on 13,050 kc. was not heard.

Reception for Central States listeners will improve during coming months on 16, 19, and 25 meter bands, if our "logs" of last year here at this post mean anything. In '33, the peak of good signal reception from PHI on 16 meters, reached in early September between 9 and 10 A.M. We keep records on most "standard" signals and suggest you do likewise. They come in handy.—*Heinie Johnson.*

Edward M. Heiser Proud of His Trophy

Edward M. Heiser, of Brecksville, Ohio, Sixth Winner of the SHORT-WAVE SCOUT Trophy Cup. His prize-winning "log" of stations appeared in the August issue.

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

Report from Official Listening Post of Geo. D. Sallade, Sinking Spring, Pa.

● LISTED below is some information which may be valuable to the fan who is tired of tuning the regular Daventry, Zeesen and Pontoise stations.

KWU tests with the Japanese stations JYT and JYK almost every evening between 9 and 10 P.M., E.S.T. The wavelength of KWU is 19.5 meters while JYT and JYK transmit on 19 and 22 meters, respectively. The California station is not very strong, but is quite intelligible. The Oriental end is very weak, which, of course, is due to the deadening effects of darkness on the 19 meter band.

Listeners who are trying to add Belgium to their list should try ORK on 10.3 megs or 29.02 meters. They broadcast daily between 1:45 and 3:15 P.M., E.S.T. On July 26th their transmission was QSA5/R7-8. ORK uses 9 kw. power with aerial directional towards Africa. This accounts for their signal being generally weak.

An official communication from this station appears below:

Bruxelles, 10 juillet

Monsieur,

En réponse a votre lettre du 24 juin dernier, je vous confirme que vous avez bien entendu la station ORK (Ruysselede) Elle procède, depuis le 23 mai 1934, a un service regulier, de radiodiffusion vers le Congo avec une antenne a proprietés légèrement directives et une puissance de 9 kw. Les émissions ont lieu tous les jours de 18.45 a 20.15 h GMT. L'annonce se fait comme suit: "Ici Bruxelles I.N.R.—Emissions spéciale 'pour le Congo'."

Pr l'Ingenieur en Chef.

(Translation) *Brussels, July 10th.*

Dear Sir,

In reply to yours of the 24th of June, I confirm that you have received station ORK (Ruysselede). This station works since May 23, 1934 on regular short wave service with the Congo. A slightly directive antenna is used, with an output of 9 kw. The emissions take place daily on 18.45 to 20.15 GMT. The announcing is made as follows: "Here Brussels I.N.R.—Special emissions for the Congo."

Chief Engineer.

There is a new station in Brazil broadcasting on 31.5 meters every evening from 5:30 to 6:15 P.M., E.S.T. Their programs consist almost entirely of educational and governmental talks in English and Spanish. Announcements are made similar to this, "Radio ———, the Federal radio station of Brazil." Generally the reception is very good. They sign off with the musical chime tones Eb, C Ab.

The majority of South American stations

(*Continued on page* 371)

SHORT WAVE SCOUTS

Eighth "Trophy" Winner—Herman Borchers, Greenfield, Mass.
103 Stations; 55 Veris

● THE editors are glad to award the eighth Short-Wave Scout "Trophy" to Herman Borchers of Greenfield, Mass., for his prize-winning "log" of short-wave stations heard, his total number of stations being 103, with 55 verified, as allowed by the judges.

Mr. Borchers rolled up his remarkable list of stations heard for the month of May with a 7-tube Baird Short-Wave and Television receiver. The antenna used was a Lynch All-Wave Antenna. Mr. Borchers also used at times a "Collector Rod" antenna, described at length in the February issue of this magazine. The list of stations submitted by the entrant in this Trophy Contest may be for any 30-day period. Keep your list of stations until you have received at least fifty per cent veris, so that you can mail the veris, list, letter, and oath all in one package. Bear in mind that the verification cards must be those received in answer to inquiries made regarding programs heard during your selected 30-day Official Listening Period. Arrange your station list in two groups, if possible, the first the verified group and the second, the unverified. State in your letter the total number of stations logged and also the number of verified ones. Before you mail your list and the veris, go before a local Notary Public and take an oath to the effect that the person submitting the list of stations has personally listened to the stations named. Also, state in your letter what 30-day "Listening Period" the list of stations is for.

List of Verified Short-Wave Stations Heard by Mr. Borchers

(Times given are Eastern Standard Time)

EUROPE

DJE—16.95—Zeesen, Germany—5 12 34.
DJB 19.73—Zeesen, Germany 5 1 34.
DJD 25.50—Zeesen, Germany 5 1 34.
DJA 31.38—Zeesen, Germany—5 1 34.
DJC 49.83—Zeesen, Germany—5 1 34.
DIQ 29.2—Zeesen, Germany—5 12 34.
EAQ—30.—Madrid, Spain—5 3 34.
PHI 16.88—Huizen, Holland—5 6 34.
PHI 25.57—Huizen, Holland—5 6 34.
12RO—25.1—Rome, Italy—5/7 34.
GSH—13.97—Daventry, England—5/1 34.
GSD—25.53—Daventry, England 5 2 34.
GSB 31.55—Daventry, England—5 2 34.
GSG 16.86—Daventry, England—5 3 34.
GSF 19.82—Daventry, England—5 3 34.
GSE 25.28—Daventry, England—5 3 34.
GSA—49.59—Daventry, England 5 6 34.
RNE—25.—Moscow, U.S.S.R.—5 6 34.
★RJI 19.—Moscow, U.S.S.R.—5 27/34
★FYA—19.68—Paris, France 5 1 34.
★FYA—25.20—Paris, France—5/2/34.

CANADA

VE9HX—49.10—Halifax, Nova Scotia—5 10 34.
VE9DN 49.96—Drummondville, Quebec 5 12 34.
CJRX 25.6—Winnipeg, Canada—5 9 34.
VE9GW—49.22—Bowmanville, Ontario 5 12 34.

MEXICO

XETE—48.94—Mexico, S. A.—5 6/34.
XETE—31.25—Mexico, S. A.—5 6 34.

SOUTH AMERICA

YV1RC—49.2—Caracas, Venezuela—5 1 34.
PSK—36.65—Rio de Janiero, Brazil—5 5/34.
CP6 32.88—La Paz, Bolivia—5 3 34.
PRADO—45.31—Riobamba, Ecuador—5 8 34.
HJ-1-ABB—46.16—Barranquilla, Colombia—5 19 34.
HC2RL—45.—Guayaquil, Ecuador 5 29 34.
★COC—49.92—Havana, Cuba—5 4 34.

AUSTRALIA

VK2ME—31.28—Sydney, Australia—5 17 34.

UNITED STATES OF AMERICA

W9XAA—19.34—Chicago, Illinois—5 6 34.
W8XK—13.93—Pittsburgh, Pa.—5 7 34.
W8XK—19.72—Pittsburgh, Pa.—5 7 34.
W8XK—25.26—Pittsburgh, Pa.—5 7 34.
W8XK—48.86—Pittsburgh, Pa.—5, 7, 34.
W1XAZ—31.33—Springfield, Mass.—5/7/34.
W3XAL—19.18—Bound Brook, N. J.—5 7 34.
W3XAL—16.87—Bound Brook, N. J.—5, 10, 34.
W3XL—16.76—Bound Brook, N. J.—5 10 34.
W3XL 17.33—Bound Brook, N. J.—5 11 34.
W2XAD—Schenectady, N. Y.—5 11 34.
★W2XAF—31.48—Schenectady, N. Y.—5 11 34.
W8XAL—49.50—Cincinnati, Ohio—5 4 34.
W9XF 49.18—Downers Grove, Ill.—5 4 34.
★W1XAL—49.67—Boston, Mass. —5 8 34.
W3XAU—31.28—Philadelphia, Pa.—5 12 34.
W3XAU—49.50—Philadelphia, Pa. 5 12 34.
W2XE—19.65—Wayne, New Jersey—5 12 34.
W2XE—25.36—Wayne, New Jersey—5 12 34.
W2XE—49.2—Wayne, New Jersey—5 12 34.
KES—28.80—Bolinas, Cal.—5 25 34.
WLK—18.44—New York, N. Y.—5 17 34.
WEB—14770 kc.—Rocky Point, N. Y.—5 17 34.
★KEJ—33.28—Bolinas, Cal.—5 30 34.
WQT—13885 kc.—Rocky Point, N. Y.—5 28 34.
WQP—13900 kc.—Rocky Point, N. Y.—5 28 34
KKZ—13690 kc.—Bolinas, Cal.—5, 4/34.

★ Disqualified by judges due to "old" veris.—Editor.

EIGHTH "TROPHY CUP" WINNER

Presented to
SHORT WAVE SCOUT
Herman Borchers
Greenfield, Mass.
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 Yorks 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 commercial phone stations, in a period not exceeding thirty 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; at least fifty per cent must be "verified".

HONORABLE MENTION AWARDS

William C. Palmer, Jr., R. F. D. No. 2, Ward Rd., Cleveland, Ohio. 96S; 47V.

P. E. Thompson, 451 E. 165th St., New York City. 95S; 61V.

J. A. Centanino, Box 516, Freeport, Pa. 88S; 44V.

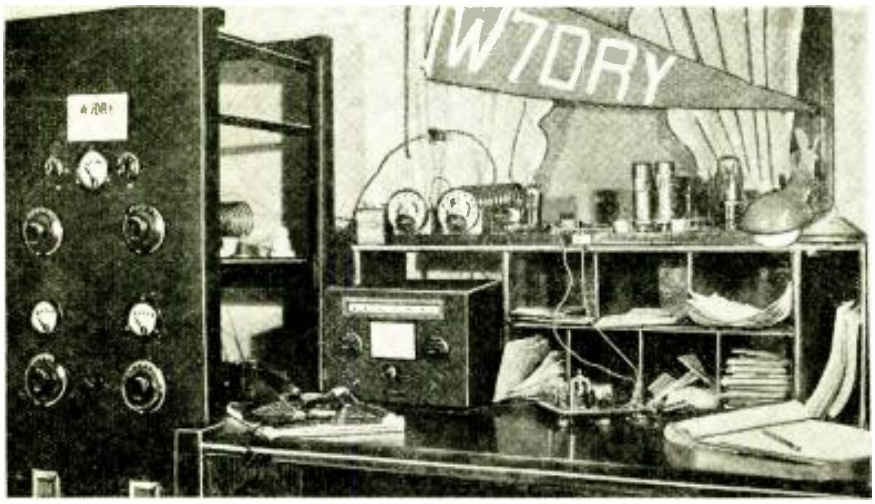
Virgil Slentz, 1433 Wooster Ave., Dover, Ohio. 82S; 43V.

S—Total number of stations submitted.
V—Total number of verifications submitted.

(Continued on page 383)

SHORT WAVES and

Arvids "Ham" Shack Has All The Trimmings



Sure a dandy station, Arvid, and we wouldn't mind owning it ourselves. This is one of the neatest and most business-like looking arrangements we've seen.

Editor, SHORT WAVE CRAFT:

I see you are still publishing pictures of "Ham" shacks, so here is one of mine.

Transmitter is crystal control, using 47 oscillator, 46 buffer and pair of 210's in push-pull; final 500 volts to plate and getting about 80 watts input. Receiver is a National FB7. "Rig" on top of desk is a single 45 TNT with 350 volts. Not in use now, expect to put it on 160 meters soon.

Get a lot of "FB" (fine business) information out of your magazine and never miss a copy.

This station is ORS and AARS.

ARVID PETERSON, W7DRY,
N3508 Normandie St.,
Spokane, Washington.

(Congratulations, Arvid, on your "live" looking Ham station. With the FB7 receiver and your transmitter equipment you should have a lot of pleasure.—Editor.)

Gilbert Galambus Contacted 14 Countries

Editor, SHORT WAVE CRAFT:

Herewith is photo of my "rig" which has done very well. I have worked 40 and 80 meter CW and 14 countries on CW. At present it is on 160 meter phone and "worked" all districts except W6. The "rig" is a 47 crystal, 210 inter. amp. 203A in *final* with 180 watts input to the class C mod. 4-250's in P.P.P. class B. A pair of 59's, class A drivers, and two stages of 56, a double-button mike. The receiver is a Hammarlund Comet-Pro.

GILBERT GALAMBUS, W9JZA,
6830 California Ave.,
Hammond, Ind.

(Fine business, Gilbert, and the old transmitter is sure "stepping out". Pretty husky set-up you have and the "Comet-Pro" undoubtedly accounts for many happy hours of DX reception.—Editor.)

A corking station, Gilbert, and she sure "steps out" right smart. This station "worked" 14 foreign countries.

WANTS CHEAP 5 AND 10 METER SET

Editor, SHORT WAVE CRAFT:

Just a few words from a couple of hams to let you know that SHORT WAVE CRAFT can't be beat. It is without doubt the best radio magazine published, and you sure picked a "Wiz" when you got George W. Shuart, W2AMN to write for your "mag." His receivers are F.B. (Fine business) and that transmitter described in the October number is good, but his 5 and 10 meter transmitter, in the December number beats them all. It just fits the "depression" pocketbook. How about having him build and describe a receiver to suit depression times; we mean a 5 and 10 meter receiver. The one in the November number is OK—but costs plenty. So keep up the good work

(Continued on page 379)

DOERLE 3-TUBER "PILES 'EM UP"!

Editor, SHORT WAVE CRAFT:

I receive your "FB" magazine here as soon as it is received at the local newsstand and would like to say that it is one magazine that is not discarded around here. Hi, Hi. I am using a Doerle "*Signal Gripper*" with very good results, using a 34 as R.F., 30 as detector, and a 33 as A.F. The 33 is transformer-coupled to the detector and gives more volume than a 30 tube as A.F., saying nothing about the ease in tuning in "foreigns". The "foreigns" I have received are, XETE, Mexico; EAQ, Spain; VK2ME, Australia; GSB, GSE, England; YV3BC, Venezuela; TGX, Central America; CFU, VE9GW, VE9MR, Canada; PRBA, PSK, Brazil; FYA, France.

I have received "veris" from EAQ, Madrid; VK2ME, Australia; GSB and GSE, England; VE9GW, Canada, Amateurs and American stations too numerous to mention. I would like to hear from some of these boys who built their *Doerle* along these lines, or who are planning to revise it. As you know Mr. Editor, an exchange of ideas never hurt anyone—that is, *good ideas!* Well, I'll close, hoping to see this in SHORT WAVE CRAFT, and 73.

RALPH I. HANSEN,
Route 5, Box 169,
South Omaha, Nebr.

(Undoubtedly you will hear from many Doerle "fans" in various parts of the world, as it begins to look as if every short-wave "fan" at one time or another in his career, has taken a fling at the Doerle, either the 2 or 3 tube hook-up. Undoubtedly many readers will be glad to note the excellent results and "foreign" reception you have accomplished with the Doerle 3-tube "Signal Gripper."—Editor)

OUR TRANSMITTER "STEPS OUT"!

Editor, SHORT WAVE CRAFT:

I know you like to hear of the success of your circuits, so I am introducing the SHORT WAVE CRAFT outfit.

My transmitter is taken from the September, 1933, issue and was designed by Leonard Victor. I wish you would inform Mr. Victor that with an 01A with a "B" eliminator plate voltage, I have worked Tacoma, Wash., and Granger, Wyo. That's gud enuff DX for me, hi!

My first receiver was a "pie-pan" type, taken from the January, 1933, issue. It worked F.B. but not wishing to keep charging an "A" battery all the time, I have changed over to a 24 detector and 27 audio. The detector came from Mr. Malsberger's article in the November, 1933, issue. The audio I picked up from various issues of your "F. B." mag.

Thanking you for the "swell" articles and knowing you will continue the good work, I will say 73 and hope to read every issue.

GEORGE E. WOLFE,
W6HPB,
Oroville, Calif.

(Mighty interesting, George, especially with regard to the excellent results obtained with Mr. Victor's "transmitter" design. Some range with only an 01A tube!—Editor)

LONG RAVES . . . OUR READERS' FORUM

TRIPLEX 2 A "CLEANER"!

Editor, SHORT WAVE CRAFT:

I have been building sets from your publications for some time now, and have gotten some very good results. Recently I built the *Triplex* 2 by Mr. George W. Shuart, W2AMN, featured in the February issue, and I certainly want to congratulate him on his outfit, and make several suggestions.

It works splendidly as illustrated, but I have always hated to fool with an antenna coupling condenser. That is what prompted me to build some sort of a stage of R.F. amplification ahead of the detector. I am enclosing a drawing of what I consider the simplest, and according to my experiments, the *most efficient* R.F. stage that can be added to this receiver. It eliminates all *dead-spots*, allows the set to oscillate on very high frequencies, and the *over-all gain* is good, because of the small loading effect on the detector.

Any kind of tubes may be used, but I find that the 6.3 volt auto type are much more efficient. At present I am using an old "A" and "B" eliminator, and experience no hum whatsoever. I might add that in my case it is necessary to ground one side of the heater circuit, to eliminate hum. Possibly this trouble would not happen when using batteries.

I have added a 7-plate midget tuning condenser in parallel with a 13-plate of the same kind, in place of the larger condenser illustrated, as a *band-spread* feature and it works fine. I am also using a one megohm variable resistor instead of the 50,000 ohm in the screen-grid circuit of the detector. Instead of shielding only the grid-lead on the "79" tube, I have shielded both the "79" and the "36" detector with ordinary tube shields, which completely eliminated all trouble from feed-back. This whole arrangement has been buil. on a galvanized base and panel measuring 5" x 6" x 7" high, which makes it very compact.

I might add that almost any kind of antenna may be used with this set. I have one about 40 feet long and 30 feet high which works swell, but a No. 18 wire 20 feet long strung up in the cellar works almost as well. I tried the collector rod antenna illustrated in the same issue by Everett L. Dillard, and the European stations rolled in with good loud-speaker volume *with the ground disconnected!*

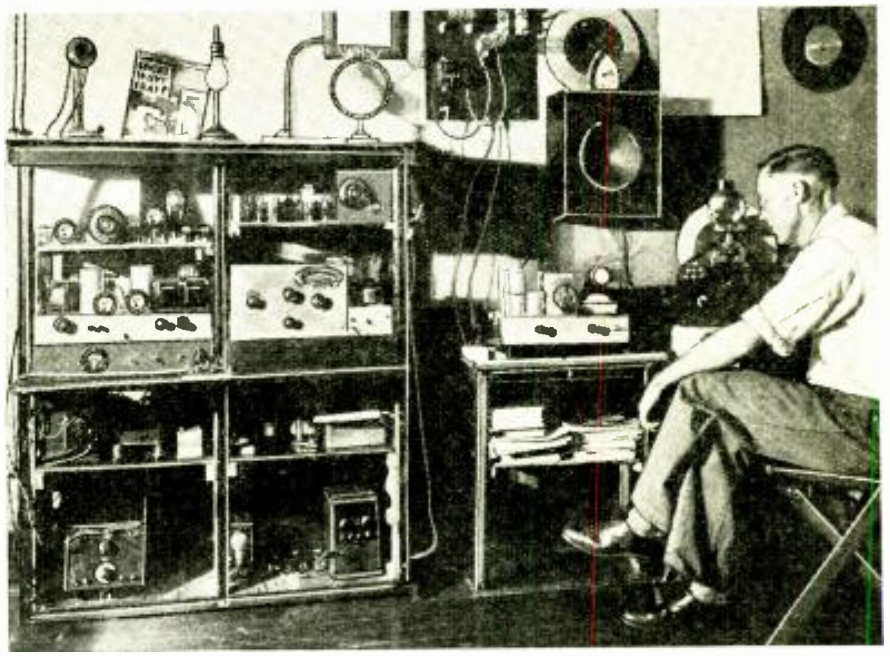
Recently R.C.A. demonstrated a 25 watt 8½ meter Police Transmitter here and I had wonderful reception at all times. I tried it in my car and find that it is much more sensitive and selective from 40 to 50 meters than it is at home in the cellar. I have waited for a set like this for some time, and I have built nearly every new set that I have read about, but this one surpasses anything that I have ever seen. The fact that I have used it over 30 days without changing it or tearing it up, proves to me that it is above the ordinary. I am sending the diagram and parts list to be published if you see fit, and I will be interested in learning anything new that the other boys have found out about this set. I would like to exchange letters about it and learn how it works in other locations. I very rarely miss an issue of SHORT WAVE CRAFT, because I find it has the *newest* and most *up-to-date* information.

Yours for better Radio,
S. L. GRANT,
Winchester, Va.

(*Hot cha!! S. L. G., and we shall certainly congratulate Mr. Shuart for you and extend your felicitations on the success you have obtained with his design—the "Triplex 2." Adding an R.F. stage invariably smoothes up the operation on any one of the smaller type 1- or 2-tube short-wave receivers. We are glad to reproduce your diagram here with for the benefit of our other readers.—Editor*)

Short and Long Waves, Plus Television

"Prize-winning" station photo awarded One year's subscription to SHORT WAVE CRAFT.



A crackerjack short-wave "Fan" station. Mr. Singleton is seated before his "television" receiver, the scanner being visible to his right. Boy! what a lot of fun one can have in such a laboratory.

SHORT AND LONG WAVE, PLUS TELEVISION

Editor, SHORT WAVE CRAFT:

I am sending you a picture of my *short-wave*, *long-wave* and *television* receivers. I'm not a licensed "Ham", so don't have a transmitter yet, but hope to by this fall. At the top of the picture on the left side, is a 5-meter receiver I'm trying out. Haven't finished this yet, so won't say much about it. Just below is my 4-tube amplifier. In it I'm using two 56's, one 45 and one 82. I'm using this amplifier at present on my receiver, which is just to the right of it in the rack. The receiver is a short-wave 4-tube *Doerle* (signal-gripper) which has the power supply built on the chassis with the receiver. I'm using a 58 as R.F., 57 as detector, a 56 as audio and a 5Z3 as rectifier, which I find works very satisfactory. *It's a go-getter for "DX"!* I got the diagram for it from your August, 1933, issue. Here are some of the European stations I have received: GSB, Daventry, England; EAQ, Madrid, Spain; DJA, Zeesen, Germany; PKM, Dutch East Indies. I also get lots of "Ham" stations from all over the globe.

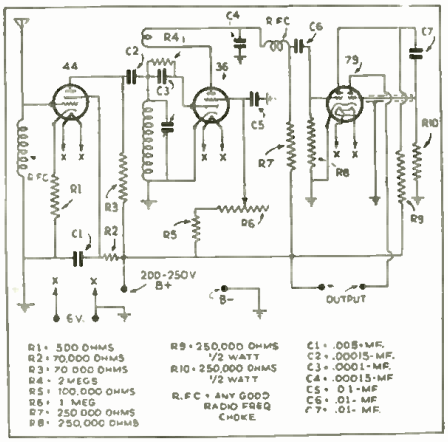
My *television* receiver appears on the table in front of me. In this set I'm using two 24's and one 35 as R.F., a 35 as detector, two 45's as audio and an 80 as rectifier, which gives it plenty of "zip". The *scanning* outfit is at the right of the receiver and it has a variable speed motor so I can use a 60 or 45 hole disc. I've fitted an old picture machine lens on it to enlarge the images, which works out fine. I've gotten very good pictures from the following stations: W9XG, Indiana; W9XK, Iowa City, Ia.; W9XAK, Manhattan, Kansas; W2XBS, N. B. C., New York; when they were operating. For this outfit I am using a *doublet* antenna, with a transposed lead-in, which I find works better than any I have ever used.

The switchboard on the wall has a pair of coils and condensers connected in the lead-in, so I can balance them, which cuts out lots of interference and "ghost" images. I use this antenna for my other receivers too.

In the lower-left corner is a buzzer with a "mike" button and transformer hitched to it, which feeds into the amplifier for *code practice* for our Short-Wave Club.

WILL H. SINGLETON,
Box 54, Keota, Ia.

(*Glad to hear from you, Will, and the "television" reception and apparatus report is indeed welcome, as well as "refreshing". We've felt like placing an emergency call in "red ink" somewhere in the magazine asking the boys if all television reception was "dead". The editors have hardly heard a peep from the fellows on the firing line—so let's have some more "news" on the television receivers and what you "see".—Editor.*)



Above we have Mr. Shuarts' Triplex 2, with some very worthwhile improvements suggested by S. L. Grant. The addition of the untuned R.F. stage will undoubtedly smooth up the operation of this marvelous set. The values of the various parts are given in order that those who have already built the Triplex 2, may make the changes pointed out by Mr. Grant.

What Station ... SIGNATURE Was That?

How the call of the kookaburra bird, chimes, clock-tick, and other characteristic sounds help short-wave listeners to quickly "identify" the station to which they are listening.

● NEARLY every broadcast station today uses some characteristic signal, such as *musical notes* for identification purposes. Even the programs broadcast by these stations have opening and closing signatures, the broadcast companies having realized that this is a decided benefit, especially as the identifying signal is more readily understood.

While some of the *short-wave* broadcast stations have, for years, used interval signals or some form of identifying signal, the majority of them up until lately have depended entirely upon the announcements. On short waves there is apt to be a period of fading just when the announcer is giving the call letters of a station it seems, and again as most people are not linguists it is very difficult for them to understand the call letters when they are spoken in the various "foreign" languages. The above difficulties, of course, have been predominant for quite some time and it is only lately that the majority of the short-wave broadcast stations have adopted *identifying* or *interval signals*. Herewith are the leading ones and we trust that they will aid the short-wave listener in determining just what station he is listening to.

American (all "W") stations—All American stations broadcasting the NBC programs give the same three xylophone-like notes used in the regular broadcast band.

* * *

CJRX, Winnipeg, Canada, 25.47 meters—Sometimes opens up by playing "O Canada" and between numbers strikes a gong four times.

* * *

CNR, Rabat, Morocco—Uses a metronome.

* * *

CT1AA, Lisbon, Portugal—Uses the famous cuckoo call.

* * *

DFB, Nauen, Germany (17.12 meters)—Uses a 3-tone whistle (D-C-G).

* * *

Stations DJA to DJE, Germany—Play on a music box an old German folk song, "Ueb immer Treu' und Redlichkeit," which means when translated, "Practice Faithfulness and Honesty." Also two national anthems are played—one is the Nazi Hymn and the other the German National Anthem.

* * *

Daventry, England—We hear the familiar tune, "God Save the King," the music of which is the same as our "America." They also use chimes of Big Ben. The interval signals are the Bow bells.

* * *

Madrid, Spain, EAQ. (Pronounced by Spanish announcer—Ay - Ah - Koo, Madreed.)

* * *

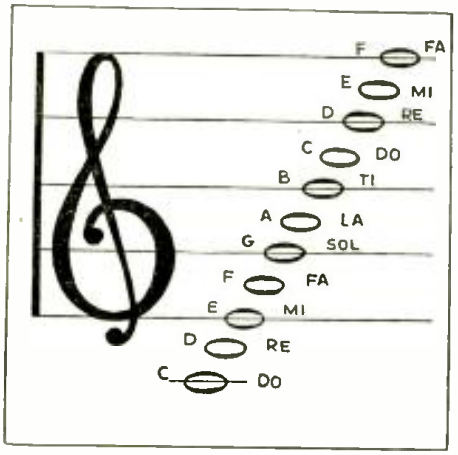
HCJB, Quito, Ecuador, 73 meters—Punctuates the announcements with a two-tone chime.

Yes, folks, I'm the "kookaburra" bird everybody's talking about! If you have a good sensitive receiver and tune carefully you'll hear my voice over VK2ME—the "voice of Australia."

HJ1ABE, Medellin, Colombia—Plays bells.

* * *

HJ3ABF, Bogota, Colombia, 48.38 meters, uses a bugle call.



Above, scale of notes for picking out musical signatures.

HVJ, Vatican City—Hear a constant tick of the studio clock as a background to the speech. Also broadcasts the bells of Saint Peter's starting each broadcast.

* * *

I2RO, Italy—Plays the Fascist National Anthem and is characterized by its woman announcer.

* * *

LSY, Buenos Aires—Uses musical notes—Mi, Mi, Sol sharp, and Sol as played on the xylophone.

* * *

PMC or PLF, Bandoeng (16.54 and 16.81 meters respectively)—You will hear previous to speech the sound of notes somewhat reminiscent of a motor horn (F-D-C).

* * *

PHI, Huizen, Holland—Uses the metronome.

* * *

PSK, Brazil—Plays chimes when signing off which sound something like the NBC signal.

* * *

RNE, RW59, Moscow, Russia—The "Internationale" is broadcast at the beginning and end of each broadcast and the bells of the Kremlin.

* * *

TGX, Guatemala—Plays a two-tone high frequency signal.

VE9CS, 49.39 meters—Uses two bells as the identifying signal.

* * *

VE9HX, 19.7 meters—Uses four strokes on the gong.

* * *

VK2ME, Sidney Australia, 31.28 meters—Uses the now famous cry of the kookaburra bird, or laughing jackass.

* * *

VK3ME, Melbourne, Australia—Opens the program with chimes of the clock in the Post Office tower.

* * *

YV2RC, Caracas, Venezuela, 49.8 meters—Gives four strokes on the chimes every fifteen minutes.

* * *

YV3RC—Plays bells on the hour.

* * *

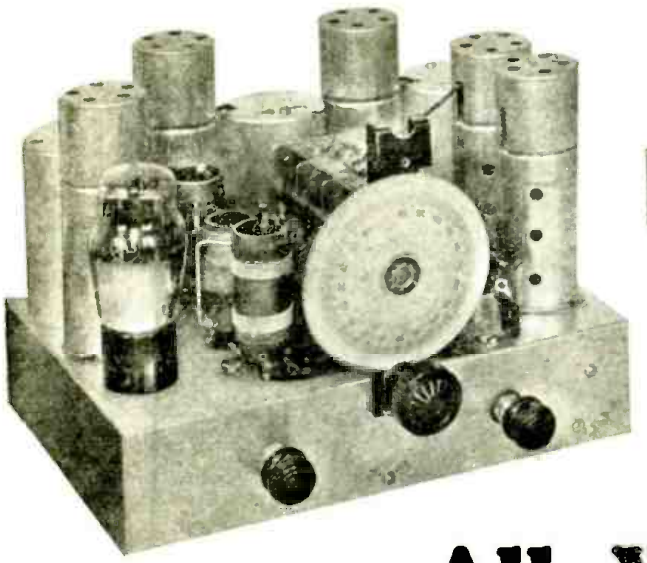
YV5BMO, Maracaibo, Venezuela—Strikes a gong before announcing.

Interval Signals

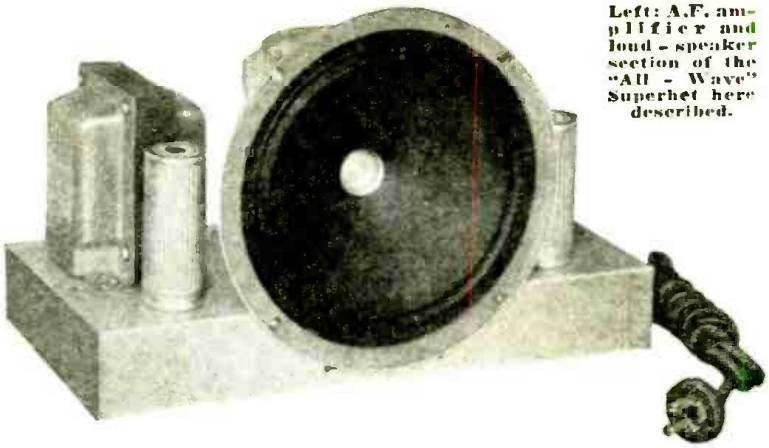
The Danish station, OXY, relays the chimes from the town hall, Copenhagen, at midnight. This is 6 P. M. E. S. T., and before signing off they usually play an old tune on a music box. FYA, the French station, opens and closes its program with the *Marseillaise* played by an orchestra. Their famous slogan is "Ici, Paree (Paris)." At this station the studio clock can be heard in the background striking every fifteen minutes. The tune is similar to that played by "Big Ben" in England but, of course, it is not as loud. "Big Ben," by the way, went back on the air on July 3, after being off for approximately two months for the regular overhauling that takes place once every ten years. Our read-

(*Continued on page 375*)

The photos show the new Miller All-Wave Super-Het as built from the instructions and blue-prints furnished with the kit of coils, which includes the "IF" transformers.



Above—It is the best idea to build the tuning and "I.F." amplifier as one unit, like that shown.



Left: A.F. amplifier and loud-speaker section of the "All-Wave" Superhet here described.

The MILLER All-Wave Super-Het

By R. T. POUNDS*

A new "kit" set which provides full-wave detection, A.V.C., high sensitivity and selectivity. "I.F." transformers are included with kit.

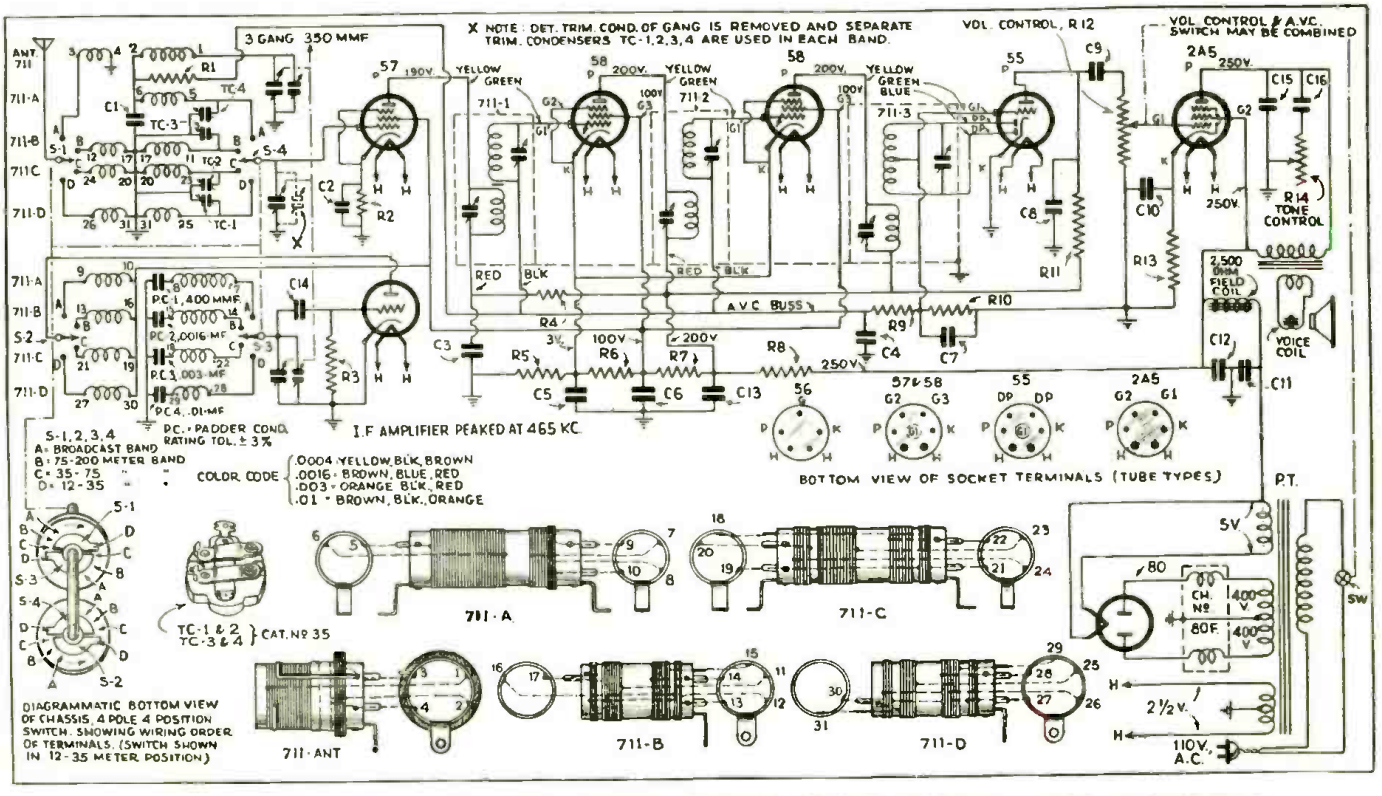
● THE problems entering into the design of an *all-wave* receiver are very clearly defined under a few concise headings, and an attempt shall be made in outlining the manner in which these problems have been overcome.

One of the most common prejudices regarding short-wave receiver design is that for efficient operation, *band-changing* must be accomplished by means of plug-in coils. There are, of course, many arguments as to the relative efficiency of plug-in coils and various switching arrangements, most designers refusing to accept a switch-type receiver as being satisfactory. The results of my tests during the past several months have definitely proven that if care is taken in the chassis design and in the careful selection of the switch employed, *switch-type coils* are *even more efficient than the usual plug-in type.*

Another generally accepted idea is that the signal tuning condensers must be of rather low value for satisfactory operation at the high frequencies. This has also been proven as a mistaken idea and, in fact, the use of a large condenser

(*Continued on page* 358)

* Chief Engineer, J. W. Miller Co.



Complete wiring diagram of the Miller All-Wave Superhet, all the coils being available in "kit" form.

SHORT WAVE

We are pleased to present this complete discussion on various types of short-wave antennas such as, noise reducing doublets, using various types of feeder systems, the inverted diamond antenna, and a general purpose antenna designed to tune to resonance with any of the short-wave broadcast bands. The good and bad features of each type of antenna are carefully brought out in this article after exhaustive tests were made to determine which antenna is best suited for general short-wave reception.

● A TRUE saying is that a receiver is no better than its antenna. It is also true that the average short-wave receiver will bring in stations with almost any type of antenna even to a short piece of wire several feet long. The ideal condition would be an antenna that is designed to operate on the specific frequency to which the receiver is tuned. Then, we would have a maximum pick-up by the antenna concentrated on a very narrow band of frequencies. This would mean high signal level and a low background noise level. First, because the antenna is tuned sharply and secondly, because the receiver gain control can be turned down on account of the strong signal that the antenna is feeding into the receiver. It has long been the desire of short-wave fans to construct a general purpose antenna, one that will respond to a wide range of frequencies preferably from around 15 meters up to 100. Theoretically it would require several antennas to cover this range of frequency and it is almost impossible to get a single antenna that will have the same efficiency over this wide range. In this article we will endeavor to set forth all the prominent types of antennas in use today. The advantages and disadvantages will be pointed out.

Doublet Antennas

In Fig. 1 we have a doublet antenna using the new Lynch Giant Killer, low impedance, transmission line. The two flat top portions are 30 feet each in length and the feeder should be at least 30 feet long. The approximate impedance of the flat top antenna when operated as a half wave affair will be between 70 and 75 ohms. The impedance of this new cable effectively matches the impedance of a half wave antenna, the feeder having an impedance of approximately 70 ohms. In the ntenna flat top, No. 12, solid enamel wire is recommended. The conductors used in the transmission line consist of 10 strands of No. 22 B. & S. gauge wire, each strand being enameled. Varnished cambric insulation is used around each conductor and then the twisted pair is sealed in heavy weather-proof rubber covering. The material used for insulation is non-wicking and no trouble will be encountered from the absorption of moisture. A small coil, L1, is used to couple the transmission line to the grid coil of the receiver. This coil should have approximately 10 turns of No. 20 double cotton covered wire. This antenna system of the dimensions shown in Fig. 1 will work very nicely on a range of frequencies from 15 up to approximately 50 meters and will produce a minimum of background noise.

Transposed Feeders

In Fig. 2, we have the familiar transposed feeder using two inch transposition blocks. The dimensions, of course, are the same as shown in Fig. 1. However, the transmission line will have an impedance of approximately 450 ohms and it does not match the antenna as well as the transmission line shown in Fig. 1. However, the higher impedance line shown in Fig. 2 can be tuned somewhat with the coil-condenser combinations shown in Fig. 3. This tends to make it slightly more selective. However, the background noise pick-up will be slightly greater than that of Fig. 1.

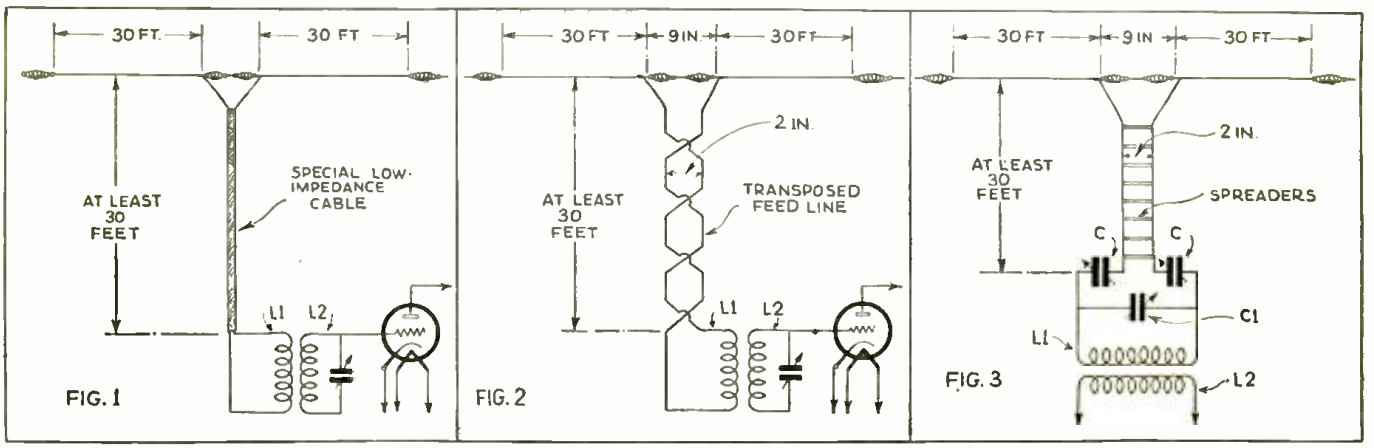
In Fig. 3 we have approximately the same thing as Fig. 2, except that instead of using transposition blocks, two inch spreaders are used and the feeder wires are run parallel. The dimensions here, are also the same as in Figs. 1 and 2. The tuning arrangement consisting of the two condensers, C and C1, provides a fairly flexible system and it will respond quite well to frequencies from 15 to 50 meters. Either spreaders or transposition blocks can be used. The advantage of tuning wherever possible in antennas, is that the antenna will peak up at a certain frequency and provide higher signal level with a lower amount of background noise.

Twisted Pair

In Fig. 4, it is the same antenna system only here we are using twisted pair or "lamp cord" for the feed line. Ordinary heavy duty twisted lamp cord has an impedance of approximately 100 ohms and is quite effective in reception. Although not being weather proof it has a tendency to absorb moisture and in the end not quite as good as the arrangements shown in Figs. 1, 2 and 3. However, if it were not for the absorption of moisture this system would be better than Fig. 2 and 3 and not quite as good as that shown in Fig. 1, that is considering that none of the feeders are tuned. Tuning, as we said before, will increase the efficiency and it is much easier to tune a line similar to that shown in Fig. 2 and 3 than those shown in Figs. 1 or 4.

Diamond Antennas

Inverted diamond antennas (Fig. 5) have received considerable comment lately and there is no doubt that they are more efficient than the doublets. However, one drawback is that they are extremely directional and for maximum signal pick-up they only receive best in one direction. In Fig. 4A, we show the method of coupling the diamond antenna to the regenerative detector and Fig. 4B shows the connections to a



Figs. 1, 2, and 3 in the above drawing show various feeder arrangements used with the doublet antenna. Fig. 3 shows how the feeders may be tuned.

ANTENNAS

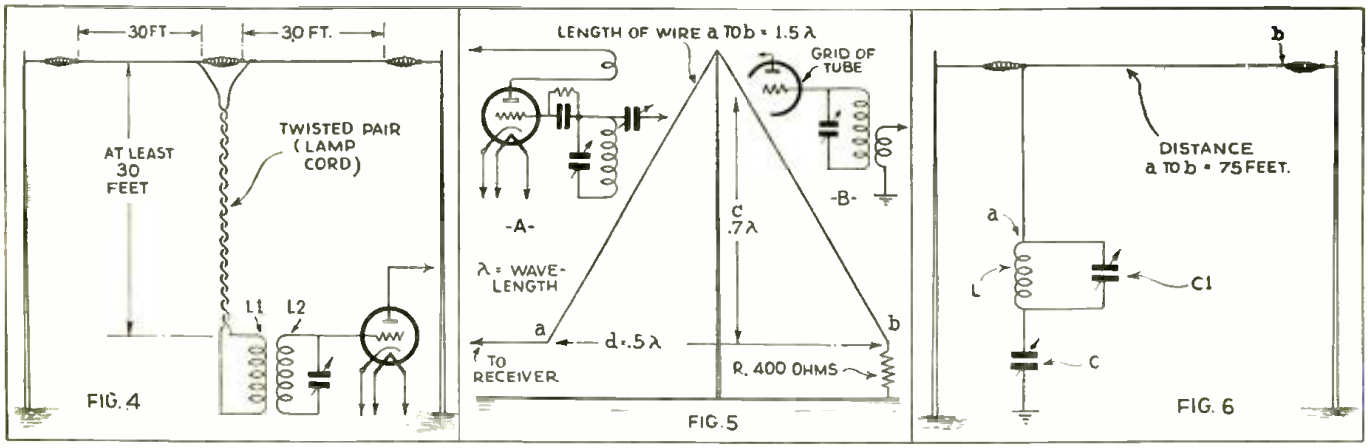


Fig. 4—We have the doublet using twisted pair as feeders. Fig. 5 shows the inverted diamond antenna which has proven quite popular in Europe. Fig. 6 shows an arrangement with which it is possible to tune the entire antenna system to the various short-wave bands.

tuned R.F. stage, or any receiver where a primary or antenna coil is used. One advantage of the diamond antenna is that it will respond to a fairly wide range of frequencies and in an antenna designed for 25 meters it would be very effective over a range from 15 to 50 meters and it does not need to be tuned. The figures for designing a 25 meter diamond antenna are as follows:

Height c = .7λ *or* .7 × 25 *or* 17.5 *meters*

There are 3.28 feet to a meter, therefore—

3.28 × 17.5 = 57.4 *feet.*

The length of the wire from a to b =

1.5λ *or* 1.5 × 25 = 37.5 *meters, or*

3.28 × 37.5 = 123 *feet.*

The base d or, distance between a and b =

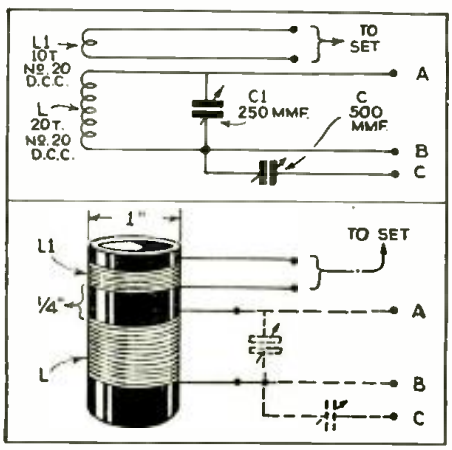
.5λ *or* .5 × 25 = 12.5 *meters, or*

3.28 × 12.5 = 41 *feet.*

It is necessary that Point B in Figure 5 should be terminated through a 400 ohm resistor to ground. This antenna receives best from the direction in which the resistor points. For those who wish to receive in a given direction and where it is possible to erect an antenna of this type it is highly recommended.

A Tuned Antenna

In Fig. 6 we have endeavored to strike a happy medium, that is, an antenna that can be tuned and will respond to the short-wave broadcast bands, 19, 25, 31, 49 meters. The length of the antenna from A to B, that is the flat top and including what lead-in may exist, should be 75 feet. The ground lead should be as short as possible, not over four or five feet long. With C, C1 and L it is possible to tune this antenna to any of the four short-wave broadcast bands previously mentioned. On some bands it will be a Hertzian antenna and on others it will function as a Marconi antenna. On the 49 meter band a Hertzian antenna will have to be 80 feet long. By setting C to a minimum the system becomes in effect not grounded. Therefore, L and C1 can be used to tune it up to an effective length of 80 feet. In the 31 meter band, this antenna functions as a ¾ wave Marconi. C should be adjusted to approximately half the capacity and tuning done with C1. In the 25 meter band, it is also a ¾ wave Marconi, and is necessary that the effective length be reduced to 60 feet. This is accomplished by the adjustment of C with C1 set to a minimum capacity. In the 19 meter band it is possible to make this system function as a five quarter wave Marconi. The necessary length here is 75 feet so we can use condenser C for tuning and C1 should be set at minimum capacity. This antenna has no noise reduction provision such as transposed feeders, twisted pair or what have you. However, it is an ideal antenna for use where background noise is not too high. Due to the fact that it is *tuned* to each of the bands in which short-wave broadcasting is done, the noise level will be low. This is because it provides a stronger signal for the receiver.



Constructional details of antenna coupling unit. Fig. 7.

Antenna Coupling

The most effective way of coupling an antenna to the receiver, of course, is necessary in order to derive full benefits from a well-designed antenna system. In Fig. 7, we have an antenna coupling unit consisting of two coils and two condensers. The coil, L1, should be connected to the receiver and consists of 10 turns of No. 20 double cotton covered wire. Coil L, the antenna tuning coil, consists of 20 turns of No. 20 double cotton covered wire. Either the doublet antennas previously described or the antenna system shown in Fig. 6 can be used in this coupling arrangement. For a doublet antenna we connect the feeders to points A and B and use condenser C1 for tuning. For the antenna system shown in Fig. 6 we use points A and C. Point A will go to the antenna and point C connects to the ground. The dimensions for making this tuning unit are given in Fig. 7. It can be made up into a small unit and mounted into a box and will serve as a medium for coupling any antenna to any type of receiver.

We trust that among the various types of antennas described in this article, the reader will be able to select one that will best suit his needs.

Constructional Hints

There are quite a few important factors to bear in mind when constructing a short-wave receiving antenna. The first and most important is that the antenna should be as high above the ground as possible and away from all surrounding objects such as trees, roofs and electrical wires of any description. Heavy copper wire must be used and all connections thoroughly soldered. Either stranded or solid copper wire may be used. If solid wire is used, the size should be 10 to 14 B & S gauge enameled. Do not use bare wire as it corrodes very rapidly. If stranded wire is used nothing smaller than seven strands of No. 22 should be used and each strand should be separately enameled. When making a connection with stranded wire be sure to clean each strand thoroughly otherwise there may be a poor connection to one strand. Do not use a metal pole to support the antenna. Wood should be used wherever possible. If an antenna is hung from a tree, leave plenty of space between the end of the antenna proper and the branches of the trees.

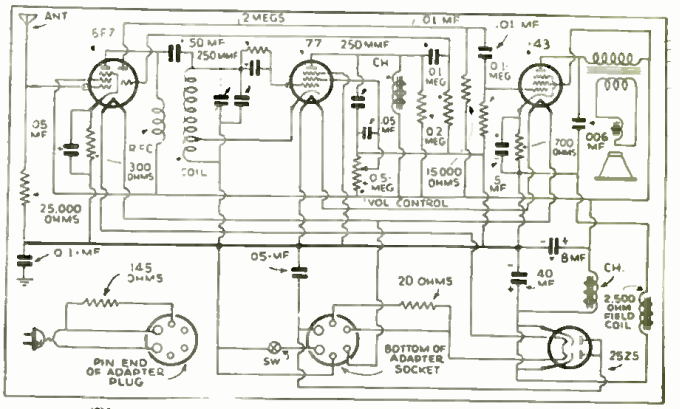
WHAT'S NEW In Short-Wave Apparatus

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

15 to 2,700 MIDGET Receiver

One of the newest and smallest "midget" All-Wave receivers is that illustrated below. It is extremely small, measuring 4"x 6½"x9" and has a dynamic speaker built into the tiny cabinet. Plug-in coils for wavelengths from 15 to 2,700 meters are available. (No. 206.)

● THIS compact, 4-tube, A.C.-D.C. receiver uses plug-in coils to cover a range of from 15 to 2,700 meters (110 to 20,000 kc.). It is of the "midget" variety and has a built-in dynamic speaker. The control to the left of the speaker grill-work is the regeneration control and the tuning dial is at the right. A novel feature is the plug arrangement used for the line cord and line voltage dropping resistor. When this plug is removed from its socket, a battery cable can be placed in position and the entire set operated from batteries, with no other changes necessary. The tubes used are a 6F7, a 77, a 43, and a 25Z5. The pentode portion of the 6F7 is used as an untuned R.F. stage, the output of which feeds the 77 regenerative detector. The audio component, in the plate circuit of the 77 detector, is fed back to the triode portion off the 6F7 for amplification. The output of this triode is then amplified by the 43 pentode power amplifier, which in turn feeds the dynamic speaker. The 25Z5 is connected in a half-wave rectifier circuit, commonly used in A.C.-D.C. sets. The values of the various parts are shown in the diagram and give the reader a general idea of the construction of this peppy "all-wave" midget. The set is an extremely neat appearing affair and is fitted into a very pleasing design of metal cabinet, finished to imitate a finely grained wood. A neatly designed grill covered with silk tapestry conceals the loud-speaker mounted behind the front panel.



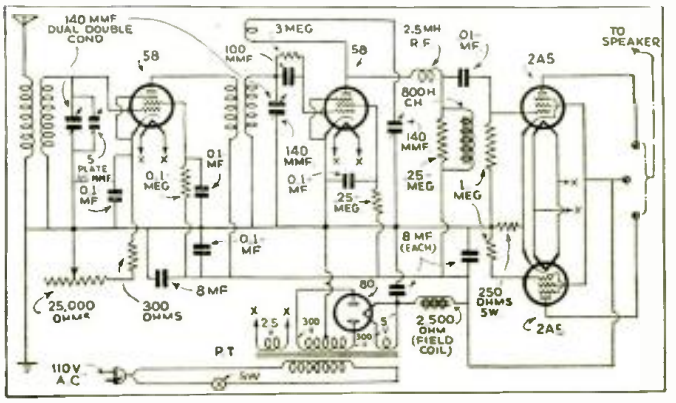
The new Midget Receiver employs this hook-up.

The "Powertone 5" Works Loud-Speaker

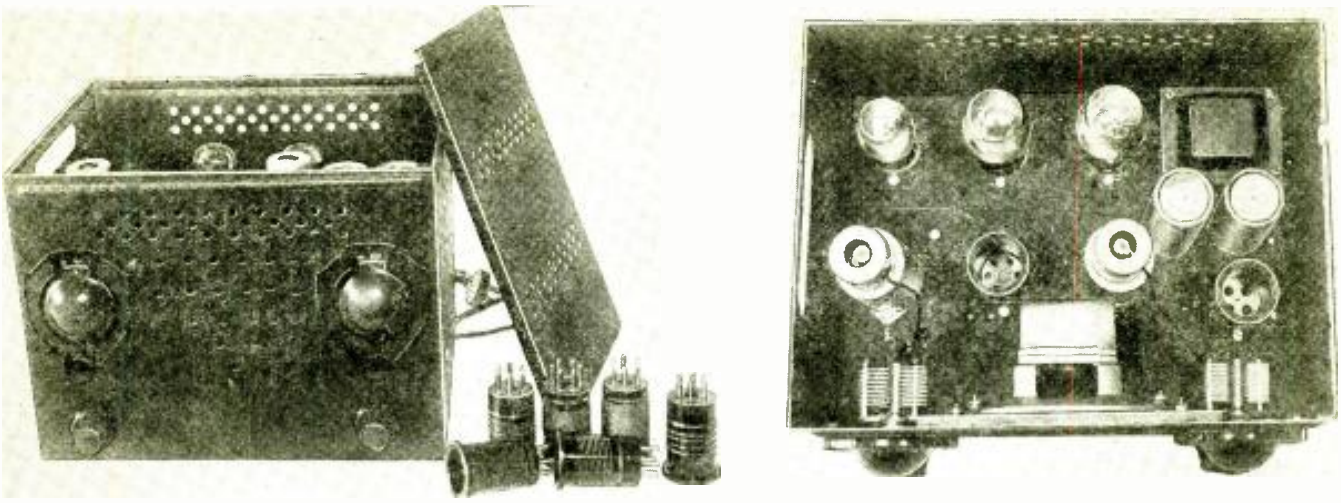
The R.F. and detector stages are tuned with a two-gang 140 mmf. dual variable condenser. A 3 plate midget condenser is used in the R.F. stage as a trimmer and aids in keeping the two stages in alignment. Inductive coupling is used between the antenna and grid circuit of the 58; this eliminates any tricky adjustments of an antenna trimmer condenser. Eight coils are necessary to cover the entire range of 15 to 200 meters, two being used at one time and they are plugged in into the front panel through convenient openings. This eliminates the bother of raising the lid of the cabinet each time the coils are changed. Small handles are attached to each coil and they can be removed or inserted in the socket with extreme ease. This set packs a "mighty wallop".

Left—The "Powertone-5" S-W receiver. Below—Hook-up of receiver. (No. 207.)

● A COMPACT and efficient receiver is this new Powertone 5-tube set in which the coils plug-in through the front panel. It is housed in a beautiful crackled finished metal cabinet which is 10" high, 14"wide, and 10" deep. A 4½" illuminated airplane dial adds to the beauty of the panel layout. The power supply and filter are contained within the cabinet and no external accessories are necessary, other than the eight-inch electro-dynamic speaker. The circuit diagram is given herewith, together with the values of the various parts. In it we find that a type 58 R.F. pentode is used as a tuned radio frequency amplifier, a 58 pentode is used as the regenerative grid-leak detector, and two 2A5's are used in a resistance-coupled output stage. The volume is controlled through the use of a 25,000 ohm variable resistor connected in the cathode circuit of the 58 R.F. amplifier. Regeneration is controlled by a .00014 mf. variable midget condenser. In this circuit the A.C. plate current does not travel directly through the tickler coil. In the power supply we find that a type 80 is used as a rectifier and the 2,500 ohm field of the dynamic speaker, together with two 8 mf. electrolytic condensers serving as the filter unit.



Names and addresses of manufacturers of sets described on this and following pages furnished upon receipt of stamped envelope; mention No. of article.

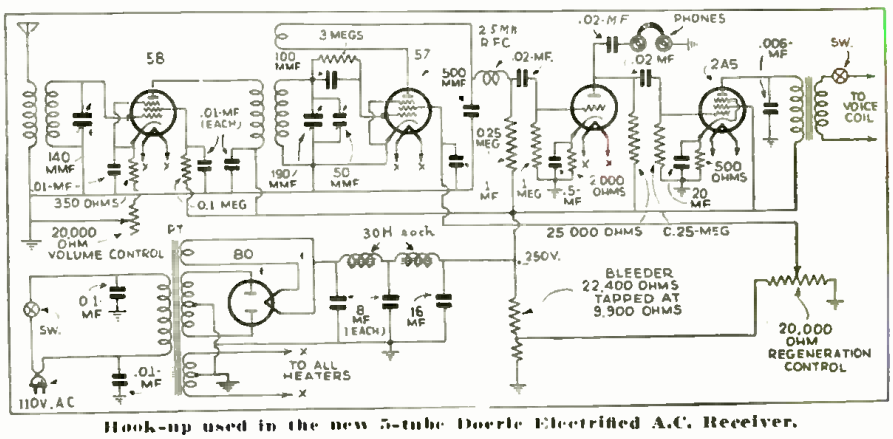


Views of the newest receiver of a famous line of sets—the "Doerle A.C. 5" with "built-in" loud-speaker. (No. 208.)

Doerle A.C. 5 Has Some "Kick"

● THE *Doerle A.C. 5* receiver shown in the photograph is the result of much experimentation. The original 3-tube Electrified Doerle formed the basis of this finished receiver. As most of us know, the 3-tube Electrified Doerle used a 58 tuned R.F., 57 detector, and a 56 audio amplifier. This receiver is exactly the same except for the addition of a 2A5 pentode amplifier. The entire receiver is contained in a neat metal box measuring, 11¼"x8½"x8½". Even the loud-speaker and power supply are contained within the cabinet. This makes a very neat and compact receiver and tests showed that it is capable of bringing in all the "foreign" stations with full loud-speaker volume. The front of the panel contains the two tuning dials, the regeneration control, and the volume control. In the center of the front

(*Continued on page* 368)



Hook-up used in the new 5-tube Doerle Electrified A.C. Receiver.

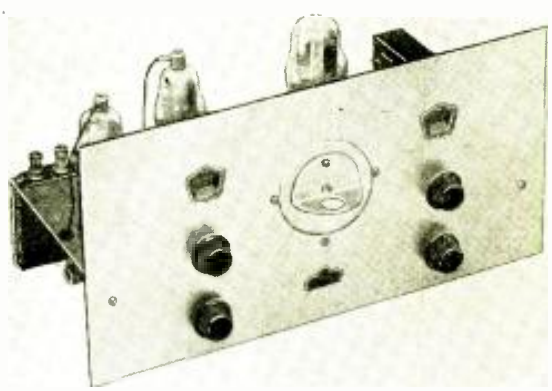
Universal Mascot 3

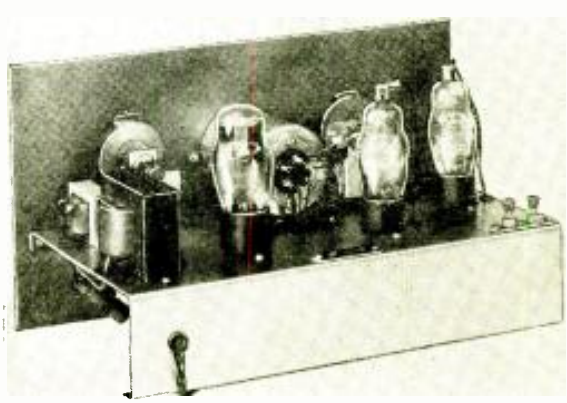
● THE *Universal Mascot* 3 employs the latest type of tubes and a very well engineered circuit. Some of its features are: the coils plug in through the front of the panel, eliminating the necessity of reaching behind the panel each time the coils are changed. It has band-spread on any frequency over the entire tuning range of the set, this being accomplished by a small 3-plate condenser connected in parallel with the main tuning condenser. The large condenser serves as the band-setting condenser with the smaller one being used for band-spread tuning. A 6F7 is used as a stage of untuned R.F. and regenerative detector. The pentode portion of the 6F7 serves as the R.F. amplifier, while the triode section is used as the regenerative grid-leak detector.

A 79 twin triode is used in a two-stage resistance-coupled audio amplifier circuit providing extremely high-gain with excellent quality. The power supply for this receiver is contained right in the set and no external apparatus is necessary other than the earphones or loud speaker, either may be used. An 80 type tube serves as the rectifier of the high voltage A.C. produced by the power transformer. As the 6F7 and 79 tubes have 6.3 volt filaments and the 80 rectifier a 5 volt filament, it is necessary that the transformer have a 6.3 and 5 volt winding. Regeneration is controlled by a 2,000 ohm resistor in series with the plate by-pass condenser of the detector tube and, very smooth control of regeneration is effected. The complete wiring diagram together with values of the various parts is given for those interested in a receiver of this type. The placement of the various parts can be learned by glancing at the photographs.

After the mechanical assembly is complete, you may proceed with the wiring. Wiring is to be done point to point—that is as straight and direct as possible. Here again you must use your own judgment. The picture diagram furnished with the kit shows as nearly as possible consistent with clearness, the exact sequence of wiring, but as with the mechanical layout, there are a few exceptions. Just keep in mind that all connections are to be made to the correct electrical point without considering its mechanical position. For instance, any point on the chassis is a ground, providing the paint is properly cleaned off and if it is more convenient mechanically to run a connection to some other ground "lug" than the one shown on the picture diagram, you may do so. In mounting the resistors and condensers use the wire leads out to the proper length and well soldered as supports but be sure that they are all well clear of the chassis and other parts of the circuit. Soldering is one of the most

(*Continued on page* 370)





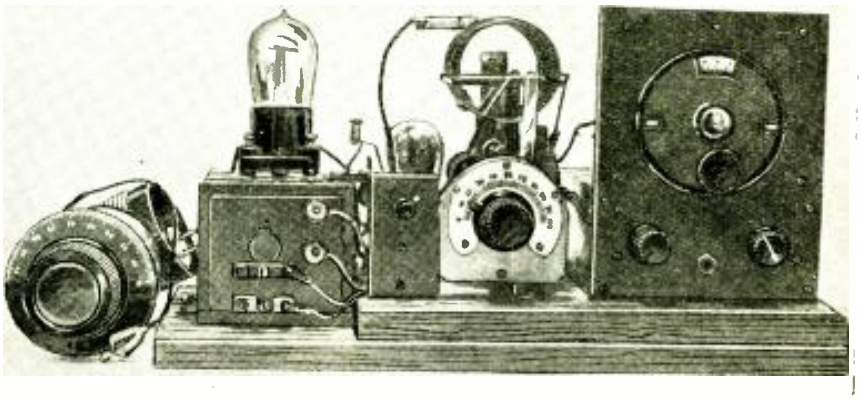
Two photos at the right show front and rear views of the Universal Mascot-3 S.W. receiver. The coils plug-in through the front of the panel and are enclosed in protective insulating shells. (No. 209.)

A DEPRESSION PORTABLE Transmitter and Receiver

Up to 10 Watts Input with High Portability; Rectified Spark-Coil Supplies Plate of 171A Oscillator. Monitor Unnecessary.

By T. C. VAN ALSTYNE
VE3LN, Canada

Here is a "nifty" portable amateur station, consisting of a simple transmitter-receiver. The plate voltage for the transmitting portion is supplied by a Ford spark coil, together with a gaseous type rectifier. "B" batteries are used for the receiver and a storage battery lights the filaments of all tubes. Make sure the note is clear, because the Federal regulations do not allow the use of modulated "CW" signals. By proper adjustment of the vibrator a good D.C. note can be obtained.



Here's the "Depression" Portable Transmitter and Receiver set up, ready for operation.

● AN air of expectancy reigned at our little fishing camp in the northern woods. The antenna was up and there lacked but five minutes of zero hour—our first "schedule" with our first *portable*.

"If you click," promised VE3RL, "I'll take your turn at dishwashing for the next three days!"

"And I'll bring you your breakfast in bed!" contributed VE3IB enthusiastically.

I plugged in the phones and listened. Several W8's and VE3's were coming in splendidly. So far so good. "How about you, Ted?" I asked VE3OO.

"I'll catch all the fish!" he replied warily, noting my satisfaction with the receiver.

Switching over, we called VE3NU back at the home town for three minutes as arranged. We doubted that our questionable power was sufficient to cover the distance and did not seriously expect a reply. But the response was immediate!

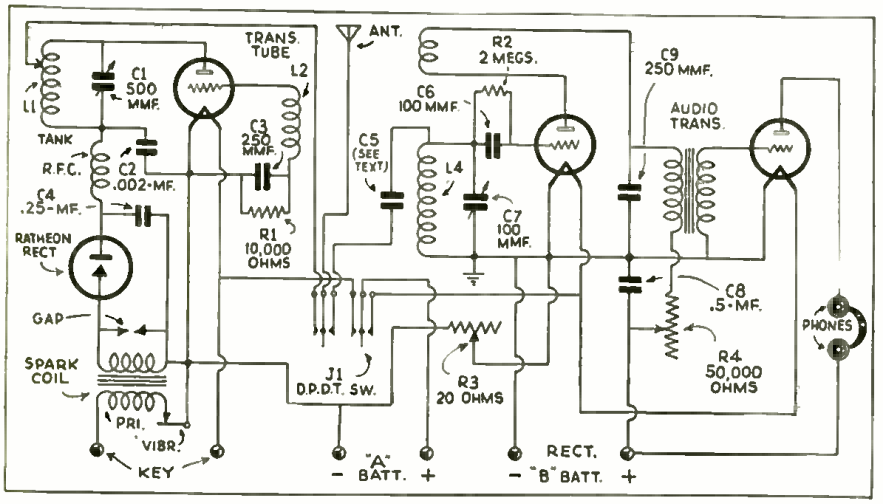
"Wash 'em clean, Len," I said, jubilantly indicating the pile of dishes.

"—— ur QSA 4 R7," VE3NU was saying. "Go ahead traffic." Success!

The *portable* made from the "junk-box" proved the most useful piece of camping equipment we ever toted north. "Contact" was made on practically every *schedule*. We kept in touch with our homes and friends, and received immediate replies. When contacts can result in such useful communication, it is indeed a privilege to be an amateur.

Spark-Coil Power-Supply

Simplicity and economy are the features of the apparatus which is shown in the photo. The *unusual* part is the spark-coil power-supply for the transmitter. A Raytheon tube is used to rectify the output from the spark-coil's secondary for the plate of the 171A oscillator. The two small pins of the Raytheon are connected in parallel as are the two large ones. Due to the high frequency of the coil's vibrator very little filter is required even though it is a half wave rectifier. The vibrator frequency of the coil in the photo is about 500 cycles and sounds much like "generator D.C." without any filter at all. The capacity of C4 will therefore depend on the vibrator. It was found that a filter condenser larger than .25 mf. drew a greater load than did the transmitter itself! A Model "T" Ford coil also gave good results with the original secondary. The vibrator is somewhat slower and requires more filter. Those who wish to use a Ford coil and secure a PDC note may do so by adding a small filter choke of only a few turns, connected in the conventional manner. In any case a safety gap spaced about 1/32" must be connected across the secondary (see diagram) so it may arc over should the load accidently open. Otherwise C4 would be punctured by the voltage-rise from the spark coil.



Simple wiring diagram, showing the various connections for this low-cost portable amateur station built and tested by VE3LN.

Tuned-Plate Single-Control Oscillator

The rest of the transmitter consists of a tuned-plate single-control oscillator. The circuit is shown in the diagram, together with the values of the various components. The plate coils L1 should be 2½" in diameter and constructed from No. 8 wire or small copper tubing. The grid coils L2 are wound with No. 30 D.C.C. on forms of one inch diameter. The turns of the former are spaced the diameter of the wire or tubing while the latter are close wound. The exact number of turns for L2 should be finally adjusted by placing a milliammeter in the plate circuit and turns added or removed until the transmitter plate current is lowest just outside the low frequency end of the band. The antenna must be disconnected while this is being done. The following table indicates the number of turns for the three popular bands.

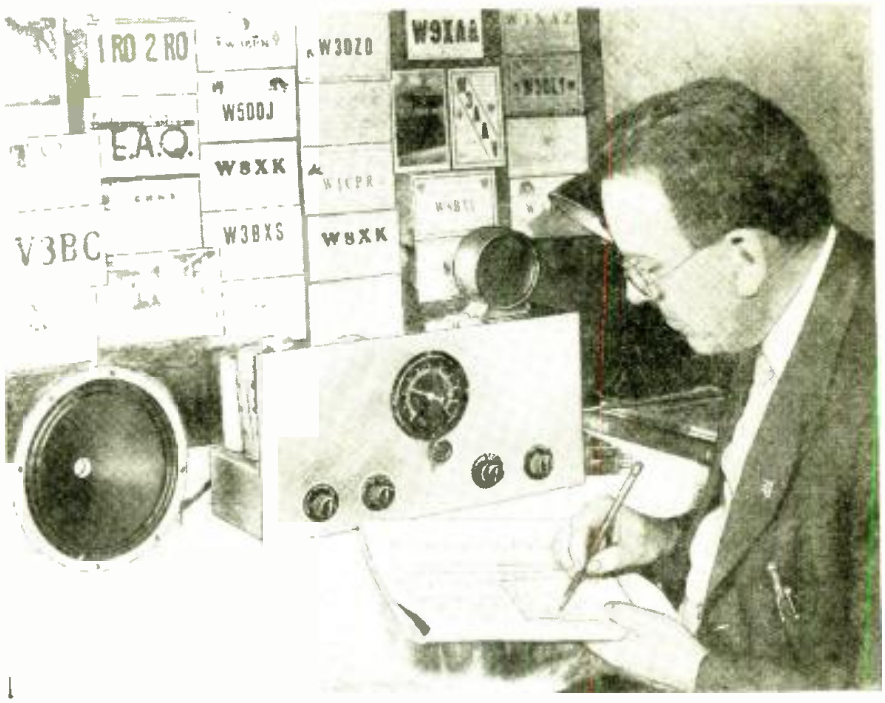
Band	*L1*	*L2*
80	12	62
40	5	25
20	3	9

(*Continued on page 366*)

Test Report On All-Star All-Wave SET

By H. W. SECOR

The All-Star All-Wave 6-Tube Receiver was set up in one of our "listening posts" located near New York City and very fine loud-speaker reception was enjoyed on all of the usual "foreign" broadcast stations, which came in with excellent volume. This set possesses a fine "DX" range due to its high sensitivity, while the continuous band-spread feature renders the tuning very easy.



The All-Star All-Wave 6-tube receiver set up in our "Listening Post" for tests on both local and DX short-wave reception. Stations several thousand miles away came in like "locals" on the loud-speaker.

STATIONS LOGGED ON THE "ALL-STAR" SUPER 6

Band	Tank Setting	Tuning Dial Setting	Stations
19 Meter	5	30-40	H1X, OXY, YV5RMO, YV2RC, VE9HX, VE9GW
75 Meter (Amateur Phone)	55	55-65	1, 2, 3, 4, 5, 8 and 9 Districts
31 Meter	40	45-50	GSB, DJA, EAQ, XETE, GSC, GCA
25 Meter	30	40-45	FYA, GSE, I2RO, CJRX, DJD
19 Meter	80	45	DJB, GSF, HVJ, FYA

● THE All-Star All-Wave six tube receiver was tested out over a period of about two weeks at one of our Listening Posts, approximately 26 miles from New York City, and we must say that its performance was really excellent. Stations from all over the world were brought in with tremendous volume and with tuning ease that would satisfy the most critical "short-waver."

The All-Star All-Wave is a 6-tube receiver using a 2A7 pentagrid converter, two type 58 tubes as I.F. amplifiers, and one 56 as second detector with a 2A5 pentode power amplifier. A 5Z3 functions as the rectifier in the power supply portion of the receiver. The wiring diagram and technical description of this receiver appeared in the September issue and those who wish to construct this set may learn the values of the various parts by referring to the above-mentioned diagram. This set was tested with various types of antennas, including the *doublet* and *Marconi* types. Results were good on both antennas, proving that the antenna to be used with this receiver is not at all critical, its main requirements, of course, being mounted well out in the clear (away from the surrounding objects) and as high above the ground as possible. All the principal European stations, including those in England, France, Germany, Italy and Spain were received like "local" broadcast stations. South American stations were also received with excellent volume and clarity.

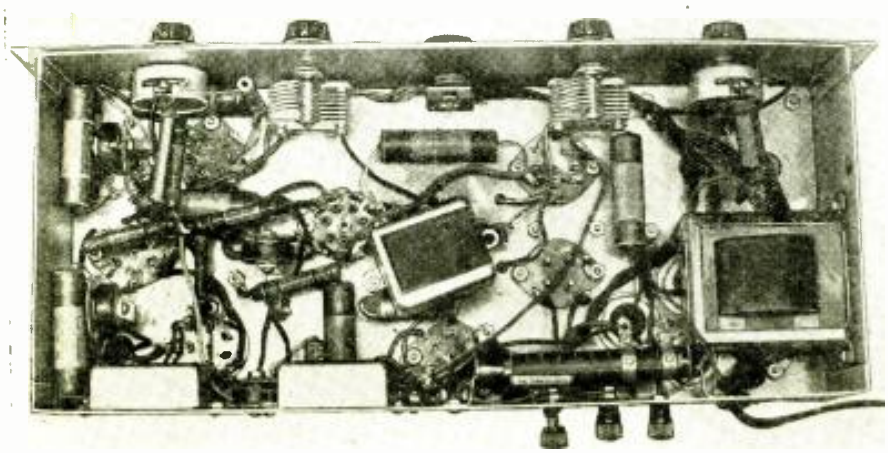
FREE BLUEPRINTS

Diagram, both schematic and pictorial, together with parts list, also assembly, wiring and tuning instructions for the All-Star Super-6 can be obtained, free of charge, by writing to the Service Department, SHORT WAVE CRAFT, 99-101 Hudson St., New York City.

Probably one of the greatest features of this receiver is its extreme tuning ease, dozens of stations are not crammed into one or two divisions on the dial of this receiver! Ample *band-spread* is available over the entire range that this set covers. The range over which it was tried out was from 10 to 90 meters and this only necessitated the use of three sets of plug-in coils. The band-spread is accomplished by the use of a two-gang 35 mmf. tuning condenser for the oscillator and detector circuits. Two larger *tank* condensers are used for adjustment and selection of the range of frequencies to be covered by the small tuning condenser. The 270 degree dial, working in conjunction with the 180 degree condenser, extends the range of the tuning condenser another 90 degrees. This, also, adds considerably to the *band-spreading*. Some of the stations which were not coming in with an R9 signal were effected quite a bit by the background noise. However, this was easily overcome by a mere adjustment of the tone control, which is located on the extreme right of the panel. This tone-control has little effect on the volume of the signal, but the background noise practically disappears as it is adjusted to the point giving a slightly deeper tone and discriminating against the high-pitched crackling noises prevalent in most short-wave receivers. In the amateur phone bands, this receiver proved to pack a mighty wallop and amateur phones from all over the U. S. could be brought in with full speaker volume.

One particularly noticeable feature, of this well-designed superheterodyne, is the low background noise in the set itself, that is noise that would be present in the speaker with the antenna disconnected and the volume control turned up to maximum. The noise here was far less than the average short-wave receiver, even of the regenerative type and this undoubtedly is an excellent feature because the weaker stations would not be blanketed out by high set noise level; we have enough noise externally picked up by the antenna without adding set noises. Another feature which was noticeably absent

(*Continued on page* 374)



Bottom view of the All-Star All-Wave, 6-tube receiver.

$5.00 FOR BEST SHORT WAVE KINK

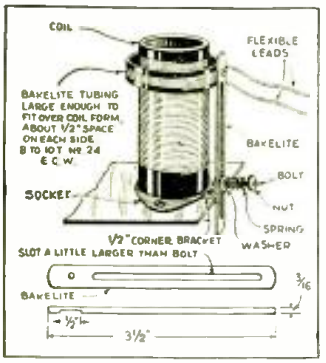
The Editor will award a five dollar prize each month for the best short-wave kink submitted by our readers. All other kinks accepted and published will be paid for at regular space rates. Look over these "kinks" and they will give you some idea of what the editors are looking for. Send a typewritten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

$5.00 PRIZE

VARIABLE COUPLING

The coil form is either bakelite or cardboard, ½" long and about 1" larger in diameter than the plug-in coil form; and on which is wound 8 to 10 turns, No. 24 enameled copper wire, the ends of which terminate in flexible leads.

The strip supporting the coil is bakelite, 3½" long, ¼" wide and 3/16" thick.



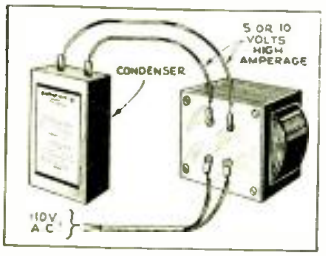
One end is notched a little to hold the coil rigid. It is slotted most of its length just a little larger than the screw that will pass through it.

This is held by a ½" corner bracket as shown, the spring tension keeps the coil at its desired height, and should not be too tight. This method is preferred to the usual series condenser in the antenna lead.—Ted Wajtosiak.

▼ ▼ ▼

BLOWN FILTERS AND MICA CONDENSERS

I frequently am able to fix blown filter



and mica condensers this way. I connect about ten volts at 5 or 10 amperes right across the "shorted" condenser. The high current usually burns out the short and the condenser may be used again.—John C. Nelson.

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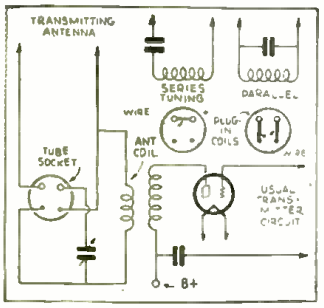
TRANSMITTER ANTENNA TUNING

This arrangement will save much time when transmission on different bands is

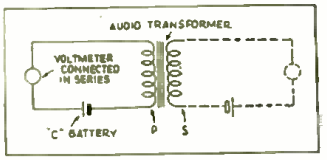


desired. Two plug-in coil forms are secured and wires (jumpers) connected as illustrated. I have used this arrangement for quite some time and the results have proved highly satisfactory.—Raymond Johnson, W9JFK.

▼ ▼ ▼

FINDING TRANSF. RATIO

Here's a simple way to find the ratio of an audio transformer without doing a great deal of calculation. All that you need is a "C" battery and a voltmeter or an ammeter. I connected the voltmeter in series with the circuit. Using a "4" battery, I found that the voltmeter when connected as shown in diagram registered three volts when it was connected at the primary. Using the same circuit at the secondary, the voltmeter registered only one volt. Dividing the one volt into three (primary voltage over secondary voltage) you will find that the ratio of the transformer will be 3:1. Using a higher voltage, instead of the "4" battery, the ratio determined will be more accurate. Should the primary voltage read 6 and the secondary voltage 4, the ratio will be 1½ to 1.—John Rojo.



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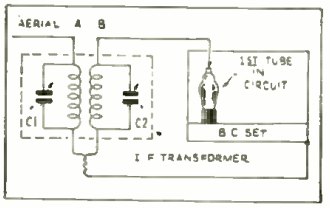


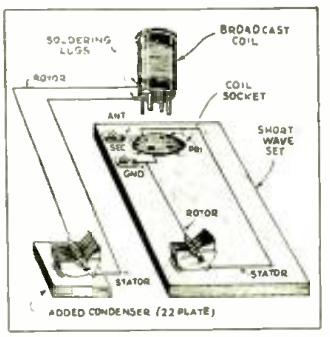
S.-W. CONVERTER COUPLING

When using an intermediate transformer as a coupling medium between a S.-W. converter and a broadcast set, a simple method of aligning the I.F.T. follows (although approximate but with satisfactory results). Set the B.C. set at the frequency desired (probably 540 kc.) and open the volume control. Connect a short piece of wire to the plate lead of I.F.T. for use as an aerial; connect the grid lead to the **first tube's** control grid. The B+ and ground leads connect to the B.C. set chassis. Then adjust the grid coil condenser in the I.F.T. so that the highest noise level appears. Reverse the plate and grid leads of the I.F.T. to their respective connections and adjust the plate coil condenser C1 to highest noise level.—K. C. Heddens.

▼ ▼ ▼

ADDING VOLUME TO B.C. COIL OF S.-W. SET

Usually the tuning condenser used in short-wave receivers has a capacity far too low to enable the operator to cover the entire broadcast band when a broadcast coil is used. By adding a large condenser in the manner shown in the drawing, the entire short-wave broadcast band can be covered very easily.—Rudy Keller.



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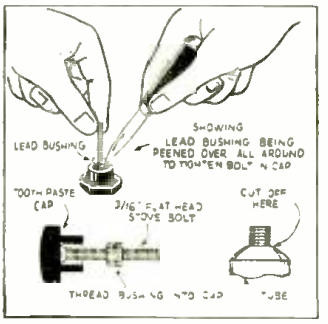
TOOTHPASTE CAP AS KNOB

Why not convert your toothpaste cap into a knob? The cap on a 25-cent size Listerine tooth paste tube fits a 3/16" flat-head stove-bolt nicely. Place the head of the bolt into the cap; next cut off the neck of the tube, taking care not to damage the thread. Slip it over the bolt and screw into place, locking the head of the bolt to the bottom of the cap. Then take the point of a penknife and push it in between the bolt and the bushing. Do this all the way around, spreading the bushing

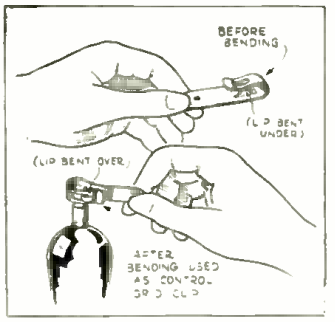


and making it fit very tightly. You can also pour sealing wax into the cap instead of using the bushing. Larger size caps can be used with larger size bolts or vice versa. A knob of this sort is ideal in the construction of a home-made antenna coupling condenser.—James Dine.

▼ ▼ ▼

SCREEN-GRID CLIP

A good screen-grid clip can be made by bending a battery clip as shown in the drawing. This clip is very easy to make and will fit any tube.—Edward E. Felter.



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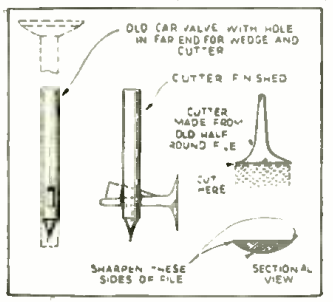
HOLE CUTTER FOR WAFER SOCKETS

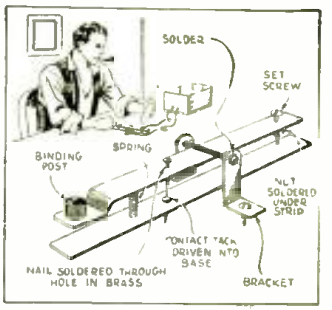
Obtain a big nail, an old half-round file one-half inch in size, and a valve that comes out of a bus or some big engine that has a square hole in the end. Cut the valve four inches from the end by cutting around the rod so that it can be broken by a sharp rap (this saves sawing



through the entire rod). Then grind the end that is closest to the hole to a point. You can make the cutter by grinding the sides of the shaft parallel, then you can put the file in the vise with the unwanted end up, so you can break the file with a knock. Now you sharpen cutter. If you use a half-round file it will cut like a knife while the other way the point will only do the cutting.—Hubert Stark.

CHEAP KEY

Here is my idea of a cheap and serviceable key. The key proper is a brass strip about ⅛"x5"x1/16". The contact is a nail passed through a hole in the brass and soldered in position to suit the key being made. The set screw is an ordinary one passed through a hole in the brass, and thence through a nut soldered underneath.

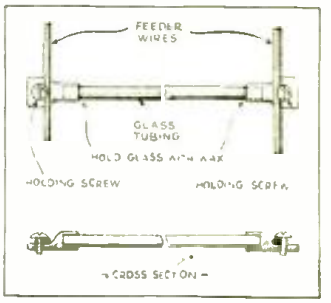


The brackets are mounted first, then a nail is placed in position and the ends covered with solder. The knob is a binding post, and a small spring around a nail will serve to push the key up. If desired the parts may be polished, and when mounted on a neat base it makes a good looking and serviceable instrument.—Hugh Lambe.

▼ ▼ ▼

"ZEP" SPREADER

This makes a very good spreader for a Zep antenna. You get some old copper lugs, cut off the flat part to proper length, put your wire in groove as shown, then drill hole next to wire a little smaller than screw you are to use. This will then thread itself when putting in screw;

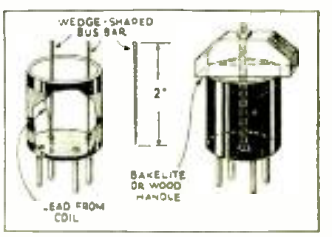


when you screw it in this will hold wire and spreader in place. Use red wax in lug which will hold glass tubing in place. I have used this for two years and it looks and works very fine.—Gilbert G. Galambus, W9HA.

▼ ▼ ▼

2 COIL KINKS

Here are two schemes which will be found useful to makers of tube-base coils. The first facilitates the selection of the proper number of turns on a coil. One end of the coil to be adjusted is soldered to its tube-base prong. The other end is temporarily fastened to its prong by wedging it in place with a two-inch piece of round bus bar filed to a wedge shape as shown. These wedges are used until the proper number of turns is found when the connections are permanently soldered. The second kink deals with a handle for tube-base coils. A piece of bakelite or wood about ¼ inch thick is cut to the shape shown and fastened to the tube-base by means of a long, flat-head machine bolt, a countersunk hole having been drilled in the bottom of the tube-base to accommodate the bolt.—Ralph F. Hunter.



▼ ▼ ▼

USE FOR "OLD TUBES"

When trying a new built receiver, instead of putting in new tubes get the same type of tube that is worn out but lights. If the tubes operate correctly then you know that it is safe to put in the new tubes. This is the way to save new tubes from being blown out. If the worn out tubes blow out, you know that something is wrong with the set and needs to be checked. Keep doing this until the tubes work properly by using other worn out tubes of the same type. Then you know it is safe to put in new tubes without fear of being blown out.—Ira Zwigaitis, Jr.

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 a few simple rules will save the short wave fan a lot of otherwise wasted time.

From daybreak to late afternoon, and particularly during bright daylight, listen between 13 and 22 meters (21540 to 13000 kc.).

To the east of the listener, from about 1 P.M.-10 P.M., and 4 A.M., the 22-35 meter will be found very productive. To the west of the listener this same band is best from about 9 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.

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

21540 kc. W8XK
-B- 13.93 meters
WESTINGHOUSE ELECTRIC
PITTSBURGH, PA.
6 a. m.-2 p. m.; relays KDKA

21470 kc. GSH
-B- 13.97 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen In" Column

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
8 a. m.-3 p. m.

21020 kc. LSN6
-C- 14.27 meters
HURLINGHAM, ARG.
Calls N. Y. C.
8 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.

18680 kc. GAX
-X- 16.06 meters
RUGBY, ENGLAND

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. & early aftn.

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

17790 kc. ★GSG
-B- 16.86 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen In" Column

17780 kc. ★W3XAL
-B- 16.87 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ, 9 a. m.-5 p. m. every day

17775 kc. ★PHI
-B- 16.88 meters
HUIZEN, HOLLAND
Daily except Tues. and Wed. 7:30-9:30 or 10:30 a. m.

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

17310 kc. ·W3XL
-X- 17.33 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ Irregularly.

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

17120 kc. WOY
-C- 17.52 meters
LAWRENCEVILLE, N. J.

17080 kc. GBC
-C- 17.56
RUGBY, ENGLAND
Calls ships, morn & early aftern'n

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

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 Spain, daytime

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

15330 kc. ★W2XAD
-B- 19.56 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY daily, 2-3 p. m.

15300 kc. CP7
-B- 19.6 meters
LA PAZ, BOLIVIA

15270 kc. ★W2XE
-B- 19.65 meters
ATLANTIC BROADCASTING CORP.
485 Madison Av., N.Y.C.
Relays WABC daily, 10 a. m.-12 noon

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

15243 kc. FYA
-B- 19.68 meters
"RADIO COLONIAL"
PARIS, FRANCE
Service de la Radiodiffusion, 103 Rue de Grenelle, Paris
7:30-11 a. m.

15210 kc. ★W8XK
-B- 19.72 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
10 a. m.-4:15 p. m.
Relays KDKA

15200 kc. ★DJB
-B- 19.73 meters
GERMAN S-W STATION
Broadcasting House, Berlin, Ger.
12:20-2:30 a. m., 8-11 a. m.
Also 4-5:30 a. m. on Sundays

15140 kc. ★GSF
-B- 19.82 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

15120 kc. HVJ
-B- 19.83 meters
VATICAN CITY
ROME, ITALY
5:00 to 5:15 a. m., except Sunday. Also Sat., 10-10:30 a.m.

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

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

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

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

14440 kc. GBW
-C- 20.78 meters
RUGBY, ENGLAND
Calls U.S.A., aftern'n & even'g

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

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

(Time given is Eastern Standard Time)

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

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

12840 kc. WOY
-C- 23.36 meters
LAWRENCEVILLE, N. J.

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
PIZA, ITALY
Calls Italian ships
Mornings

12780 kc. GBC
-C- 23.47 meters
RUGBY, ENGLAND
Calls ships, after'n & early eve'g

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

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

12000 kc. RNE
-B- 25 meters
MOSCOW, U. S. S. R.
Sat. 10-11 p. m.
Sun. 6-7 a. m., 10-11 a. m.
4-5 p. m.
Mon., Wed., Fri., 4-5 p. m.

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

11880 kc. ★FYA
-B- 25.25 meters
"RADIO COLONIAL"
PARIS, FRANCE
11:15 a. m.-2:15 p. m.-3-6 p. m.

11870 kc. ★W8XK
-B- 25.26 meters
WESTINGHOUSE ELECTRIC
& MFG. CO.
PITTSBURGH, PA.
4:20-10:00 p. m.
Sat. till 12 Midnight
Relays KDKA

11860 kc. GSE
-B- 25.3 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

11830 kc. ★W2XE
-B- 25.36 meters
ATLANTIC BROADCASTING
CORP.,
485 MADISON AVE., N. Y. C.
2-4 p. m. Relays WABC

11810 kc. I2RO
-B- 25.4 meters
ROME, ITALY
Daily 11:15 a. m.-12:15 p. m.
1:15 p. m.-5:30 p. m.

11790 kc. W1XAL
-B- 25.45 meters
BOSTON, MASS.
Irregularly in the evening

11780 kc. ★CJRX
-B- 25.47 meters
WINNIPEG, CANADA
8-11 p.m.; 11:30 p. m.-12:30 a.m.

11760 kc. ★DJD
-B- 25.51 meters
GERMAN S-W STATION
BROADCASTING HOUSE, BERLIN
12:15-4 p. m., 5-10:30 p. m.

11750 kc. ★GSD
-B- 25.53 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

11720 kc. ★FYA
-B- 25.6 meters
"RADIO COLONIAL"
PARIS, FRANCE
6:15-9 p. m.
10 p. m.-12 midnight

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

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

10740 kc. JVM
-C- 27.93 meters
NAGOYA, JAPAN
Phones California evenings.
Broadcasts 3-7:45 a. m.

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

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

10530 kc. GBX
-X- 28.49 meters
RUGBY, ENGLAND

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

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

10420 kc. XGW
-C- 28.79 meters
SHANGHAI, CHINA
Calls Manilla 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 9 p. m.-12
midnight

10330 kc. ORK
-C- 29.04 meters
RUYSSELEDE, BELGIUM
Broadcasts 1:45-3:15 p. m.

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

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

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

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

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., eve'g & early a. m.

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, late evening

9860 kc. ★EAQ
-B- 30.43 meters
P. O. Box 951
MADRID, SPAIN
Daily except Saturday and Sunday,
5:15-7 p. m.; Saturday, 12 N.-2
p. m., 5:15-7:30 p. m.; Sunday,
5:15-7:30 p. m.

9840 kc. JYS
-C- 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., eve'g & early a. m.

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

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

9675 kc. TI4NRH
-B- 31 meters
HEREDIA, COSTA RICA

9600 kc. CT1AA
-B- 31.25 meters
LISBON, PORTUGAL
Tues. and Friday, 3:30-6 p. m.

9600 kc. YV5RMO
-B- 31.25 meters
MARACAIBO, VENEZUELA
Irregular

9600 kc. XETE
-B- 31.25 meters
MEXICO CITY, MEXICO
Irregularly, 2 p. m.-2 a. m.

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

9590 kc. ★VK2ME
-B- 31.28 meters
AMALGAMATED WIRELESS,
LTD., 47 YORK ST.
SYDNEY, AUSTRALIA
See "When to Listen in" Column

9590 kc. W3XAU
-B- 31.28 meters
NEWTOWN SQUARE, PA.
Relays WCAU
11 a. m.-6:50 p. m.

9585 kc. ★GSC
-B- 31.30 meters
BRITISH BROAD. CAST.
DAVENTRY, ENGLAND
See "When to Listen In" Column

9580 kc. VK3LR
-B- 31.31 meters
Research Section,
Postmaster Gen'ls. Dept.,
61 Little Collins St.,
MELBOURNE, AUSTRALIA
3:15-7:30 a. m. except Sun.

9570 kc. ★W1XAZ
-B- 31.35 meters
WESTINGHOUSE ELECTRIC &
MFG. CO.
SPRINGFIELD, MASS.
Relays WBZ, 6 a. m.-12 midnight

9565 kc. VUB
-B- 31.36 meters
BOMBAY, INDIA
11 a. m.-1 p. m., Wed., Sat.

9560 kc. ★DJA
-B- 31.38 meters
GERMAN S-W STATION,
BROADCASTING HOUSE, BERLIN
8-11 a. m., 5-8:15 p. m.
also 4-5:30 a. m. Sundays

9540 kc. LCL
-B- 31.45 meters
JELOY, NORWAY,
Relays Oslo 10 a. m.-4 p. m.

9530 kc. ★W2XAF
-B- 31.48 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY 6:45-10 p. m.
Sundays 6:45-11:30 p. m.

9510 kc. ★GSB
-B- 31.55 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

9510 kc. ★VK3ME
-B- 31.55 meters
AMALGAMATED WIRELESS,
Ltd.
G. P. O. Box 1272L.
MELBOURNE, AUSTRALIA
Wed., 5-6:30 a. m.; Saturday,
5:00-7:00 a. m.

9510 kc. YV3RC
-B- 31:55 meters
CARACAS, VENEZUELA
Irregularly

9415 kc. PLV
-C- 31.87 meters
BANDOENG, JAVA
Phones Holland, 7:40-9:40 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

9020 kc. GCS
-C- 32.26 meters
RUGBY, ENGLAND
Calls N.Y.C., evenings

8920 kc. GCX
-X- 33.63 meters
RUGBY, ENGLAND

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

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

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

8560 kc. WOY
-C- 35.05 meters
LAWRENCEVILLE, N. J.

8380 kc. IAC
-C- 35.8 meters
PIZA, ITALY

8214 kc. HCJB
-B- 36.5 meters
QUITO, ECUADOR
7:14-10:15 p. m. except Monday

8185 kc. ★PSK
-C- 36.65 meters
RIO DE JANIERO, BRAZIL
7-7:30 p. m.
Relays PRA3

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.

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

7400 kc. HJ3ABD
-B- 40.54 meters
BOGOTA, COLOMBIA
Daily, 12-1 p. m., 8-11 p. m.
Sunday, 5-9 p. m.

7150 kc. HJ4ABB
-B- 41.6 meters
MANIZALES, COLOMBIA
Various times during evening

6977 kc. EAR110
-B- 43 meters
MADRID, SPAIN
Tues., Sat., 5:30 p. m.

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

6860 kc. KEL
-X- 43.70 meters
BOLINAS, CALIF.
Tests irregularly

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

6666 kc. ★HC2RL
-B- 45.00 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- 45.1 meters
PIZA, ITALY
Calls ships, evenings

6611 kc. RW72
-B- 45.38 meters
MOSCOW, U. S. S. R.
1-6 p. m.

6500 kc. HJ5ABB
-B- 46.14 meters
MANIZALES, COL.
7-10 p. m.

6447k c. ★HJ1ABB
-B- 46.53 meters
BARRANQUILLA, COL., S. A.
P. O. BOX 715,
11:45 a. m.-12:45 p. m.,
7-9:30 p. m.; Sun., 2-6 p. m.

(Time given is Eastern Standard Time)

6425 kc. ★W3XL
-X- 46.70 meters
NATIONAL BROADCASTING CO.
BOUND BROOK, N. J.
Tests irregularly.

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.

6275 kc. HJ3ABF
-B- 47.81 meters
BOGOTA, COLOMBIA
7-11 p. m.

6272 kc. HI1A
-B- 47.84 meters
P. O. BOX 243, SANTIAGO, DOMINICAN REP.
11:40 a. m.-1:40 p. m. 7:40-9:40 p. m.

6150 kc. ★CJRO
-B- 48.78 meters
WINNIPEG., MAN., CANADA
8-11 p.m.; 11:30 p.m.-12:30 a.m.

6150 kc. ★YV3RC
-B- 48.78 meters
CARACAS, VENEZUELA
Generally 4:00-10:00 p. m.

6140 kc. ★W8XK
-B- 48.86 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
Relays KOKA
4:30 p. m. midnight

6130 kc. ZGE
-B- 48.94 meters
KUALA LUMPUR, FED. MALAY STATES
Sun., Tue. and Fri., 6:40-8:40 a. m.

6122 kc. JB
-B- 49 meters
JOHANNESBURG, SOUTH AFRICA
Daily except Sat. and Sun., 11:45 p. m.-12:30 a. m., 4-7 a. m., 9 a. m.-3:30 p. m. Sat., only, 4-7 a. m., 9 a. m.-4:45 p. m. Sun., only, 11:45 p. m.-12:30 a. m., 8-10:30 a. m. and 12:30-3 p. m.

6120 kc. ★W2XE
-B- 49.02 meters
ATLANTIC BROADCASTING CORP.,
485 MADISON AVE., N. Y. C.
Relays WABC, 5-10 p. m.

6112 kc. ★YV2RC
-B- 49.08 meters
CARACAS, VENEZUELA
Sundays, 9-11:30 a. m.; 1:30-10:30 p. m.; Weekdays, 11:30 a. m.-1 p. m., 5:30-9:30 p. m.

6110 kc. ★VE9HX
-B- 49.10 meters
HALIFAX, NOVA SCOTIA
9:30 a. m.-1 p. m.; 6-12 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.

6100 kc. ★W3XAL
-B- 49.18 meters
NATIONAL BROADCASTING CO.
BOUND BROOK, N. J.
Relays WJZ
Monday, Wednesday, Saturday, 5:30 p. m.-12 midnight

6100 kc. ★W9XF
-B- 49.18 meters
DOWNERS GROVE, ILL.
Relays WENR, Chicago
Tuesday, Thursday, Friday, 3:30-7:00 p. m.; 8:30 p. m.-1 a. m. Sunday, 3:30-6 p. m.; 8 p. m.-1 a m.

6095 kc. ★VE9GW
-B- 49.22 meters
BOWMANVILLE, ONTARIO, CANADA
Sunday 10:30 a. m.-7 p. m.; Monday-Wednesday, 1-10 p. m.; Thursday, 2-11 p. m.; Friday, Saturday, 6 a. m.-11 p. m.

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, 10:30 a. m.-8 p. m. and Tues., Thurs., Sat., 3-11 p. m.

6075 kc. XEBT
-B- 49.4 meters
MEXICO CITY, MEX.
P. O. Box 79-44
7 p. m.-1 a. m.

6072 kc. OER2
-B- 49.41 meters
VIENNA, AUSTRIA
Mon. and Thurs., 9 a. m.-1 p. m., 2-3:30 p.m.

6070 kc. ★YV5RMO
-B- 49.42 meters
MARACAIBO, VENEZUELA
Between 5 and 10 p. m.

6070 kc. VE9CS
-B- 49.42 meters
VANCOUVER, B. C., CANADA
Fri., 12:30-1:45 a. m.; Sun., 12 noon-12 midnight

6065 kc. HIX
-B- 49.46 meters
SANTO DOMINGO, DOMINICAN REPUBLIC
Tues. and Fri., 8-10 p. m.; Sun., 7:45-10:40 a. m., 3-5 p. m. Sat., 10:40-11:40 p. m.

6060 kc. OXY
-B- 49.50 meters
SKAMLEBOAEK, DENMARK
1-6:30 p. m.; also 8-9 a. m. Sunday

6060 kc. ★W8XAL
-B- 49.50 meters
CROSLEY RADIO CORP.
CINCINNATI, OHIO
Relays WLW Irregularly

6060 kc. VQ7LO
-B- 49.50 meters
IMPERIAL AND INTERNATIONAL COMMUNICATIONS, Ltd.
NAIROBI, KENYA, AFRICA
Mon., Wed., Fri., 5:45-6:15 a. m., 11 a. m.-2 p. m. Tues., 3-4 a. m., 11 a. m.-2 p. m., Thurs. 8-9 a. m., 11 a. m.-2 p. m., Sat., 11 a. m.-3 p. m., Sun., 10:50 a. m.-2 p. m.

6060 kc. PK1WK
-B- 49.5 meters
BANDOENG, JAVA
Daily exc. Fri., 5:30-6 a. m.

6060 kc. W3XAU
-B- 49.50 meters
NEWTOWN SQUARE, PA.
Relays WCAU, Philadelphia
7 p. m.-10 p. m. Irregular

6040 kc. W1XAL
-B- 49.67 meters
BOSTON, MASS.
Very irregular

6025 kc. CQN
-B- 49.79 meters
MACAO, CHINA
Mon., Fri., 7-9 a. m.

6020 kc. ★DJC
-B- 49.83 meters
GERMAN S-W STATION
BROADCASTING HOUSE, BERLIN
12:15-4 p. m., 8:45-10:30 p. m.

6012 kc. ZHI
-B- 49.9 meters
RADIO SERVICE CO.,
20 ORCHARD RD.,
SINGAPORE, MALAYA
Mon., Wed., Thurs., 5:40-8:10 a. m.; Sat., 12:10-1:10 a. m., 10:40 p. m.-1:10 a. m. (Sunday)

6005 kc. VE9DN
-B- 49.96 meters
CANADIAN MARCONI CO.
DRUMMONDVILLE, QUEBEC
Sat., 11:30 p. m.

6000 kc. EAJ25
-B- 50 meters
BARCELONA RADIO CLUB,
BARCELONA, SPAIN
3:30-4:30 p. m., Saturday

6000 kc. RW59
-B- 50 meters
MOSCOW, U. S. S. R.
4-6 p. m., daily

6000 kc. YV4RC
-B- 50 meters
CARACAS VENEZUELA
7:30-9:30 p. m.

5970 kc. HVJ
-B- 50.26 meters
VATICAN CITY (ROME)
2-2:15 p. m., daily. Sun., 5-5:30 a. m.

5930 kc. HJ4ABE
-B- 50.6 meters
MEDELLIN, COLOMBIA
Mon., 7-11 p. m.; Tues., Thurs., Sat., 6:30-8:00 p. m.; Wed. and Fri., 7:30-11:00 p. m.

5900 kc. HJ2ABC
-B- 50.85 meters
CUCUTA, COL.
11 a. m.-12 n., 6-9 p. m.

5853 kc. WOB
-C- 51.25 meters
LAWRENCEVILLE, N. J.
Calls Bermuda, nights

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

5660 kc. HJ5ABC
-B- 53 meters
CALI, COLOMBIA
8-10 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

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

4752 kc. WOY
-C- 63.1 meters
LAWRENCEVILLE, N. J.

4320 kc. G6RX-GDB
-C- 69.44 meters
RUGBY, ENGLAND
Tests, 8-11 p. m.

4273 kc. RW15
-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

4272 kc. WOY
-C- 70.22 meters
LAWRENCEVILLE, N. J.

4107 kc. HCJB
-B- 73 meters
QUITO, ECUADOR
7:14-10:15 p. m., except Monday

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

"WHEN TO LISTEN IN" APPEARS ON PAGE 377

POLICE RADIO ALARM STATIONS

CGZ	Vancouver, B. C.	2452 kc.
CJW	St. Johns, N. B.	2416 kc.
CJZ	Verdeen, Que.	2452 kc.
KGHG	Las Vegas, Nev.	2474 kc.
KGHK	Palo Alto, Cal.	1674 kc.
KGHM	Reno, Nev.	2474 kc.
KGHO	Des Moines, Iowa	1682 kc.
KGHX	Santa Ana, Cal.	2430 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.	1674 kc.
KGPE	Kansas City, Mo.	2422 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.	1674 kc.
KGPN	Davenport, Iowa	2466 kc.
KGPO	Tulsa, Okla.	2450 kc.
KGPP	Portland, Ore.	2442 kc.
KGPQ	Honolulu, T. H.	2450 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, Calif.	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.
KGZW	Lubbock, Tex.	2458 kc.
KGZX	Albuquerque, N. Mex.	2414 kc.
KSW	Berkeley, Cal.	1658 kc.
KVP	Dallas, Tex.	1712 kc.

(*Continued on page* 356)

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

An Interesting Argument on the "Code-less" License

"Bootleg" Stations Liable to Result From Codeless License

Editor, SHORT WAVE CRAFT:

I have been intending to write you on this subject for some time but reading a letter in the August issue of your magazine brought me around to finally doing so. It is about this "code-less five meter" question.

By employing a small amount of common-sense or you might even call it psychology, one can readily see what it is all about. I believe that you claim your magazine to be for the short-wave listener. From the few copies of it which I have seen, it seems to be chiefly concerned with the latest thing in S.W. receivers. Of late, however, I have seen its pages littered with information as to how to build simple transmitters, articles concerning five meter operation, and data on the construction of five meter transmitters and receivers, mostly the latter. I don't see what use the average listener has for a five meter receiver. It doesn't seem sensible to me that he should go to the trouble of building one of the comparatively complicated receivers that you have shown just to hear perhaps, a few dozen locals. What you are doing is filling the minds of the short-wave listeners who consistently read your magazine with thoughts of how nice it would be to "get on the air" and they, thus duly inspired, build a simple transmitter, usually phone, and go on the air, not waiting to get a license. This kind of person is commonly known as a "bootlegger." I know of quite a few on 160 meters; one showed such an absence of knowledge of amateur radio as to use a call which wasn't issued until about four months afterward.

In that letter of August SHORT WAVE CRAFT, the writer states that he, living in Arkansas I think, can listen on five meters for hours at a time without hearing a signal. That's the same as taking an eighty-meter receiver down to the south-pole and wondering why there aren't more American amateurs on that band. The average five meter signal doesn't travel farther than fifty miles or so, if that much, so how does a fellow out in Arkansas where amateurs are comparatively scarce, expect to hear the band "crowded"? Perhaps a special five meter license for fellows in a situation like his wouldn't hurt anybody, but in the metropolitan districts the five meter band is plenty occupied and if such a privilege was granted, it could not be limited to those in the non-congested areas.

Suppose a special license was granted for operation on five meter phone, without a code test. After being on "five" for a short while he would probably listen on one of the other bands, and, seeing how much farther out he could reach on "20" or "75," he would promptly put a transmitter on one of those bands and join the army of "bootleggers" of which there is already a great number. I know for one thing that my call, along with a few others which I know are being regularly borrowed and operated illegally on the air. I for one would like to see this stopped.

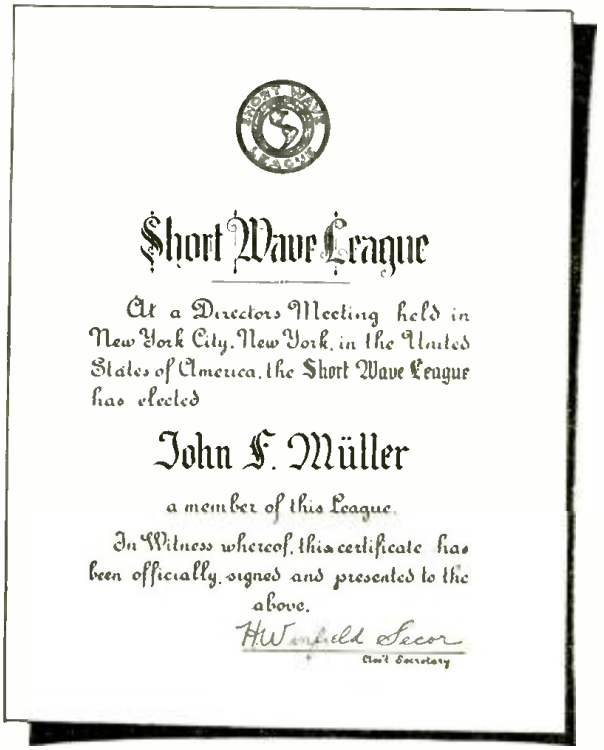
The writer of the letter in the August issue of your magazine says he knows of some radio engineers who have attained B.S. degrees and would like to get on the air, but cannot learn code, having studied it for two years. To me this sounds a bit fantastic, for a mind which has those capabilities would rarely let up on a little thing like learning the code at ten words a minute. I know of one young "ham" of sixteen who can copy 25 words per minute solid on paper and speeds up to 40 in his head and he is no genius. I rigidly believe that this codeless argument is all "bunk" and will never be attained. Why should an amateur, who has gone to the trouble of learning the code, stand for having a person getting off a lot easier and still enjoying the same privileges that he does? That is not jealousy; it is a sense of fairness. In conclusion I might say that in a recent issue of "QST" I saw the official statement of the Federal Radio Commission, squelching all rumors about a *code-less* license.

I hope to see this letter in print and get the opinion of any amateurs or others who might see it.

DAVID SCOTT, W2CLM,
245 Grove Street,
Montclair, N. J.

(From your letter, Dave, one gets the impression that SHORT WAVE CRAFT *is suggesting that its readers go on the air* WITHOUT A LICENSE. *This is absolutely not so and we surely believe that anyone so doing, should be prosecuted to the full extent of the law and we do not believe it is advisable for the rank beginner to operate a transmitter of any description. What we mean to infer is, that due to the very limited use of the code on wavelengths below 5 meters, a "code test" should not be given but a very thorough technical examination—one even more severe than that now given, with the present-day code test, should be substituted in its place. We believe in this way a lot of the "lids," as you amateurs sometimes call them, would be eliminated from the 5 meter band. A code test does not mean everything, for as this is being written, a* LICENSED AMATEUR *is heard on the 5 meter band in communication with a "bootleg" station and giving him code practice. Between the two stations which were very poorly operated, nearly the entire 5 meter band was cluttered up to the extent that hardly anyone else could get through. So you can see that a good stiff technical examination would have eliminated this disgraceful condition which existed, even though*

(Continued on page 379)



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 378—how to obtain certificate.

Get 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.

SHORT WAVE QUESTION BOX

EDITED BY

GEORGE W. SHUART, W2AMN

● Because of 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 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.

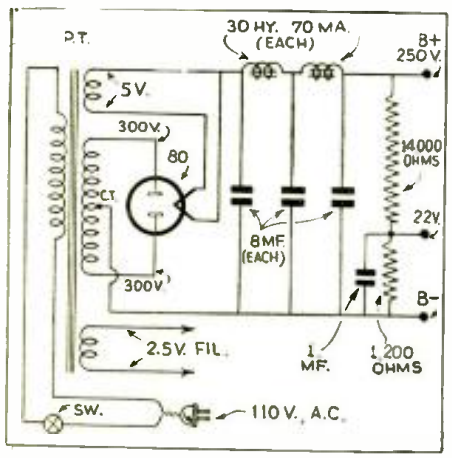
Correspondents are requested to write or print their names and addresses clearly. Hundreds of letters remain unanswered because of incomplete or illegible addresses.

LEARNING THE CODE

Charlotte Ann Page, Delray, Fla.

(Q) I know the code and can translate it, but when it comes in "on the air" I cannot make the distinction between the letters and words. I have a short-wave set and I find a great deal of it code; I am very much concerned about this matter and I hope you can help me.

(A) It takes considerable practice to become proficient in code reception and unless you have commercial training it will be quite some time before you can copy code at a fairly reasonable speed. On page 287 of the September issue there appears an article entitled, "Short Cuts in Learning the Code". Much valuable information is contained in this article and we suggest that you read it carefully.



This power supply can be used to operate 2, 3, 4 and 5-tube A.C. receivers.

POWER SUPPLY DIAGRAM

Frank Winelaw, Detroit, Mich.

(Q) Will you please print a diagram of a power-pack?

(A) A diagram for a power-supply is shown herewith. This power-supply can be used to operate any of the 2, 3, 4 and 5-tube short-wave receivers described in SHORT WAVE CRAFT.

DIAGRAM OF 3-TUBE A.C. SET

J. Block, Chicago, Ill.

(Q) Would you please publish a diagram of a 3-tube receiver using A.C. and using some of the new type tubes?

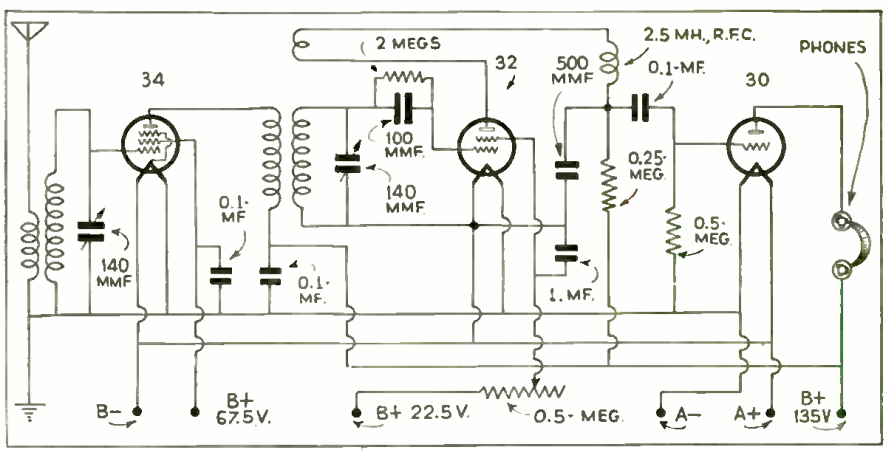
(A) Herewith you will find the 3-tube diagram using the A.C. type tubes. A power-supply delivering approximately 250 volts D.C. for the plates of the tubes and 2½ volts A.C. for the filaments will be required in order to operate this receiver. A power supply is also illustrated on this page.

3-TUBE T.R.F. SET

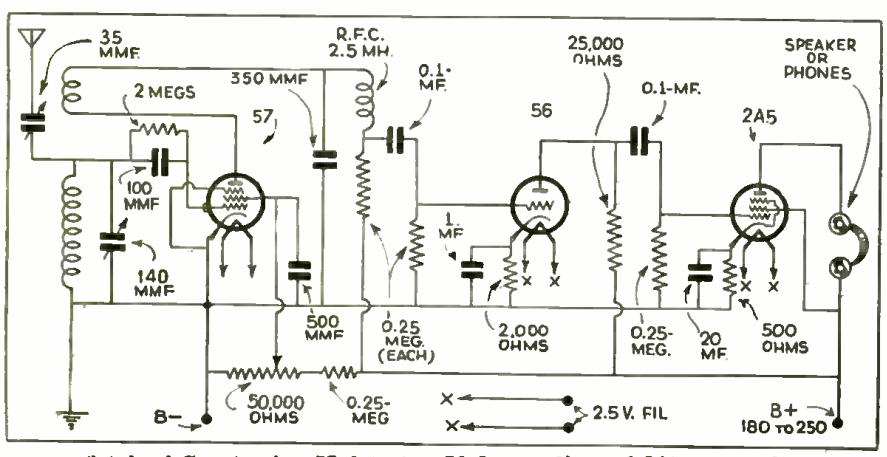
J. Huttler, Newport, R. I.

(Q) Would you be kind enough to print a diagram for a 3-tube T.R.F. receiver using a 34 for the T.R.F. stage, a screen-grid detector using a 32, and an audio stage using a 30. I think that many fans would appreciate this receiver.

(A) We are pleased to print your diagram. This set should be very sensitive and all the short-wave "broadcast" (voice and music) stations will be received with good quality and volume.



Above—Diagram of 3-tube battery-operated receiver, using the two-volt tubes.



3-tube A.C. set using 57 detector, 56 first audio, and 2A5 output for loud speaker operation.

PARTS VALUES

T. J. Tracy, Superior, Wisc.

(Q) I am building the 2-tube Doerle receiver using type 30 tubes. I do not know the capacity of the regeneration control and wondered whether you would please tell me, also the capacity of the R.F. choke.

(A) The capacity of the condensers usually used in short-wave receivers is .00014 mf. This size condenser can be used in conjunction with coils constructed according to the data given in the "Question Box" of the July issue. Radio-frequency choke coils for short-wave work can be anywhere from 2.5 to 5 millihenries.

OFFICIAL PRESS AND WEATHER REPORTS

W. H. Williams, Albuquerque, N. Mex.

(Q) Can you advise me if there are any phone stations providing the same service as NAA and other similar stations with press, weather reports, news, stocks, etc. If so, please list these for me?

(A) So far as we know the service performed by NAA is not being duplicated by a phone broadcast station. However, most of the present day "broadcast" stations give the weather, press, and stock reports, together with the time. NAA is used particularly for marine service.

THE OSCILLODYNE

L. Bentzen, Avon-by-the-Sea, N. J.

(Q) I have heard how wonderful the *Oscillodyne 1-Tube Wonder Set* really is. People actually get "foreign" stations. As I have not the plans to this wonderful set and have no means of getting them I would appreciate it very much if you would print the diagram. A friend told me that he used the plans of the set printed in the April, 1933, issue of SHORT WAVE CRAFT.

(A) The Oscillodyne receiver diagram was published in the "Question Box" of the March issue. We believe if you refer to this diagram you will have no trouble in getting the set to work properly.

"EASY TUNE" RECEIVER

C. Kopusainaki, Cleveland, Ohio.

(Q) The Victor "Easy Tune" 2-tube band spreader described in the June issue of 1934 calls for a filament choke. How many turns of wire in each pie?

(A) There are 27 turns in each section of the special filament choke used in Mr. Victor's "*Easy Tune*" receiver. Present day 2½ millihenry radio-frequency chokes such as National, Hammarlund, etc., can be used in place of the choke described by Mr. Victor.

Short Wave Stations of the World

(*Continued from page* 353)

VYR	Montreal, Can.	1712 kc.
VYW	Winnipeg, Man.	2416 kc.
WCK	Belle Island, Mich.	2414 kc.
WEY	Boston, Mass.	1558 kc.
WKDT	Detroit, Mich.	1558 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.
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.	2450 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.	2382 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.	2422 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	Arlington, Mass.	1712 kc.
WPES	Saginaw, Mich.	2442 kc.
WPET	Lexington, Ky.	1706 kc.
WPEW	Northampton. Mass.	1666 kc.
WPFA	Newton, Mass.	1712 kc.
WPFC	Muskegon, Mich.	2442 kc.
WPFD	Highland Park, Ill.	2430 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	Swathmore, Pa.	2474 kc.
WPFR	Johnson City, Tenn.	2470 kc.
WPFS	Asheville, Md.	2458 kc.
WPFU	Portland, Me.	2422 kc.
WPFV	Pawtucket, R. I.	2466 kc.
WPFX	Palm Beach, Fla.	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	1682 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	Binghampton, N. Y.	2442 kc.
WPGN	South Bend, Ind.	2490 kc.
WPGO	Huntington, N. Y.	2490 kc.
WPGS	Mineola, N. Y.	2490 kc.
WRBH	Cleveland, Ohio	2458 kc.
WRDQ	Toledo, Ohio	2474 kc.
WRDR	Grosse Pt. Village, Mich.	2414 kc.
WRDS	E. Lansing. Mich.	1666 kc.

AIRPORT RADIO Stations

AERONAUTICAL (AIRPORT) FREQUENCIES

	(Red Chain)	
3,147.5	3,322.5	5,582.5
3,162.5	5,122.5	5,592.5
3,172.5	5,572.5	5,662.5
3,182.5		
	(Blue Chain)	
2,906	4,937.5	4,952.5
3,072.5	4,967.5	5,672.5
3,088		5,692.5
2,720	6,510: Day only	
2,732	6,520: Day only	
4,110	6,530: Day only	
	8,015: Day only	
	(Brown Chain)	
3,127.5	4,917.5	3,005
3,222.5	5,602.5	2,854
3,232.5	5,612.5	5,377.5
3,257.5	5,632.5	
3,447.5		
3,457.5		
3,467.5		
3,485		
2,640	4,740	6,540
2,644		6,550
2,612		6,560
2,636		8,015
3,467.5		
	(Green Chain)	
2,922	4,122.5	
2,946	5,652.5	
2,986		
2,748	6,590	
4,745	6,600	
	(Orange Chain)	
2,870	5,375	8,220
3,082.5	5,405	12,330
	5,692.5	16,440
2,648	6,570	
3,082.5	6,580	
5,375	8,015	
	16,240	

The various transport companies are assigned frequencies for their use and each transport company's network is given a certain code color.

TELEVISION Stations

1600-1700 kc. **176.5-187.5 m.**

W2XR—Long Island City, N. Y.
W8XAN—Jackson, Mich.

2000-2100 kc. **142.9-150 m.**

W9XAO—Chicago, Ill.
W6XAH—Bakersville, Cal.
W9XK—Iowa City, Iowa

2100-2200 kc. **136.4-142.9 m.**

W2XBS—New York, N. Y.
W6XS—Los Angeles, Calif.
W9XAP—Chicago, Ill.
W9XAK—Manhattan, Kans.

2200-2300 kc. **130.4-136.4 m.**

W9XAL—Kansas City, Mo.

2750-2850 kc. **105.3-109.1 m.**

W9XG—W. Lafayette, Ind.

43.000-46.000 kc. **6.52-5.98 m.**
48.500-50.300 kc. **6.00-6.20 m.**
60.000-80.000 kc. **3.75-5.00 m.**

W9XD—Milwaukee, Wis.
W9XE—Marion, Ind.
W8XF—Pontiac, Mich.
W3XAD—Camden, N. J.
W2XR—Long Island City, N. Y.
W9XAT—Portable
W2XF—New York, N. Y.
W6XAO—Los Angeles, Calif.
W3XE—Philadelphia, Pa.
W2XAK—New York, N. Y.
W10XX—Portable and Mobile
W8XAN—Jackson, Mich.
W8XI.—Cuyahoga, Heights, Ohio

New York Police Stations Get S-W Receivers

The New York City Police Department has begun the installation of short-wave radio sets in every precinct in the city. The sets are similar to the short-wave receivers in use in police radio cars and are being placed directly behind the lieutenant's desk. The first installation was made in the Sheriff Street station house.

The innovation is intended, it was said, to enable the lieutenants on desk duty to send one or more patrolmen to the locality from which an alarm has come, even before the radio car responding to the alarm has reported. The lieutenant will also be able to inform the detectives of the precinct if this seems advisable.

Police radio experts have recently been carrying on experiments on short-wave sets mounted on police motorcycles with side cars.

Quincy, Mass., Has 2-Way Radio

The first city in New England to put two-way police radio system into operation, Quincy, Mass., recently had one cruising car out on the road in constant two-way communication, and announcement was made that even the *patrol wagon* is going to have *two-way radio.*

While other police departments have confined the radio system to cruising cars, Quincy intends to have the patrol wagon constantly in touch with the station, and those being given a ride to the station will be fittingly announced by air before they step before the desk to be booked.

The station is known as *W1BVL*, and operates on 7.5 *meters.*

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(s) H. H. PEEBLES,
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Cleveland, Ohio.

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Verly truly yours,
(s)LOUIS SCHMADELBECK
Beaver Dam, Wis.

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Dear Mr. Gernsback:
I am in receipt of the 1934 OFFICIAL SHORT-WAVE RADIO MANUAL, and wish to state after looking it over I think it is one of the finest Manuals I ever saw published on Short Waves, and I certainly wish to congratulate you on your effort of compiling such a fine Manual. It is sure filled full of good Radio Material, and I am proud of my Manual.

It is worth quite a bit more than what you ask for it.

FERREL THOMAS,
1328 Locust Street,
St. Louis, Mo.

"GLAD TO OWN ONE"

Gentlemen:—
I received my "SHORT WAVE RADIO MANUAL" and it is a real joy to read and study the book. I waited long for it, but it was worth waiting for.

I am introducing it around to all of my friends, and I am glad to own one of these books.

Yours respectfully,
(s) VINCENT KRAJNAK,
100 West 119th Street,
New York City.

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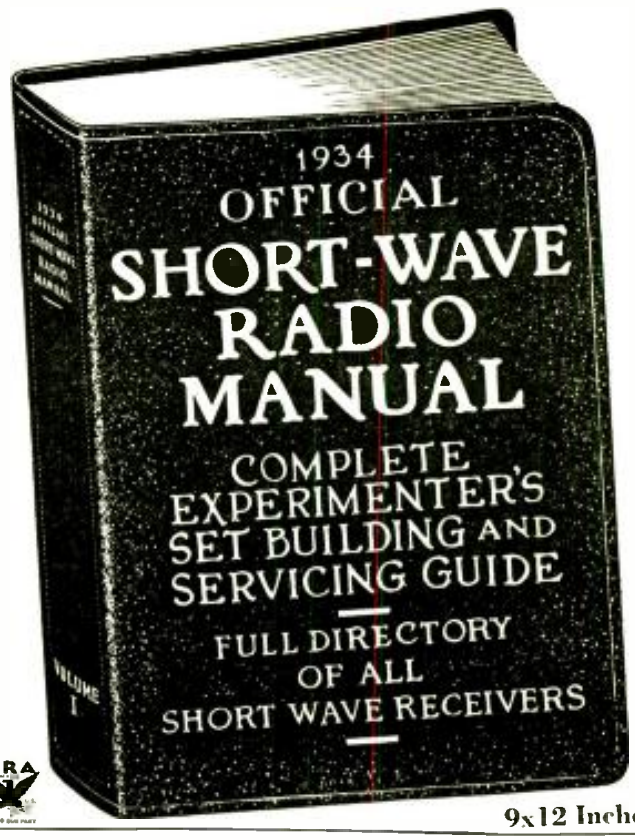
- A section on Amateur 'Phone Transmitters and how to build them.
- A Short-Wave Physics section on theoretical short-wave data for the advanced experimenter and radio student.
- A most interesting section on Super-Regeneration in Short-Wave Receivers.



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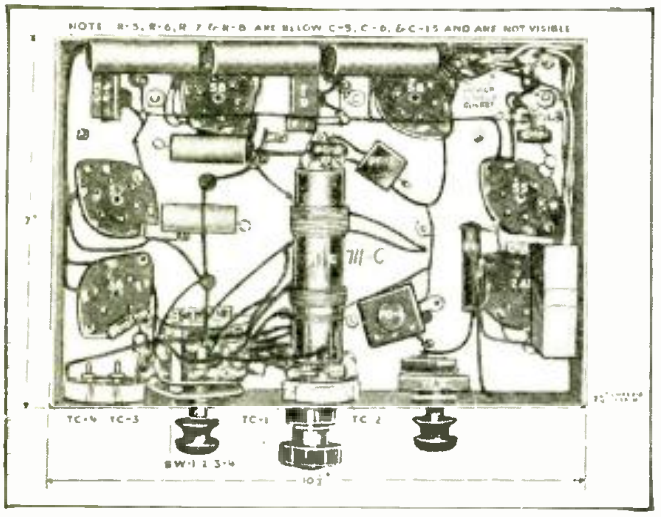
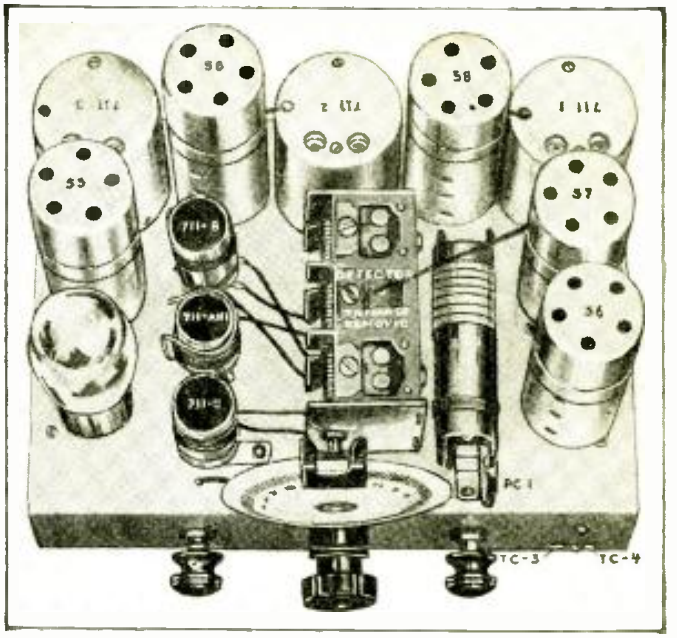
The MILLER All-Wave Super-Het



Bottom view of the All-Wave Superhet receiver.



Looking down on the All-Wave Superhet.

(*Continued from page* 343)

allows a degree of selectivity in the signal tuning circuits that is impossible when a smaller capacity is used, the added selectivity being due, of course, to the fact that less inductance and consequently less resistance is in the circuit at any particular frequency.

As a general rule, it is conceded that to be efficient on the *high-frequency* bands a receiver will of necessity prove inferior on the broadcast band, or vice versa. Here again we find this to be an error and, in fact, there is absolutely no reason why an *all-wave* receiver can not be as efficient on one band as another.

The receiver shown in the accompanying photographs is the result of many months of exhaustive tests in the laboratory and in actual *short-wave* and *broadcast* "distance" reception. The receiver is so smooth in operation that even those who are as yet uninitiated in the art of short-wave tuning can enjoy the thrill of listening to foreign programs. The reception on the broadcast band is surpassed by no other receiver I have had the privilege of testing. It is usually customary to print a long list of stations that have been received on any new receiver, but it is my contention that a receiver of worthwhile design does not require any such superfluous statements. Practical design and choice of efficient component parts determine the ultimate performance of any receiver.

The most important items in a short-wave receiver or, for that matter, in any receiver, are the *coils* employed. First-class performance can be obtained only when the coils are especially designed for the particular receiver desired, and if purchased in manufactured form they should be the highest quality product available. The J. W. Miller Company have prepared a kit of coils for this receiver, which also contains the oscillator padding condensers and other parts as listed at the close of this article.

Before a wire has been soldered or a part mounted on the chassis, close attention should be given the following details:

The parts selected should be of first quality and should correspond in physical size as nearly as possible to those shown in the photo.

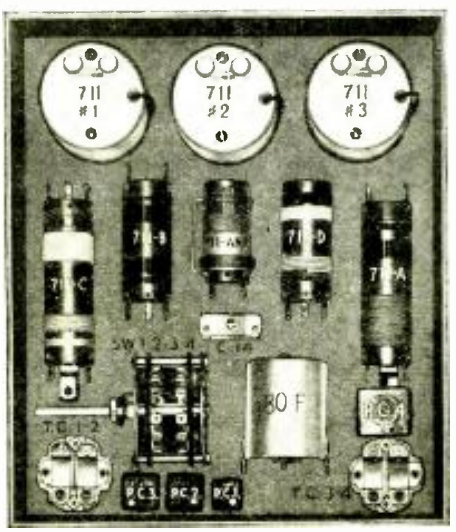
The parts employed should be laid out in the manner shown on the chassis layout.

In wiring the receiver, solder each joint carefully, using rosin core solder only.

All leads in the wave-band switch must be kept as short as possible, and all wires separated in order to reduce the stray capacities between them. This is of utmost importance.

If the coils and switch are mounted in the positions as shown, stray capacities are reduced to a minimum and no *dead-spots* will occur. It must be remembered that inductive coupling must also be avoided. You will observe from the photos the only coils in inductive relation are those whose natural periods do not fall in the following tuning range. For instance, the broadcast antenna coil is always tuned to some point in the broadcast band, as it is never disconnected from the variable condenser. Likewise, the 75 to 200 meter coils do not resonate within the 12 to 35 band. Furthermore, it is important that all leads in the tuned circuits correspond as nearly as possible in length to those shown in the chassis layout. Otherwise, the oscillator and detector circuits will not track. This is particularly true of the high frequency band. No particular lengths will be given; the important thing is to keep the chassis layout as nearly as possible to that shown, and then place each wire in such a position as to keep it at a minimum length. Another important item is to make all ground returns as short as possible. If these precautions are taken, there will be absolutely no dead-spots at any point.

While this may sound complicated, it is really very simple. As may be observed from the photographs, the leads to the No. 711B and No. 711C Coils, which are mounted on top of the chassis, do not pass through the chassis directly below the coils, *but are passed through individual holes drilled in the chassis* near the variable condenser. This simple precaution adds greatly to the efficiency of the completed receiver by reducing the stray capacities between those leads and coil No. 711C, which is mounted below the chassis.



Coil and Band-Switch "kit" for Super-Het, which also includes "I.F." transformers and padding condensers.

One of the most advanced features incorporated in this receiver is the use of high-impedance coupled antenna coils on all bands with the exception of the 75-200 meter band. This type coupling offers distinct advantages *inasmuch as it allows the oscillator coils to be padded and each band individually trimmed, eliminating the necessity of a panel-operated trimmer. This will be recognized as a definite step in the direction of making short-wave reception really efficient and practical.*

It is next to impossible to obtain perfect oscillator tracking when using the more conventional type antenna coupling, that is, a small capacity from antenna to the grid of the first detector. When using this method, the added capacity of the antenna circuit is directly parallel with the tuned detector circuit. However, this parallel circuit contains not only capacity, but also the inductance of the antenna, forming a series resonant circuit. The effect upon the detector circuit is a greatly distorted tuning curve. As the oscillator circuit has no such influence upon it, the sensitivity is reduced and image response is quite prominent at various points in the tuning range.

The disadvantages of this system are entirely removed in this new All-Wave receiver. The antenna primaries are designed to form a resonant circuit whose natural period is well below the received frequency. A small capacity is also provided so the effective energy transfer is equal at all frequencies. This capacity is so small as to have negligible damping effect upon the tuned circuit.

This capacity, which is in the form of an open-end turn of wire wound at the grid end of the detector coil, is not shown in the circuit, for reasons of simplicity. It is already connected to the proper lugs on the coil form; so as far as actual wiring is concerned, it need not be considered.

The 75 to 200 meter band is the only one in which high impedance antenna coupling is not employed. However, as the frequency range of this band is well below the natural period of almost any antenna installation, best results were obtained by using an aperiodic antenna primary for coupling.

The broadcast band coils are of Litz bank-wound construction, providing exceptional selectivity ahead of the first detector. Two such coils are used in a pre-selector circuit, having a low degree of mutual coupling. This is not to be confused with the usual band-pass circuits which are designed for flat-top selectivity curve. The selectivity of this arrangement is equivalent to a stage of radio frequency ahead of the first detector, and

(*Continued on page* 379)

The Traveler's D-C 6

(*Continued from page* 334)

Don't Use Junk!

One point which I like to stress, although it has been repeated before by many serious experimenters: *It does NOT PAY to build a set from "bargain" or "junk" parts,* if *noise-free* and *stable* operation, high gain per stage and life-like reproduction are the final goal of the constructor. With these points in mind, only first-grade short-wave parts like National and Hammarlund have been employed throughout the set. R.F. pentodes, type 39 have been used in the two R.F. stages and in the grid-leak type detector stage.

To compensate for capacity variations in the grid-antenna circuit of the first R.F. stage, a small antenna trimmer of 35 mmf. is shunted across the main tuning condenser of that stage. The addition of this trimmer facilitates lining-up of both R.F. stages and results in a marked sharpening of tuning of the first R.F. stage. This is very desirable in the crowded bands of 25, 31 and 48 meters, as the first R.F. stage is notorious for its broad tuning.

Why 2 Tuning Controls Are Used

The trend of the general public points to "one dial" tuning, but a real short-wave fan and experimenter will not mind if he has two or more tuning knobs to "fiddle around with" if he can get improved results in gain and selectivity over the sets employing all tuning condensers ganged to one shaft. For, no matter how well a short-wave condenser gang is lined up, the final result will be only a certain MEAN value of gain per stage, and the individual stages will get out of line due to frequency drifts. *Maximum results per stage can only be realized with individual tuning controls for each stage.*

As the detector stage is the most likely one to get out of line, a compromise was made in ganging the two R.F. stages to one dial, but employing a separate tuning control for the detector stage. This results in a far more flexible tuning arrangement when it comes to separating the different stations in the crowded 25, 31 and 48 meter bands, than can be done if all three tuning condensers were "ganged" to one shaft.

For although it may be theoretically possible to define the different stations in these bands and separate them *on paper*, it is an impossibility practically, even with an excessively sharp-tuned superhet receiver. The fact remains that there are 26 to 30 SW phone stations broadcasting in the frequency range of 1 meter with a resulting "hash" of interfering heterodyne whistles in the 48 to 49 meter band alone, and only 50 per cent of these stations can be received sufficiently clear so the listener can "enjoy" their programs. There are too many SW broadcast stations crowded into the 25, 31 and 48-49 meter bands!

Decoupling Resistors and R.F. Chokes

Decoupling resistors of 7,000 ohms are used in the R.F., S.G., circuits and R.F. chokes (National type 100) on Isolantite forms, are employed in the R.F. plate leads. Separate, cartridge-type condensers of .1 mf. are used for by-passing in the S.G. and plate circuits of the R.F. stages. Only the best *non-inductive* type of by-pass condensers should be used.

A four-prong Isolantite coil socket is used in each R.F. stage and a six-prong socket of the same material in the detector stage. Only sockets of *rugged* construction should be used, for the coil sockets are those parts which have to stand the hardest "wear and tear" due to the frequent coil changes when switching from one wave band to another. A high percentage of "static-like" crackling, erratic performances and "fading" can be traced directly to ill-fitting and worn-out coil sockets because the springs in a cheaply constructed socket make poor contacts after a short period of operation.

Adjusting Detector Stage

The 39 R.F. pentode tube makes an excellent grid-leak detector and oscillator. Regeneration control by means of the S.G.

rheostat (R) of 50,000 ohms is very smooth down to 12 meters. To avoid long leads between this resistor and the detector tube elements, the resistor was placed close to the detector socket and fastened to the chassis by a bakelite support. The rheostat is operated from the front panel by a hard-rubber or bakelite rod, which is connected to the metal shaft of the resistor by a brass coupling. The main points to remember when adjusting the detector stage for the most efficient point of sensitivity and oscillation are: To get the detector tube oscillating smoothly over the range of the particular wave band with the *least plate voltage*, the *least number of turns* in the tickler winding, and the *least voltage* at the detector screen grid. Not more than 3 to 5 tickler turns, 15 volts on the plate and 20 volts on the S.G. of the detector are needed to obtain the best operating conditions for that stage.

The remainder of the R.F. and Detector stages is self-explanatory and no difficulties should be encountered if the diagram is followed carefully. The writer tried a high grade S.G. plate-coupling impedance in the plate of the detector in place of the .5 meg. resistor, as well as a type 36 S.G. tube in place of the 39, but the final arrangement shown gave far better results.

A.F. Booster Stage

There follows the A.F. booster stage with its 37 automotive type tube, resistance-coupled to the detector stage. The 37 works into the push-pull 48 power output stage through the PP (push-pull) input transformer (Tr). These two 48 output tubes give 100 mills (M.A.), 3 watts in the output, with a tremendous volume, and only 95 volts on their plates.

The large heater surfaces of the 48 tubes generate quite an amount of heat; for this reason one should place the receiver in a location where there is sufficient cool air circulation. For the same reason the two 48 tubes and the 37 were not enclosed in the metal cabinet with the three 39 tubes.

The loud-speaker is an 8 inch diameter dynamic speaker. Its field resistance is 75 ohms and is excited by the heater current of .4 amps. The speaker is coupled to the plates of the 48 tubes by a properly matched output transformer.

Power-Pack Line Filter

The D.C. line filter of the power-pack consists of the choke CH2, valued at 30 henries, 180 ohms and 60 ma.; the filter condensers C9 and C10 of 8 and 4 mf. The components of the power-pack are assembled on a wood base and enclosed in a metal cabinet measuring 10" long, 4" wide and 5" high. This metal cabinet was reconstructed from an old B-eliminator box.

All heaters are connected in series, with the 48 type tubes placed at the positive end of the D.C. line. The heaters of the 48 type tubes operate on 30 volts at .4 amps., and the 39 type tubes are of the 6.3 volts heater type, with a current consumption of only .3 amps. The excess current of 1 ampere, drawn by the 48 tubes has to be shunted across the heaters of the type 39 tubes; this is accomplished by the heater shunt resistor (R8) of 240 ohms. The remainder of the 110 volts is utilized to excite the speaker field of 75 ohms, which is in series with the heaters. The voltage for one of the 6.3 volt pilot bulbs is also taken off across one portion of the heater shunt resistor, while the second pilot bulb obtains its voltage across the resistor (R4) in series with negative D.C. line. This method of obtaining the voltages of the pilot bulbs across resistors is safer than the method of connecting the pilot bulbs directly across one of the heaters of the 39 tubes to dissipate the excess current of .1 ampere at the same time. For, if one of the pilot bulbs burns out the entire .4 amps. flow through the .3 amps. heater and will cause a detrimental increase of heater voltage across the 39 tube.

The ground return leads of all circuits and the negative side of the D.C. line are not connected at random to the aluminum chassis, but are fastened to a No. 12 bus bar wire, which is run the entire length below the chassis. This bus bar is insulated from the chassis by bakelite supports and then connected to the external ground through

the ground blocking condenser. The chassis is connected to both ends and the center of the bus bar by similar bus bar wire. This method restricts the R.F. currents to well pre-defined paths and results in improved selectivity. For the latter reason the cathode returns of each main tuning condenser, that is the rotor parts, are also insulated from the metal chassis by bakelite supports and from the metal drum dials by 1" long hard rubber rods. The rods are fastened to the condenser shafts with the usual brass couplings. The cathode returns of the tuning condensers are run directly to the ground bus bar wire.

The B positive plate supply lead of the two R.F., the detector and the 1. A.F. stages, the negative B and both heater terminals are connected to a five-prong power supply socket at the rear of the chassis. The three speaker terminals, consisting of the positive B supply to the 48 tubes, and the two plate connections to the output transformer, are connected to a similar four-prong socket, also at the rear of the chassis. Both these sockets are connected to the power-pack with plug and cables. All connections in the chassis, with the exception of the heater leads, are made with bus bar wire and spaghetti (insulation sleeving) covered. The heater leads have a heavy rubber insulation.

Due to the fact that the heaters of the two 48 tubes require a much longer time to heat up to their proper operating values than do the type 39 and 37 tubes, the 6.3 volts tubes will indicate a starting voltage of 7-9 volts for about 20 seconds. As soon as the heaters of the 48 tubes have reached their proper temperature and potential of 30 volts, the heater voltages of the 6.3 volts tubes will have gradually decreased to their normal operating voltages of 5-6.3 volts. The writer has operated this receiver with the higher heater starting voltages for the last 8 months and no damaging effects have been noticed. The performance of the tubes remained normal, which is in strict accordance with the claims of tube manufacturers for this type of tubes.

There is no danger of having an excess voltage on the heaters as the 110 volts of the supply line are utilized completely by the heaters in series and the speaker field. Rather the opposite, a lack of sufficient heater voltages may be encountered. A so-called 110 volt D.C. line will supply only 95 to 100 volts, or as I experienced, the speaker field resistance, though labelled 75 ohms, checked up as high as 85 or even 100 ohms. In both cases there would not be sufficient heater voltages. But by shunting a resistance of 75 to 100 ohms across the speaker field, the mean resistance of the speaker field will be cut into half and with it the voltage drop across the field. The "rescued" voltage can be added to the total heater consumption. This manipulation will decrease the amount of excitation current flowing through the speaker field from 400 ma. to around 200 ma., which was found quite ample for excellent speaker performance.

Finally, I like to add, in order to obtain precision results from an "all-electric" receiver, one has to employ precision measuring instruments when adjusting the proper voltages in the receiver. And last, a good habit to cultivate is, to check every component of the receiver for its electrical continuity before assembling it into the receiver. This procedure will save many hours otherwise spent in hunting down troublesome parts.

Construction Remarks

The construction of the set should offer no difficulties. The front panel of 1/16" aluminum measures 14½" long and 8" high. The sub-panel of the same material measures 14½" long, 10" deep and 2" high. National coil shield cans of 3" diameter are used, and changing of coils is accomplished from the front panel. To assemble the coil sockets into the cans and assemble the latter to the front panel proceed as follows: Drill two ⅛" holes into the top of the shield cans so that the sockets are centered in the cans. Then drill 4 holes of ⅛" diameter into the sides of the cans, so that the wire leads from the coil sockets can be pulled through easily, and six similar holes into the detector can. After these leads of flexible,

rubber covered wire, 10" long, have been soldered to the coil sockets, they are started through their proper holes in the can. Then the coil socket is fastened inside the top of the can with two 1/8" machine bolts, 1½" long; over these bolts have been slipped brass sleeves 1" long. These sleeves determine the distance of the coil socket from the top of the shield can. Then four equally spaced holes of 1/8" are drilled on the bottom rim of the coil can and corresponding holes drilled in the front panel so that the rims of the cans will be just flush with the top of the front.

Front Panel

To give the front panel additional rigidity, the two outer coil cans are anchored with their socket ends to the subpanel by pieces of 1/8" bakelite measuring 5" long and 2½" wide. These pieces are fastened to the top of the cans with the same bolts which hold the sockets to the cans. Small angle brackets of aluminum 1/2" by 1/2" and 2½" long fasten the pieces of bakelite to the subpanel. These pieces of bakelite also serve as insulating supports for the main tuning condensers of the first R.F. and detector stage, with the condensers attached to them vertically. A smaller piece of bakelite 2½" by 2" serves as support for the tuning condenser of the second R.F. stage located in the center of the chassis.

Looking at the front panel, the knob at the lower left controls the R.F. bias and the volume, the control above this is the 35 mmf. compensating condenser of the first R.F. stage. To the right we see the tuning dial which operates the second R.F. stages, the next dial to the right tunes the detector stage, and the knob at the extreme lower right is the regeneration and sensitivity control, located in the S.G. circuit of the detector. Starting from the left, the coils in the shield cans are the antenna, first R.F. coil, second R.F. and the detector coil.

$20.00 PRIZE MONTHLY FOR "BEST" 1-TUBE SET

Or other short-wave set article accepted and published. Send diagram first or set if you prefer.

Sets must be sent PREPAID and should be CAREFULLY PACKED in a WOODEN box!

The closing date for each contest is sixty days preceding date of issue (Oct. 1 for the December issue, etc.). In the event of a "tie" an equal prize will be paid to each contestant so trying.

The judges will be the editors of SHORT WAVE CRAFT, and George Shuart and Clifford E. Denton, who will also serve on the examining board. Their findings will be final.

Address your entries to:

Editor,
SHORT WAVE CRAFT,
99-101 Hudson St.,
New York City.

Coil Data

A table with coil data is given, but any other type of good short-wave coils can be used. All coils are wound on National R-39 coil forms. The primaries and secondaries of the coils covering 19.5 to 38 meters, and 38 to 80 meters, are closely interwound. This type of winding results in somewhat improved selectivity over the space wound type if used over the same wave bands. The coils covering 12 to 21 meters are space-wound 5 turns to the inch. Excellent results over long distances were obtained with coils covering the broadcast band. This ship leaves distances of up to 2,000 miles to the nearest American B.C. (broadcast) station, so the wavelength was chosen as to include mainly the powerful stations of 5 to 50 k.w., which are found between 250 to 480 meters. Of course, anybody interested in any additional wavelengths can wind his coils accordingly. The secondary of the "B.C." coils, beginning at the top of the form with the grid end, are bank-wound in three layers with No. 32 D.S.C. wire for 125 turns, then continuing with a space of ¼" from the bank layer, thirty turns are wound single-layer. Over this closely wound cathode end of the sec-

ondary are wound three layers of empire cloth, to give the proper spacing between the secondary and the primary, which consists of 30 turns of No. 32 D.S.C. wire wound closely over the empire cloth.

COIL TABLE

	Pri.	Sec.	Tickler	
Wavelength	L1	L2	L3	
12- 21 meters	4**	5*	3	No. 36E
20- 40 meters	5**	9***	4	
38- 80 meters	9**	17***	5	
250-180 meters	30	155	55	

* No. 16E (Enamel).
** No. 22 D.S.C.
*** No. 18E.
"B.C." Coil—All No. 32 D.S.C.

Marvellous Reception

The list of stations received with this set, and with *tremendous speaker* volume, is too long to be repeated. World major SW stations come in like "locals"! In a position just off the coast of Florida, the SW phone station on the "*Jacob Ruppert*" of the Byrd antarctic expedition, was received with volume to spare—the "*Jacob Ruppert's*" position being near "Little America" at the south pole, a distance close to 10,000 miles!

List of Parts

1—C .00005 mf.—Antenna Condenser. Mica.
3—C1 .00009 mf.—Main Tuning Condenser. National S.E. 90.
1—C2 .000035 mf.—Compensator Condenser. National.
1—C3 .1 mf.—GRD. Blocking Condenser. 500 volts.
1—C4 .01 mf.—A.F. Coupling Condenser. 600 volts.
5—C5 .1 mf.—By-pass Tubular NON-Inductive.
1—C6 .5 mf.—By-pass Detector S.G.-Inductive.
1—C7 .00025 mf.—Det. Plate Regen. Mica.
1—C8 10 mf.—A.F. Bias—Tubular—50 volts.
1—C9 8 mf.—Line Filter, 500 volts. Trutest.
1—C10 4 mf.—Line Filter, 500 volts.—Trutest.
1—C11 .0001 mf.—Det. Grid Cond.—Mica.
1—R1 350 ohms—Bias Minimum—1 watt.
1—R2 25,000 ohms—Bias Rheostat.
1—R3 50,000 ohms—Bleeder—1 watt.
2—D4 7,000 ohms—R.F. S.G.—1 watt.
1—R5 75,000 ohms—Det. S.G.—1 watt.
1—R6 50,000 ohms—Det. S.G. Regen.
1—R7 5 Megs—Det. Grid Leak—½ watt.
1—R8 .5 Megs—Det. Plate—1 watt.
1—R9 1 Meg—A.F. Leak—1 watt.
1—R10 2,000 ohms—1 A.F. Bias—1 watt.
1—R11 180 ohms—Bias Power Tubes—25 watts.
1—R12 8 ohms—Pilot Bulb R—25 watts.
1—R13 240 ohms—Heater Shunt—25 watts.
2—CH 8 mh.—R.F. Plates—Hammarlund.
1—CH1 90 mh.—Det. Plate—National 90.
1—CH2 30 henry—Line Filter—180 ohms, 60 ma. Trutest.
3—39 Tubes—R.C.A. Radiotron (Sylvania).
1—37 Tube—R.C.A. Radiotron (Sylvania).
2—48 Tubes—R.C.A. Radiotron (Sylvania).
2—Coil Sockets—4 prongs—National (Isolantite).
1—Coil Socket—6 prongs—National (Isolantite).
3—Tube Sockets—5 prongs—National (Isolantite).
1—Tube Socket—5 prongs—Na-Ald (Bakelite).
2—Tube Sockets—6 prongs—Na-Ald (Bakelite).
8—Coil Forms—4 prongs—National R-39.
1—Coil Forms—6 prongs—National R-39.
1—Socket and Plug—4 prongs—Speaker—Na-Ald.
1—Socket and Plug—5 prongs—B Supply—Na-Ald.
1—Speaker, Dynamic—75 ohms field—with PP 48 Output Transformer.
1—Tr-3: 1 PP Input Transformer—Thordarson.
2—Drum Dials—270 degrees—Vernier—National Type H.
3—Tube Shields—2¼" by 5" high—National.
3—Coil Shield Cans—3" by 3¼" high—National.
1—Shaft Couplings—Brass (or National).
1—Cable—5 strands—Power Supply—5 ft.
1—Cable—3 strands—Speaker—5 ft.
1—Cable—Fixture D.C.—6 ft.
1—Plug—Fixture D.C.
1—ANT. and GRD. Posts.
Resistors—Ohmite.
Bypass Condensers—Cornell-Dubilier.

'April Fool' Transmitter

(*Continued from page* 333)

broadcast band, especially if there are receivers near.

We have made no attempts to transmit great distances. One of the state institutions has reported a distance of a mile or so, using an arc lamp. Who will be the first to report ten miles, using the 600,000,000 megacycle transmitter?

New High Impedance Lines Replace Coils

(*Continued from page* 333)

regenerators being too broad for this purpose. The transmitter was turned on and the receiver tuned to zero-beat with the transmitter, and, believe it or not, *the two stayed in zero beat over periods as long as 15 minutes without the slightest sign of "creeping" and would probably have remained that way for hours.* This was with 500 volts on the tubes, at 100 milliamperes plate current, and an antenna feeder current of .6 amperes. This input was modulated about 90 per cent and there was no sign of the frequency being modulated while the receiver was tuned to zero-beat. However when the receiver was "detuned" to give about a 1,000 cycle beat note, there was a slight sign of frequency modulation, so small though, that excellent quality could be obtained with the receiver out of oscillation. This is as good if not better stability than maintained by all of the master oscillator amplifiers that were checked over the air; M.O.P.A. transmitters are quite popular around this district. So much for the results obtained, now for the construction of a typical transmitter.

Line Design

The ideal *line* to use would be one that was exactly a quarter wavelength long and adjusted to provide maximum selectivity. However this is not easily done, due to the internal losses of the oscillator tubes. These losses will have to be taken into consideration in the line design. If it were possible to design a perfect line with the present day tubes, "crystal stability" would be the result. This line would have the following physical and electrical demensions: It would be a quarter wavelength long, constructed of one-half inch copper tubing spaced approximately one inch between centers; with one end "shorted" it would have an impedance of approximately 86,000 ohms and a Q, or *selectivity factor*, of 650; the line being designed for a frequency of 60 megacycles. But unless we have special tubes, this is not obtainable. The best we can do is to use tubes with very low internal capacities and having short plate and grid leads. We then adjust the line to resonate at the frequency on which we wish to operate. As the diameter of the conductors is increased the impedance and "Q" will increase directly in proportion; increasing the copper tubing to one inch in diameter we would have a Q of 1,300 and an impedance of 172,000 ohms! The transmitter shown in the photographs uses one-half inch tubing; the reader can use any size he wishes but nothing smaller than one-half inch should be used for best results. The space between centers of the conductors should be 4 times the radius of the tubing.

With tubes such as the 210, 801, 245, 71A and 12A the length of the copper tubes will be slightly less than three feet, and with tubes such as the 800, 825 and 852 the line will be slightly over three feet long. In either case the line should be made three or four inches longer than necessary in order to allow for tuning and also for losses that may be encountered in the lengths of connecting leads; make the line three and a half feet long, that is, for the *five meter* band; if the transmitter is to be used on lower wavelengths the line will have to be proportionately shorter.

Adjustment of Transmitter

Adjustment of the transmitter using "long lines" is a very simple procedure. Set the "shorting" clamp (see Fig. 4), about three or four inches from the end, set the grid slider about three inches below this point. The plate voltage should be applied low and the grid clip adjusted for lowest plate current; the frequency should then be checked on the receiver. Sliding the clips *up* or *down* as the case may require, in order to obtain the proper frequency. Attaching the antenna is the next procedure.

Antenna Used

The antenna shown in Figure 2 is used at the writer's station and gives excellent results. It is a *matched impedance* affair, of the *doublet variety*. The Lynch *Giant-Killer* cable is used as the transmission line. It has an impedance of approximately 70 ohms and when attached to the center of the dipole antenna gives excellent performance. The line feeding the antenna should be connected three inches from the "shorted" end of the plate circuit line. This point seems to provide maximum output, even though other settings will effect higher inputs. Connect an 0-1 R.F. ammeter in series with the feeder (a Xmas tree bulb can also be used) and adjust the grid slider for maximum feeder current. The plate slider will now need adjusting as the frequency will have changed. Whichever the case, *always make the final adjustment with the grid slider; maximum output will not be obtained with the grid slider at a point giving lowest plate current.*

The new RCA Radiotron 801, an excellent high frequency tube.

Power Supplies and Modulator

Diagrams of power-supplies and modulator are given for the benefit of the reader wishing to duplicate the entire transmitter.

Besides being more efficient, a transmitter using *long lines* as tuned circuits is slightly more economical to construct. It also has plenty of other advantages over parallel-tuned circuits.

Best Tubes to Use

The writer used many different types of tubes in his experiments with "long lines". The final model used the new R.C.A. 801 tubes. These tubes worked exceedingly well and the output was higher, with lower input, than any other tubes tried. With the 801's the grid-leak value that seemed to be optimum was 15,000 ohms. The plate current was 40 milliamperes with no load and maximum output attained with a plate current of 100 milliamperes; this was with 500 volts on the plates. The measured output was around 25 watts.

That's real efficiency for a five meter transmitter. Running the oscillators with higher plate currents only increased the

plate dissipation and resulted in lower output. With 500 volts on the plates of the tubes, the plate input should not exceed 50 watts.

For those interested, the characteristics of the 801 are as follows:

Filament Voltage	7.5	volts
Filament Current	1.25	amperes
Amplification Factor	8	
Grid-Plate Capacity	6.	mmf.
Grid-Filament Capacity	4.5	mmf.
Plate-Filament Capacity	1.5	mmf.
Plate Voltage, Max.	600	volts
Plate Current, Max.	70	ma.

For ultra high frequency operation:

Frequency	60	90	120	150
Plate Voltage— (Telephony)	480	360	310	260

Parts List "Long Lines"

4—Copper tubes ½" outside diameter with 1/32" wall (each 42" long).
4—Stand-off insulators. National.
2—2.5 M.H. R.F. chokes. National.
2—Sliders (see drawing).
1—30,000 ohm 25 watt grid-leak. Ohmite.
1—75 ohm C.T. resistor. Ohmite.
2—4 prong Isolantite sockets. National.
2—801 tubes, R.C.A. Radiotron.

A Depression Portable Transmitter and Receiver

(*Continued from page* 348)

Receiver Details

When the power of the transmitter is necessarily limited there is little object in building an elaborate and expensive *receiver*. We used 201A's. The new type tubes may of course be substituted at greater expense with suitable filament resistors if desired. A 45 volt B battery is sufficient for the plate supply. The circuit is that of a detector and one stage of audio. The coils L3 and L4 are the windings contained on the plug-in coil form. L3 is spaced about half an inch from L4 and wound in the same direction. While the exact number of turns will vary with the distributed capacity and the size of C7, the following will serve as a guide to what will be required. No. 22 wire is used throughout.

Band	*L4*	*L3*
80	17	8
40	10	8
20	4	5

If the receiver fails to oscillate *reverse the connections of L3*. If it still fails add more turns to L3 and reverse the connections again if necessary. Continue to add turns and reverse the connections until the receiver operates smoothly over the entire band with the regeneration control R4 set about half way.

The antenna coupling condenser C5 may be made from two pieces of copper or brass about 1" by 1½" spaced 1/16" apart. Or an aligning condenser such as used on broadcast receivers will do nicely.

Rapid switching from "send" to "receive" is accomplished by the DPDT jack-switch illustrated at J1 in the diagram. The jack-switch is foolproof; that is, the spark-coil will not operate if the key is accidentaly touched when on the wrong side.

All RF leads should be kept short as possible. It is also important to use the heaviest wire convenient, including key leads when hooking up between the storage battery and the primary of the spark coil. When the key is pressed the current is three or four amperes and the voltage drop on the filament of the 171A is considerable, if small wire is used. Running separate leads from the terminals is a good alternative. A very definite preference will be found in the polarity of the "A" battery at the vibrator. Determine the correct way by reversing the connections *at the coil*. Nearly twice the plate current and a better note will result! *This is imperative.*

The large 3" coil and condenser shown at the left of the photo is for listening on the

"broadcast" band with the same receiver. L3 has 25 turns, L4 contains 75, while the condenser has about 30 plates in all (about .00035 mf.). A ground should be used when this coil is employed. It is plugged into the coil socket and the antenna connected directly to the binding post provided on the coil. The series condenser C5 makes this alteration necessary at broadcast frequencies. Weather reports, news and entertainment may thus be had in camp.

The transmitter being single control eliminates the necessity of lugging along a monitor. Different antenna locations affect the frequency but little. We found that the continuous single wire type of 132 feet was best and most convenient. Our only loose equipment consists of a neon bulb, a small 45 volt B battery for the receiver, key, phones and a ready cut antenna completed with insulators. The car battery supplies all the filaments and the spark coil.

Parts List for Portable

R1—10,000 ohms resistor.
R2—2 meg. grid-leak.
R3—20 ohm filament rheostat.
R4—50,000 ohm variable resistor.
RFC—2.5 mh. receiving choke. National. Hammarlund.
J1—DPDT jack switch.
C1—500 mmf. variable condenser.
C2—.002 mf. fixed condenser.
C3—.00025 mf. fixed condenser.
C4—.25 mf. or larger condenser.
C5—Antenna coupling condenser (see text).
C6—100 mmf. fixed condenser.
C7—100 mmf. variable condenser. Hammarlund. National.
C8—.5 mf. bypass condenser. Corn.-Dubilier.
C9—250 mmf. fixed condenser. Corn.-Dubil.
L1-L2—Plate and grid coils (see text).
L3-L4—Plug-in coils (see text).
1—Audio transformer.
3—201-A tubes. RCA Radiotron. (Arco.)
1—Raytheon rectifier, gaseous type.

World-Wide Short-Wave Review

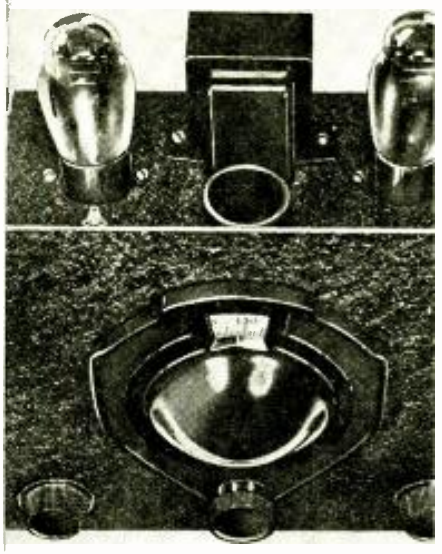
(Continued from page 337)

We are showing here two simple super-regenerative circuits which appeared recently in an issue of AMATEUR WIRELESS. The values of the parts, except for the coils, will be found on the circuits. In the single tube sets, coils L1 and L2 are the usual grid and plate coils found in regenerative receivers. For five meter operation these two coils each consist of three turns of number 12 wire, ½ inch in diameter. Owing to the heavy wire, they will be self-supporting when wound. The suppression frequency coils, or quencher coils as they are sometimes called, consist of 500 turns of No. 36 enameled wire wound in spool shaped forms, one inch in diameter and having a slot ¼ inch wide. Honeycomb coils of 500 turns each can be used for the purpose. The R.F. chokes consist of 75 turns of No. 34 enameled wire close-wound on ½ inch forms.

The three tube set uses a separate tube for the suppression frequency, which makes it more flexible and more stable in operation. In addition the pentode output tube provides loudspeaker operation for most signals. The tuning coils, L1 and L2, and the R. F. choke, are wound the same as the coils for the single tube set. The quencher coils, however, are a little different in construction. Coil L3 contains 600 turns and coil L4, 500 turns of No. 36 enameled wire. Honeycomb coils can be used here if desired. It is important to use tubes in the detector and quencher circuit which have a low plate impedance, in order to obtain satisfactory operation.

Now is a good time to begin thinking of over-hauling that aerial to withstand the Fall and Winter winds.

Eilen "DC" All-Wave Set



Above is shown combination front and top view of the Eilen "DC 3" All-Wave Receiver which was described on page 282 of the September issue, and for which the wrong picture was shown.

Doerle A-C 5 Has Some Kick

(*Continued from page* 347)

panel is mounted a dynamic loud-speaker. This is fastened to the rear side of the panel and numerous holes are drilled in the panel in order to allow the sound to come through. The metal panel, together with an auxiliary plate, provides the necessary baffling for the dynamic speaker. Provisions are also made for "earphone" reception. This is done by means of a .02 mf. condenser connected in series with the earphones between the "B" negative circuit and the plate of the 56 first audio stage. The switch mounted in the rear of the box opens the voice coil to the dynamic speaker and renders it inoperable. This switch can be left on and speaker and earphone operation can be had simultaneously. Looking at the circuit diagram, we find that sufficient filtering is used and renders the set absolutely "hum-free." Two 8 mf. and one 16 mf. electrolytic condensers, together with a 30 henry choke and the dynamic speaker field, serve as the efficient filter. The 22,400 ohm resistor which is tapped at 9,000 ohms provides the necessary load to this filter which stabilizes line voltages. This tap is used to provide screen voltage for the detector tube. The voltage is also varied by a 25,000 ohm potentiometer to allow smooth control of oscillation. It will be remembered that in the original Doerle A.C. model, regeneration was controlled by a .00014 mf. condenser. The diagram and photographs clearly show the values of the various parts, together with their placement and will give the readers a good idea as to how the set is built.

YV2RC—The S-W Voice From Caracas

(*Continued from page* 326)

mingled with many other Latin-American songs, classical selections, operatic arias, dramatic sketches, educational talks, sporting events, interviews with prominent people, as well as concerts from schools and academies.

Mr. Lopez, their engineer, began his career in the Lee de Forest Laboratories and in 1924 at the start of the talking picture industry was employed in the De Forest Phonofilm Corporation. He is a sound expert of the Hirleagraph Company of Fort Lee, N. J., Member of the American Radio Relay League and its delegate to the Cleveland Convention in 1926.

Mono-Coil S-W Converter

(*Continued from page 329*)

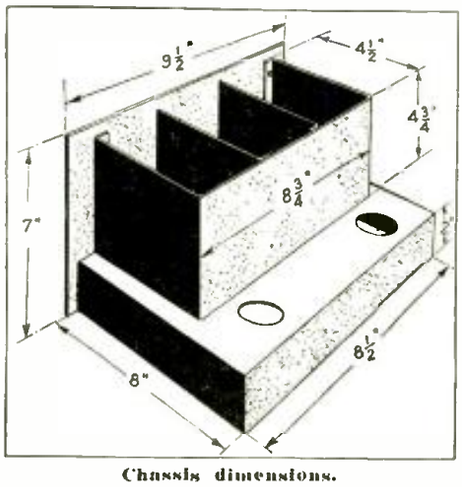
ency on the various S-W broadcast bands. This coil will not, or rather, does not cover the entire range of from 15 to 200 meters. The bands on which all the foreign and domestic stations are broadcasting are covered. (19, 25, 31 and 49 meter bands). This means that tuning can be done with a small condenser capacity allowing a better 10 ratio and greater tuning ease. Changing of bands is accomplished with a simple single-pole three contact rotary switch for each stage.

The layout of the parts is as follows: the two-gang tuning condenser is located in the center shield compartment, to the left of this is the detector stage and to the right is the oscillator stage. Behind the detector is the I.F. transformer and behind the oscillator stage is the I.F. tube. The detector trimmer is on the lower left of the panel and the volume control is on the lower right.

After the converter has been wired correctly the job of getting the whole thing lined up properly is at hand. This, if done according to the following instructions, is not at all difficult.

Aligning Converter

Connect the output of the converter to the antenna and ground posts of the "BC" set, connect the two filament leads to any pair of filament prongs of the "BC" set, except to those that go to 245 tubes. It is best to connect them to the filament prongs of an RF stage. Then connect the "B" plus lead of the converter to any point along the voltage divider of the "BC" set that gives between 135 and 250 volts; the "B" minus is taken care of in the connection to the chassis. Now turn the "BC" set on and tune it to the broadcast station that comes in on the lowest frequency.

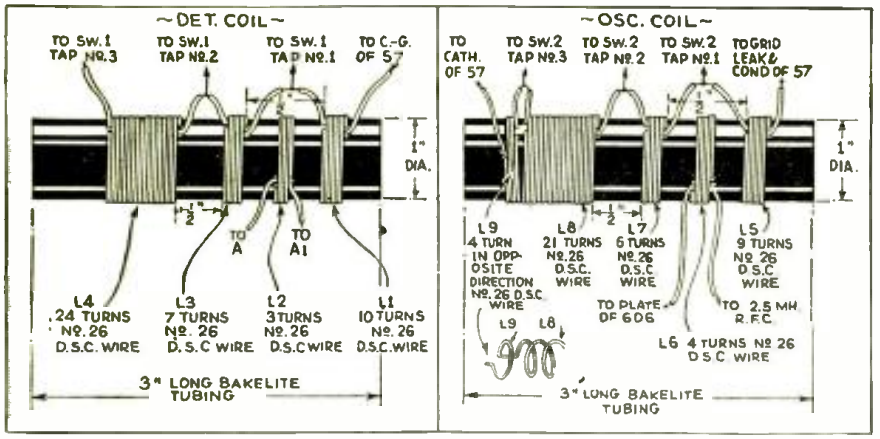


Chassis dimensions.

Disconnect the grid cap of the oscillator tube of the converter; attach the antenna directly to the grid of the detector tube. Now adjust the I.F. transformer on the converter until that broadcast station, to which the set was tuned, comes in with maximum volume; the whole outfit is now aligned on that frequency. Now put the grid cap back on to the oscillator tube and connect the antenna to the antenna post on the converter. The next move is to tune the "BC" set slightly lower in frequency (about one point on the "BC" dial) than the "BC" station used to align the stages. Now tune the converter carefully until a station is heard, then readjust the I.F. transformer on the converter for maximum signal. A slight adjustment of the tuning dial as the I.F. stage tuned will result in perfect alignment.

Parts List for Mono-Coil Converter

1—Aluminum chassis with shield components, see text. Blan. (I.C.A.; Korrol.)



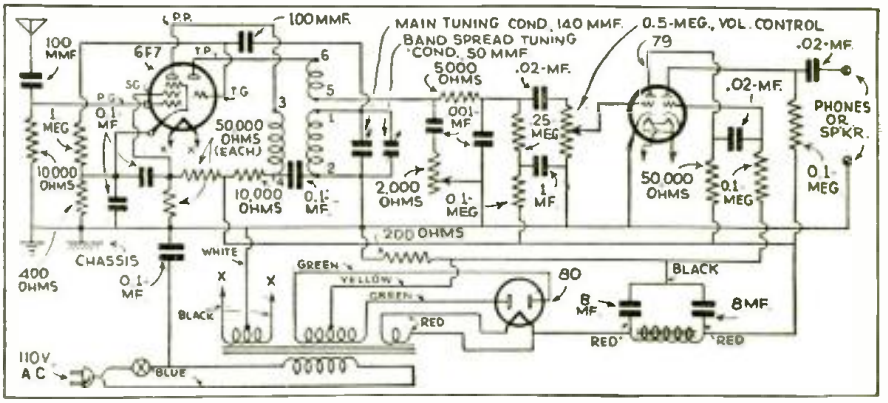
Coil data for Mono-Coil S-W Converter.

2—Mono-Coils, for construction see drawing.
2—3 or 4 point rotary switches. Blan.
1—2 gang, 35 mmf. tuning condensers. Hammarlund.
1—35 mmf. midget condenser. Hammarlund.
1—.0001 mf. mica condenser. Cornell-Dubilier.
1—.0002 mf. mica condenser. Cornell-Dubilier.
1—.002 mf. mica condenser. Cornell-Dubilier.
1—.1 mf. by-pass condenser. Cornell-Dubilier.
1—20,000 ohm, ½ watt resistor. Ohmite.
1—10,000 ohm, ½ watt resistor. Ohmite.
3—100,000 ohm, ½ watt resistors. Ohmite.
1—50,000 ohm, ½ watt resistor. Ohmite.
1—20,000 ohm volume control resistor. Ohmite.
1—R.F. choke, 2.5 MH. Hammarlund.
1—I.F. transformer that will tune to 550 kc.
2—6 prong Isolantite sockets. Hammarlund.
1—6 prong laminated socket. Na-ald.
2—switch knobs and dials. Blan.
1—National type B dial.
1—tube shield. Hammarlund.
2—antenna ground terminal strips. Na-Ald.
1—four wire battery cable. Belden.

Universal Mascot 3

(Continued from page 347)

important considerations in wiring up any set. Use a clean iron hot enough to cause the solder to run freely. Thoroughly clean surfaces to be soldered by scraping if necessary and use only rosin core solder. Every precaution should be exercised to make sure that good solid connections are made and you will be rewarded by having a set which will give the least possible trouble and consistently good results. In wiring in the electrolytic condenser, be very careful to attach the red and black wires exactly as shown. If these are reversed or connected incorrectly, not only will the set be inoperative but the condensers will be completely ruined. On tubes requiring grid clips, these are soldered to a length of flexible wire just long enough to reach the top of the tube and brought up through the appropriate hole in the chassis. The rubber grommets are provided for the purpose of insulating and preventing wear of these leads where they pass through the chassis. Diagram appears below.



Short-Wave Scout News

(*Continued from page 338*)

are below the noise-level. However, HJ4ABB was very good on July 25. The wavelength was 40.5 meters and the time 8:30 to 9:00 P.M., E.S.T. Their programs are usually spoiled by poor modulation. The station may be identified by, "Achay Hota quatro ah bay bay," spoken very fast.

PCK is on the air irregularly in the morning on 16.2 meters. The time, between 6 and 7 A.M., E.S.T. Reception is extremely fine when they are on the air.

Official Short-Wave Scout Listening Report from E. M. Heiser, Brecksville, Ohio.

● RECEPTION has been spotty but at times very good. The English and German stations in the 31 meter band have been coming in strong during the past week (July 15 to 22) although previously they could not be heard here at all.

Between 6 and 9 P.M., the European stations on 25 meters have been coming in with tremendous volume.

GSF on 19.81 meters has been heard as late as 4 P.M., for the past week.

The other European stations in the 19 meter band are heard best in the morning.

The 49 meter band is not very good at present, as the static at most times is too strong, although the South American stations manage to come through.

I have heard amateur phone stations on 20 meter band using a tone signal, the same as the commercial stations and broadcasting some music. Appended is list of principal S-W stations heard during July.—*Edward M. Heiser.*

TIME IS EASTERN STANDARD

June 13—GBA; 21.44; Rugby, Eng.; 11:30 A.M., working Montreal.
June 13—KKW; 19.42; Bolinas, Cal.; 8:30 P.M., working Hawaii.
June 29—GBU; 24.41; Rugby, Eng.; 3:30 P.M., testing.
July 1—WNB; 28.10; Lawrenceville, N. J.; 5:30 P.M., working Bermuda.
July 1—KWU; 19.46; Dixon, Cal.; 6:30 P.M., working Hawaii.
July 1—CJA2; 32.13; Drummondville, Can.; 7:15 P.M., working London.
July 2—KKZ; 21.91; Bolinas, Cal.; 8:00 P.M., working Philippine Islands.
July 2—KKP; 18.25; Kohuku, Hawaii; 8:30 P.M., working Cal.
July 6—W3XAL; 16.87; Bound Brook, N. J.; 3:30 P.M., relay WJZ. Came in strong.
July 6—KKW; 19.42; Bolinas, Cal.; 5:15 P.M., working Manila, KTO.
July 6—GSF; 19.81; London, Eng.; 5:20 P.M., using 0-24 Time now.
July 7—HBL; 31.27; Geneva, Switz.; 5:30 P.M., usual talks. Came in weak.
July 8—PHI; 16.88; Huizen, Holland; 10:00 A.M., just understandable.
July 8—DJB; 19.73; Zeesen, Ger.; 10:30 A.M.
July 8—W2XE; 19.65; Wayne, N. J.; 10:35 A.M.
July 8—W8XK; 19.72; Pittsburgh, Pa.; 10:40 A.M.
July 8—CGA2; approx. 22.00; Drummondville, Can.; 10:50 A.M., working GMGB in Simplex.
July 8—WED; 28.22; Rocky Point, N. Y.; 11:25 A.M.
July 13—DJB; 19.73; Zeesen, Ger.; 1:30 P.M., talking to WEA.
July 15—WQP; 21.58; Rocky Point, N. Y.; 2:20 P.M., working IRJ and IRM.
July 15—GCW; 30.64; Rugby, Eng.; 7:30 P.M., working WON.
July 18—GSC; 31.29; London, Eng.; 7:30 P.M.
July 18—DJA; 31.38; Zeesen, Ger.; 7:35 P.M.
July 19—KKP; 18.25; Kohuku, Hawaii; 7:15 P.M., working CAL.
July 20—WNC; 19.92; Hialeah, Fla.; 9:45 A.M., working Panama and Costa Rica.
July 23—DIQ; 29.15; Konigswust, Ger.; 7:30 P.M., working WEA. Very, very loud.

Report from Charles Guadagnino, Detroit, Mich.

● DUE to very, very *hot weather* (95 degrees Fah.) here in Detroit for the past 25 days, I haven't done any listening. Hope to have a report next month.

But, I have received numerous letters from owners of the National S-W 45 receiver asking for help on locating "foreign" stations on their National. I'm inclosing a list of "foreign" stations, countries—Coil—and Dial reading of stations I heard on my National SW-45.

BLACK COIL (13.5 to 25 Meters)

	Dial Reading
LSY—Buenos Aires, Argentina	53
CEC—Santiago, Chile	62
PLE—Bandoeng, Java	75
OCI—Lima, Peru	78
HJY—Bogota, Colombia	80
YVQ—Maracacy, Venezuela	83
FTM—St. Assise, France	65
PPU—Rio de Janeiro, Brazil	66
KKP—Kanuka, Hawaiian Isl.	111
PONTOISE—Paris, France	119
DJB—Zeesen, Germany	120
HVJ—Vatican City, Italy	120
GBW—Rugby, England	129
SUZ—Cairo, Egypt	135
KKW—California	133
KKZ—California	133

RED COIL (23 to 41 Meters)

	Dial Reading
W6XI—Dixon, California	10
WOO—New Jersey	32
IAC—Piza, Italy	35
GBU—Rugby, England	40
W8XK—Pittsburgh, Pa.	54
PONTOISE—France 25.2	55
12RO—Rome, Italy	57
GSD—Daventry, England	59
DJD—Zeesen, Germany	60
PONTOISE—France 25.6	61
PPQ—Rio de Janeiro	62
XAM—Mexico	65
LSX—Argentina	93
ORK—Belgium	93
OPM—Belge-Congo, Africa	95
LSN—Argentina	100
DIQ—Nauen, Germany	93
EAQ—Madrid, Spain	103
JIAA—Japan	103
TI4NRH—Costa Rica	106
CTIAA—Portugal	109
VK2ME—Australia	109½
WIXAZ—Mass., U. S. A.	109
VK3ME—Australia	111
OXY—Denmark	113
RABAT—Morocco	115
TGX—Guatemala	119
HBP—Switzerland	142

WHITE COIL (40 to 70 Meters)

	Dial Reading
PRADO—Ecuador	68
REN—Russia	72
W3XL—New Jersey	73
W8XK—Pittsburgh, Pa.	82
PRA3—Brazil	15
HBP—Switzerland	30
VE9GW—Canada	92
HJ1ABB—Colombia	85

Hope this information will help owners of National SW-45's.

CHARLES GUADAGNINO,
15,226 Mack Ave.,
Detroit, Mich.

O.L.P. Notes from Harold Hansen, Omaha, Nebraska.

THE 25 and 19 meter bands are giving the best reception this month. The 31 meter band is fair and 49 meter band continues terrible, with a great amount of static. DJB, CJRX and Pontoise are very good on the 25 meter band in the evenings.

GSF, DJB, and HVJ have come in very good in the mornings on the 19 meter band.

A new station to be logged here is W10XCX on 6350 kilocycles, which is located at the Indian School at Rapid City, South Dakota. This station is the ground station for the stratosphere balloon W10XCW. W3XAL on 46 meters has been heard testing with W10XCX in the late evenings.

The station in Rio Bamba, Ecuador: PRADO on 45.3 meters, has been heard here on Sunday evenings as well as on Thursday evenings.

The powerful Japanese station on about 27.9 meters has been coming in with good volume in the early mornings. One morning

they will give the call letters of JOAK. The next morning the call letters may be given as JMB or JVM.—HAROLD HANSEN.

Report from John Sorensen, Bronx, New York City.

● I FIND reception in July very good. All "G" stations averaging R9.
FYA 25.6 meters 25.3 meters R9, QSA5.
FYA 19 meters R7, QSA3 to 4.
D stations R9, QSA5.
South American stations (poor).
Rome poor and not heard often.
Lisbon, Portugal R6, QSA3-4.
PRRA, Rio Janeiro, 31.6 meters; R9, QSA5 6:30 to 7:00 p.m. DST (D.S.T. = Daylight Saving Time; E.S.T. is one hour earlier), irregular.
Australia R6, QSA 3-4.
Spain R9, QSA5.
American stations R9, QSA5.
PHI; R7-8, QSA 4-5.
16 Meters good till noon.
25 Meters good from 4 p.m. all night.
31 Meters good from 4 p.m. all night.
30 Meters good from 4 p.m. all night.
50 Meters Locals only good.
16 Meters good lately till 2 a.m.
KWU, 19 meters heard often evenings.
KWO, 19 meters heard often evenings talking to Japan, JVF, and Philippines and PLE, Java.
July 23 PRBA, 31.8 meters 6:35 to 7:15 p.m. D.S.T. R9, QSA5—talks to Brazil.
YV4BSG, Caracas, Venezuela, S. A., 1100 watts, 6000 kc. Address YV4BSG, Este 10 bis N71, Caracas, Venezuela.
HJ3ABD Apartado 500, Bogota, Columbia, S. A. 40.5 meters—reception May 22, 1934 (no other information given).
Two veris from RNE, 25 meters.
Reception 29.5 7:35 p.m. E.S.T.
Reception 30.5 7:30 p.m. E.S.T.
From July 7 to 18 tests will be conducted on 1107 and 50 meters; from July 18 onward the wavelength will again be 1724 meters. (Both times this was heard good R6-QSA3.)
WQO July 12, 1934, 02.00 G.M.T., Rocky Point, 6725 kc, talking to Antarctic—"Little America" and S.S. *Seth Parker*. R6—QSA4.
WEA-WEM, Rocky Point (all RCA) 10,610 kc.-7400 kc. relaying Europe.
WEF—9490 kc. and others.
WEJ—8050 kc.—Sweden was relayed through DJD.
WQP—13,900 kc.—all Rocky Point, N. Y.
KKZ—13,600 kc. Bolinas sending Broadcast to Honolulu.

Verification received from OXY. Written in English. Your reception of the Danish short wave station, OXY, we hereby verify. OXY is situated at Skamlebaek by the Bay of Syro, 11° 25' 26" W. Longitude. 55° 50' 20" North Latitude. Frequency 6060 kc, or 49.50 meters 0.5 kw.—500 watts. Daily on air after 19 o'clock Danish time. Denmark's broadcasters besides OXY are Kalundborg Radio station 238 kc, 60 kw, and Copenhagen radio station on 1176 kc, 10 kw.

Two fine photos of OXY, close-ups of transmitter, were included in letter—address:

Radioingeniortyeneesten
Centralpastbygningen
Bernstorffsgade Opgang 2E
Copenhagen, Denmark.

(No wonder we so seldom hear OXY, as WSXAL is always on 49.50 meters.)

* * *

Verification from JB reads:

Johannesburg, June 20, 1934
African Broadcasting Co., Ltd.
Empire Buildings, Kruis St.
Johannesburg.

"Dear Sir: We thank you for your letter dated May 25, 1934, and have pleasure in advising that your report shows that you have heard the Johannesburg station's early morning session, during which period physical exercises are broadcast.

Yours faithfully,
(signature)"

I have heard this station many times but not lately; they did not give any information asked for, and I find, that goes for most of the stations.

SHORT-WAVE ECHOES!

● CONSIDERABLE concern has been given lately to "echoes" of short-wave signals. Special transmitting stations in England and Switzerland are sending out signals for the purpose of checking the time between the original signal and its echo. Listeners all over the world are requested to observe these signals. Some of the stations transmitting signals for the above purpose are GSB, 9,510 kc., Daventry, each Sunday, Tuesday and Thursday; HBQ, 6,675 kc., Geneva, each Wednesday and Friday from 6 to 6:30 A.M., Eastern Standard Time. Summaries of the results of this investigation will be made available later in publications in this country. Persons desiring to keep in touch with all details of the project meanwhile can do so by consulting the weekly issues of "World-Radio", published by Broadcasting House, London, W. 1, England.

Test Report on "All-Star" Set

(*Continued from page* 349)

was *images*. No stations outside of those in the immediate range to which the detector tuning dial is set can be picked up by varying oscillator control. This is undoubtedly due to the very fine design of the coils. Usually superheterodynes require a stage of R.F. ahead of the first detector in order to reduce this *image* response to a minimum. However, as we said before with no pre-R.F. amplifier not the slightest trace of image response could be noticed. It might be well to mention that this set is not a manufactured instrument. It has been designed by several leading radio engineers and it uses all standard parts; parts which are available from any reliable dealer. The chassis is available for this receiver, completely drilled for the parts specified in the circuit diagram. The chassis is being sold by all jobbers sponsoring this set. Free circuit diagrams and parts lists are given with this chassis, together with complete instructions for building and operating the receiver. Some of the various parts used in this receiver are those manufactured by Cornell-Dubilier Corp.; Thordarson Elec. Mfg. Co.; Meissner Mfg. Co.; Ohmite Mfg. Co.; Hammarlund Mfg. Co.; Electrad, Inc.; Belden Mfg. Co.; Crowe Nameplate & Mfg. Co.

Visible Radio Waves

(*Continued from page* 327)

the other coil. These two waves produce a standing wave similar to that produced in an organ pipe. It is a well-known fact in physics that the original sound wave and the reflected sound wave from the end of the pipe produce a standing wave. The two waves have an electron flow between them from one rod to the other. The *phase shift* is such that at the nodes (the point at which an electrical wave crosses the zero potential line) there is no electron flow.

The flow of electrons through the glass tube ionizes the gas contained therein only at the points where the electrons contact the gas. At the nodes, referred to above, no electrons flow and hence no glow exists. Assuming a pure sine wave form, the length of the resultant visible wave may be expressed as the distance from one dark band to the second dark band following. The two illuminated portions contained represent the positive and negative values of the sine wave: the brightest part of the illuminated portion, the peaks; and the dark portion, the zero points.

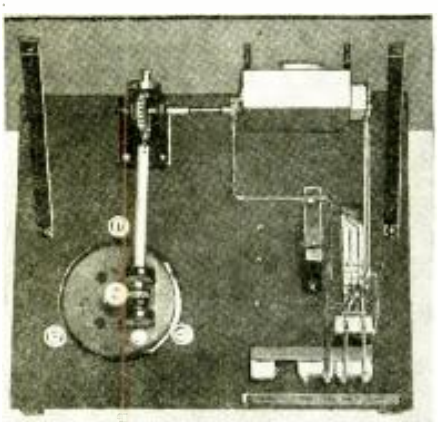
Measuring the length of the illuminated wave as described above, and counting the number of turns of wire on the rod for the equivalent distance, by a few simple computations, it is found that the length of wire so measured, if stretched out in a straight line, would very nearly equal the length of the transmitted wave of the set, 12.5 meters.—*Photo courtesy New York Museum of Science and Industry.*

What Station Signature Was That?

(*Continued from page* 342)

ers may also be interested in learning that it takes two men six hours to wind this clock. On the quarter or half hour, the first note struck by "Big Ben" denotes the time. On the hour the first note struck after the *melody* has been played is the hour. The "Bow bells" broadcast by English stations are from the famous Bow church. However, the sound is recorded on a record and you do not hear the bells directly from the church.

Herewith is reproduced a drawing of the musical scale for those who are not familiar with music. It will be comparatively easy for them to distinguish the various notes broadcast by the stations by merely referring to the drawing. We have given the name of each note, together with the do-re-me, etc., nomenclature. Picking out the notes in the sequence used at DFB of Nauen, Germany (re-do-sol), on the piano, the tune or rhythm will be apparent. However, of course, it may be played in a different key.



—N. Y. Sun.

Photo shows music box used by DJC to identify its programs. Vibrating reeds produce the notes of the melody shown on staff.

The "Trans-Atlantic 2"

(*Continued from page* 331)

plate current runs around twelve or thirteen milliamps, which is normal current for the tubes employed. While 90 volts is rather low voltage for the R.F. stage, the R.F. pentode of the 6F7 gives very good results. The suppressor grid of the pentode is tied to the cathode in the tube. The suppressor prevents secondary emission from the plate to the screen grid yet allows the electrons from the filament to reach the plate. With

TABLE NA-ALD "3"-WINDING COIL DATA
6 pin base for use with .00014 mf. (140 mmf.) tuning condenser

Band W.L.	Primary*	Secondary	Tickler	Dis. bet. Tick. & Sec.
10-20 meters	4T. No. 32 S.S.C. Interwound with sec. turns (tickler end).	5T. No. 26 S.S.C. wound 3/16" pitch bet. turns.	5T. No. 32 S.S.C.	3 32"
20-40	8T. No. 32 S.S.C. Interwound with sec. turns.	11T. No. 26 S.S.C. wound 3/32" pitch bet. turns.	7T. No. 32 S.S.C.	3/16"
40-80	15T. No. 32 S.S.C. Interwound with sec. turns.	23T. No. 26 S.S.C. wound 5/64" pitch bet. turns.	8T. No. 30 S.S.C.	3 32"
80-200	31T. No. 32 S.S.C. Interwound with sec. turns.	50T. No. 30 S.S.C. wound 1/32" pitch bet. turns.	16T. No. 30 S.S.C.	5/32"

*Tickler coil wound at bottom or pin end of 1¼" dia. form. Prim. Turns interwound at lower end of Sec. (nearest tickler). This winding not used on "antenna" coil.

pentodes, secondary emission which ruins power output, is not therefore a function of plate voltage to screen voltage as in screen grid tubes and one can use the same screen and plate voltage and get good power output.

Operation

The operation of this set is not at all "tricky" and after a few hours of practice the most inexperienced fan should be able to pull in any of the foreign stations with no trouble. The bands, of course, are switched by the large knob on the front panel which controls the coil mounting switch. The four coils mounted in this arrangement cover the complete range of from 15 to 200 meters in four convenient steps. When starting, it is best to operate on the 100 to 200 meter coil, that is the coil having the largest number of turns because on this band, amateurs and police stations can be heard almost any time of the day. Tuning in the 100 to 200 meter band is not as critical as the other bands and the operator will have a better opportunity to become familiar with the operation of the set. There are two regeneration control condensers. It is best to set one of these condensers at minimum capacity, that is with the plates all the way unmeshed. Then adjust the other regeneration condenser until there is a slight rushing sound heard with phones. This will indicate that the detector is oscillating. If the main tuning dial is now rotated, a series of whistles will be heard. These are the so-called carrier waves of the stations. As the tuning dials rotate back and forth over these carrier waves, the regeneration control should be gently "backed off" until the whistling disappears and the voice comes through clearly. With the tuning dial set at the high capacity end of the scale it may be found necessary to turn one of the regeneration control condensers all the way in, that is, with the plates fully meshed and use the other condenser for controlling regeneration.

Antenna

The antenna used with this set should be as far out in the clear as possible, away from trees, surrounding buildings, etc. A single wire 75 feet long will serve very nicely. However, the more modern types of antenna such as the doublet are recommended wherever their erection is possible as they usually provide a stronger signal with less background noise. A 6 volt storage battery can be used to furnish the filament voltage for the tubes and B batteries for the plate supply. If the builder desires to use a power supply, it is necessary that the transformer have a 6.3 volt filament winding. As the tubes used in this set are designed for either A.C. or D.C. operation no trouble will be experienced due to hum when a power supply is used.

Parts List for "Trans-Atlantic 2"

1—140 mmf. tuning condenser, C1, Hammarlund.
1—1 mf. by-pass condenser, C2, Cornell Dubilier.
3—.01 mf. by-pass condensers, C3, Cornell-Dubilier.
1—.0001 mf. mica condenser, C4, Cornell-Dubilier.
2—100 mmf. variable condensers, C5, Hammarlund.
1—5 megohm resistor, ½ watt, R1, Ohmite.
1—40,000 ohm, ½ watt resistor, R2, Ohmite.
1—2 megohm, ½ watt resistor, R3, Ohmite.
1—400 ½ watt resistor, R4, Ohmite.
1—10,000 ½ watt resistor, R5, Ohmite.
1—250,000 ohm, ½ watt resistor, R6, Ohmite.
1—2.5 mh. R.F. choke, National or Hammarlund.
1—Set 3-winding Na-Ald coils, 15 to 200 meters. (Gen-Win; Bud.)
1—Na-Ald coil switch, mounted.
2—6-prong wafer sockets, Na-Ald.
1—Panel and sub base—see text, Blan. (Korrol.)
1—6F7 tube RCA Radiotron (Sylvania).
1—79 tube, RCA Radiotron (Sylvania).
1—1-tube shield, Hammarlund.
1—National dial, type B.

When to Listen In

By M. HARVEY GERNSBACK

Daventry

● FOR September, Trans. 1, 1:15-3:15 A.M. on GSB and GSD. Transmission 2, 6-8:30 A.M. on GSF and GSG. Transmission 3, 8:45-10:45 A.M. on GSF and either GSG or GSE; 10:45 A.M.-12:45 P.M. on GSE and either GSF or GSB. Trans. 4, 1-5:30 P.M. on GSD and also channel GSB; 3:30-5:30 P.M. on GSD and GSB. Trans. 5, 6-8 P.M. on GSD and GSC. (GSE and GSB might be used.) See station list for wavelengths of these stations. The B.B.C. abandoned the 24 hour clock time Aug. 19th.

Sydney

VK2ME at Sydney, Australia will operate each Sunday in September from 12:30-2:30, 4:30-8:30, and 9:30-11:30 A.M.

Japan

The mysterious Asiatic listed last month in this column has been identified as JVM at Nagoya, Japan on about 27.93 meters. Details on this new "star" station appear in the station list.

Azores

We have received a letter from the directors of Station CT2AJ in "Ponta Delgada, Sao Miguel Acores" (Azores apparently).

This station broadcasts entertainment with announcements in English and Portuguese every Wednesday and Saturday from 5-7 P.M. on 3600 kc. or 83.5 meters. The power of the station is 50 watts with 100% modulation. Crystal frequency control is employed.

The address is CT2AJ, Electro-Auto, Ponta Delgada, Sao Miguel Acores. The phonetic translation of the Portuguese announcement is: "Aqui estacio *Say Tay Doir Ah Jhota* (CT2AJ) em Ponta Delgada, Sao Miguel Acores."

This station verifies.

Daylight Saving Time

On the last Sunday in September many cities in the U. S. and Canada go back to Standard time.

Many stations in these localities will then alter their schedules so that they will start and finish one hour later in Standard time than they have been doing for the previous 5 months. England goes back on Standard time on Oct. 7. At that time there will be *slight alterations* in the timing of *some* of the Daventry transmissions.

Rio

A station in Rio de Janeiro has been heard on about 31.58 meters at good strength frequently of late from about 4:30-6 P.M. It may be PRBA or PRAB. All announcements are in Spanish or Portuguese. It may be PSK on a new wave relaying PRA8.

Germany

The evening transmission of the Berlin stations from 5-10:30 P.M. will probably take place on DJD from 5-6:15, on DJA from 5-8:15, on DJC from 6:45-10:30 and on DJD from 8:45-10:30 P.M. (DJA uses a directional aerial for South America. DJD and DJC use North America directional aerials.)

Vienna

We have received definite information from the operators that OER2 at Vienna, Austria has now been overhauled and is back on the air again. Details of the transmission will be found in the station list. OER2 operates on 6072 kc.

EDITORIAL TREATS!

More good articles on simple Experimental, as well as Advanced, Sets are in preparation for the November issue.—Don't Miss It!

• • • SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE • • •

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

The SHORT WAVE LEAGUE was founded in 1930. Honorary Directors are as follows:

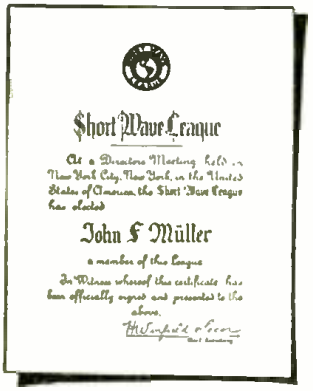
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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.

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.



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 LEAGUE LOG AND CALL MAGAZINE

Here is the finest book of its kind ever published. It contains the largest listing of short wave stations in the world, much larger in fact than the list published in SHORT WAVE CRAFT and other magazines. All experimental stations, no matter where located, are listed. A large section is provided where calls can be listed in a proper manner. This log section gives dial settings, time, date, call letters, location, and other information. Another section has squared-paper pages on which you can fill in your own frequency curve for your particular receiver. It helps you to find stations which otherwise you could never log. It is the only book of its kind published.

B—Official Log and Call 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.

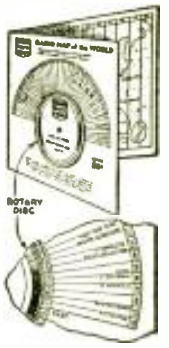
D—Globe of the World ..... Prepaid **$1.25**

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**



C—25c each

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**

D—$1.25 each

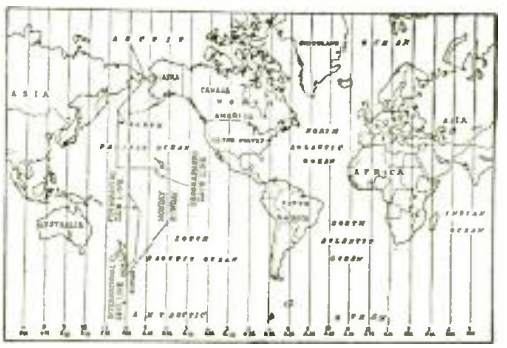
PLEASE NOTE THAT ABOVE ESSENTIALS ARE SOLD ONLY TO MEMBERS OF THE LEAGUE—NOT TO NON-MEMBERS.

Send all orders for short wave essentials to SHORT WAVE LEAGUE, 98 Park Place, 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.

G—15c for 25



F—25c each

D—$1.25 each

E—35c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 10-34
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.

SHORT WAVE LEAGUE, 99-101 Hudson Street, New York, N. Y.
Gentlemen:
I am already an enrolled member in the SHORT WAVE LEAGUE ☐
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 .....
10-34 City and State .....
Country .....

S-W League

(*Continued from page* 354)

one of them was a LICENSED *operator and* PASSED THE CODE TEST! *Contrary to popular belief* SHORT WAVE CRAFT *has a large number of* LICENSED AMATEUR *readers and for this reason, you will see the various types of amateur transmitting and receiving apparatus are described in* SHORT WAVE CRAFT. *These articles are intended for our amateur readers only and* NOT *to lead the beginner to the point of* GOING ON THE AIR WITHOUT A LICENSE!—*Editor*)

Wants Cheap 5 and 10 Meter Set

(*Continued from page* 340)

on transmitters and good luck and 73's to W2AMN and SHORT WAVE CRAFT—from a couple of hams, W2FZQ, New Jersey and W2GNL, Bronx, N. Y.

(You'll find a low-priced 3 tube superregenerative receiver described in the February issue of this magazine. It fits the "depression" pocketbook OK.—Editor.)

Miller All-Wave Super-Het

(*Continued from page* 358)

yet eliminates the disadvantages of switching encountered with a radio frequency stage. Coupling between the pre-selector coils is accomplished through the condenser, C-1, in the common ground returns of No. 711 Antenna Coils and No. 711A. It is important that no other coupling exists between these two coils.

The resistor R-1 serves to isolate the pre-selector coils from the intermediate amplifier.

The use of the 57 type first detector provides a degree of sensitivity impossible with other type tubes. The type 56 oscillator has been chosen as the best type to obtain sufficient oscillator output on the high-frequency band, where the LC ratios are of necessity quite high.

It is well to note at this point that many different type mixer circuits were tested before this combination was selected. Inductive coupling between the oscillator and first detector assures the "home-constructor" proper operation of his completed receiver, due to the fact that this coupling is a fixed value and will not vary in individual cases as will other types, as for instance, electron-coupling circuits.

If a panel-operated trimmer is used with inductive coupling, it is difficult to obtain resonance at the higher frequencies, due to the fact that trimming the detector circuit affects the oscillator frequency. *Inasmuch as this receiver does not employ a panel-operated trimmer* and as the circuits track without adjustment, after once being trimmed at the high frequency end of the band, *there is no disadvantage in using inductive coupling.*

The intermediate amplifier transformers supplied with the kit have been especially designed for use with this receiver, and afford a degree of sensitivity and selectivity seldom obtained. The units supplied with this kit represent the result of several years' experience. Excellent frequency stability is

(*Continued on page* 381)

The 6 Best Radio Books

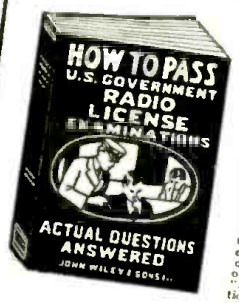
We herewith present the six most important books in radio. These volumes have been selected after an exhaustive study of the foremost radio books published today. They represent the finest in radio books, and offer a variety of information on the subject.

WE PUBLISH NO CATALOG, and ask you to please order from this page. Prompt shipments of all books will be made to you directly from the publishers. We act only as a clearing house for a number of radio publishers, and OUR PRICES ARE AS LOW OR LOWER THAN WILL BE FOUND ANYWHERE. Remit by money order or certified check. Register all letters which contain cash.

THESE BOOKS ARE ALSO OUR 6 BEST SELLERS.

The Radio Amateur's Handbook
(New Revised Edition)
By A. FREDERICK COLLINS
Cloth covers, size 5¾x7¾". 394 pages, 116 illustrations

This standard book on radio appeared among the first, and has been continually reprinted and revised, not only to meet the demand, but also to present constantly a work that is always up-to-date.
The book is almost entirely new in contents. Here are the important chapters: How to Begin Radio; Putting up your Aerial; Simple Telegraph and Telephone Transmitting and Receiving Sets; How to Begin Receiving by Code; Electricity Simply Explained; How the Transmitting and Receiving Sets Work; Mechanical and Electrical Tuning; A Simple Vacuum Tube Receiving Set; Regenerative Amplification Tube Receiving Sets; Short-Wave Regeneration Receiving Sets; The Hammarlund "Hi-Q 30" Receiver; A 245 Pushpull Radio Tube; Operation of Vacuum Tubes; Developments in Radio Tubes; Use of Wavemeters; Radio Transmitters; Construction and Operation of Transmitters; New and Talking Motion Pictures; The Photoelectric Cell and its Uses; Ultra-Short Waves; Appendix.
Your Price..... **$1.97**

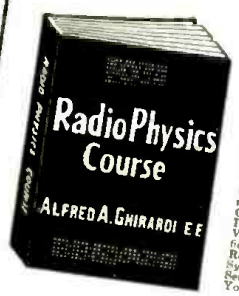


How to Pass U. S. Government Radio License Examinations
By R. L. DUNCAN and C. E. DREW
Flexible covers, size 9½x7". 170 pages, 92 illustrations

This is the most important book on this subject ever written. It gives every conceivable angle which will help you to pass a radio license examination successfully.
Here are the contents: Standard Regulations Governing the Issuance of Radio Operator's Licenses; Commercial and Broadcast Transmitters; hadio Receiving Apparatus; Motors and Generators; Storage Batteries and Auxiliary Apparatus; Radio Laws and Regulations; Appendix.
It is extremely important for the radio man who contemplates taking an examination for the radio license that he be thoroughly familiar not only with the theory involved in radio reception and transmission but also he must be thoroughly conversant with the practice considerations in connection with commercial apparatus which immediately distinguishes the practical man from one who is grounded only in his theory.
"How to Pass U. S. Government Radio License Examinations (Second Edition)" is the only publication which gives exactly this information in the most concise and practical form. It is a practical book on commercial practice. Your Price..... **$1.89**

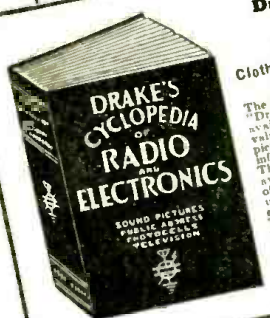
Electricity at High Pressure and Frequencies
By HENRY L. TRANSTROM
Cloth covers, size 5¼x7½ inches, 141 illustrations, 266 pages.

High pressure and frequency phenomena in electric circuits constitute a field of activity and electricity. The amazing manner in which conductors become apparent insulators and insulators become apparent conductors under the application of high-voltage alternating currents constitutes a study which is both instructive and remunerative.
In this standard work on the subject the author clearly defines the line between this and the more familiar field of "commercial" currents and frequencies. He treats his topic without of the followed by description of every type of generating equipment, including Tesla and Oudin high frequency coils, complete construction details are available for the man who wishes to duplicate the results described by the author. Myriad types of Geissler tubes are illustrated and described. This book is recommended to the earnest student of radio and electricity.
Your Price..... **$2.33**



Radio Physics Course
(Second enlarged edition)
By ALFRED A. GHIRARDI
Cloth covers, size 7½x9¼". 992 pages, 552 illustrations, numerous tables

The finest and most popular book on radio and electricity. Each subject is clearly discussed, with the aid of dozens of excellent drawings.
Here are the chapters in this revised edition: Radio Broadcasting System; Sound, Speech and Music as Related to Broadcasting; Electron Theory; Electric Currents; Electrical Units and Circuits; Magnetism and Electro-Magnetism; Inductance and Inductors; Condensers; Electro-Magnetic Current Circuits; Electrical Measuring Instruments; Radio Transmission; Elementary Study of the Vacuum Tube; Superheterodyne Receivers; Audio Amplification and Loud Speakers; Automobile and Aircraft Receivers; Phonograph Pickups and Sound Amplifier Systems; Short-Wave Reception; Television; Testing and Servicing; Sound Motion Pictures; Appendix.
Your Price..... **$3.89**



Drake's Cyclopedia of Radio and Electronics
By H. P. MANLY (Fifth Edition)
Cloth covers, size 6x9 inches, 1048 pages, 1178 illustrations, 130 tables, 105 graphs.

The new 1933 edition of that now very well-known volume, "Drake's Cyclopedia of Radio and Electronics," is now available. Included in this latest edition are further interesting reference data on public address equipment, sound pictures, television, and photoelectric cells; also, up-to-date information on radio transmission and reception.
The new tubes and the new circuits are described in readily available form. Every technical detail of the great number of topics covered by this reference work is treated individually so that the reader no longer need be in the dark concerning any point.
The keynote of today is speed and accuracy; and "Drake's Cyclopedia of Radio and Electronics" is the most comprehensive work available, is the finest book for the technician who wants to get accurate technical information in the shortest possible time.
Your Price..... **$4.88**

Principles of Radio Communication
By J. H. MORECROFT, Professor of Electrical Engineering, Columbia University
Cloth covers, size 9½x6". 988 pages, profusely illustrated.

This book is the radio classic by the dean of radio. It covers the art of radio as no other book does.
The chapters are as follows: Fundamental Ideas and Laws; Resistance—Inductance—Capacity—Shielding; Laws of Oscillation Circuits; General View of Radio Communications; Shunt Telegraphy; Vacuum Tubes and Their Operation in Typical Circuits; Continuous-Wave Telegraphy; Radio Telephony; Antennae and Radiation; Amplifiers.
Perhaps the most important single recommendation which we can make for this volume—the radio man's "bible"—as it is called, is that it is the new 1933 edition. In other words, this most valuable single book in the entire field of radio publications has been brought right to 1933. This book is far too comprehensive to permit more than a greatly abbreviated comment—buy it, if you want a real reference book on the subject covering the broad field of radio theory, both receiving and transmitting.
Your Price..... **$7.35**

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Here are 13 new, up-to-date books on every conceivable radio subject, just published. Modern in every sense. All books uniform from 64 to 72 pages; 50 to 120 illustrations. All books are written by well-known radio authors. Order all your books by number.

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No. 10 **HOME RECORDING AND ALL ABOUT IT**, by George J. Saliba.
No. 11 **HOW TO BUILD AND OPERATE SHORT-WAVE RECEIVERS**, by the Editors of SHORT WAVE CRAFT
No. 12 **HOW TO BECOME AN AMATEUR RADIO OPERATOR**, by M. F. Eddy
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RADIO PUBLICATIONS
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ORDER DIRECT FROM THIS PAGE

Miller All-Wave Super-Het

(*Continued from page* 379)

obtained due to the use of a well balanced LC ratio in the tuned circuits, and coil windings of remarkably high "Q." These coils are Litz wound and are thoroughly protected against the effects of moisture by a process known as *flash dipping*, in a special compound of highly refined vegetable waxes. *As a further assurance of obtaining a product of uniformly high quality, each intermediate frequency transformer is peaked at the proper frequency and the gain checked before packing.*

A separate tuner unit, as shown, is admirably suited to rebuilding old type radios, which are equipped with a high-quality audio amplifier, or as the tuning unit for any type power-amplifier you may desire to construct. Furthermore, it is simply necessary to substitute the 6.3 volt series tubes of corresponding type and provide the proper "B" voltage supply, and an All-Wave *battery* set for the mountain cabin, seaside or motor launch is the result.

Parts List

1 Miller No. 711 Coil Kit
1 Receiver Chassis
1 Power Supply Chassis
1 3 Gang Condenser, .00035 mf. per section.
NOTE: Most variable condensers now on the market have a maximum capacity of .00036 mf. to .00037 mf., rather than the usual range of .00035 mf. The operation of the completed receiver is not affected by using the higher values found in the newer condensers. The effect is simply to cause the wave bands to overlap a slight bit more.
5 Tube Shields
1 Power Transformer
1 Dynamic Speaker, 2500 ohm field, 245 output transformer
1 4 Prong Wafer Socket
1 5 Prong Wafer Socket
5 6 Prong Wafer Sockets
1 7 Prong Wafer Socket (for power supply connection)
1 7 Prong Plug (for power supply connection)
5 Screen Grid Clips
1 Dial
2 Knobs
AC Cord, Plug and miscellaneous hardware.

Resistor List

All resistor wattage ratings are one-half watt, unless otherwise specified.
R1 500,000 Ohms
R2 10,000
R3 100,000
R4 10,000
R5 150
R6 15,000 2 Watt
R7 10,000 2 Watt
R8 1,000
R9 1 Meg
R10 100,000 Ohms
R11 100,000
R12 500,000 Potentiometer
R13 500 Ohms 1 Watt
R14 50,000 Tone Control

Condenser List

C1 .05 mf. Preselector Coupling Condenser
C2 .1 mf. 200 V
C3 .2 mf. 400 V
C4 .25 mf. 200 V
C5 .25 mf. 200 V
C6 .25 mf. 200 V
C7 .001 mf. by-pass Cond.
C8 .0005 mf. Plate by-pass
C9 .01 mf. Coupling Cond.
C10 10 mf. Electrolytic By-pass Cond. 25 Volt
C11 8 mf. Electrolytic Filter Cond. 450 Volt
C12 8 mf. Electrolytic Filter Cond. 450 Volt
C13 .25 mf. 400 Volt
C14 .0025 mf. Cond. (supplied with Kit)
C15 .001 Plate By pass Condenser
C16 .05 400 Volt Condenser

Tubes Required

1 Type 56 Tube Oscillator
1 Type 57 Tube First Detector
2 Type 58 Tubes Intermediate Frequency Amplifier
1 Type 55 Tube Detector AVC
1 Type 2A5 Tube Power Amplifier
1 Type 80 Tube Rectifier
If it is desirable to use batteries instead of AC operation as shown, the following types would replace those listed above.
1 Type 37 Tube Oscillator
1 Type 6C6 Tube First Detector
2 Type 6D6 Tubes Intermediate Frequency Amplifier
1 Type 85 Tube Detector AVC
1 Type 41 Tube Power Amplifier
No rectifier tube is necessary.

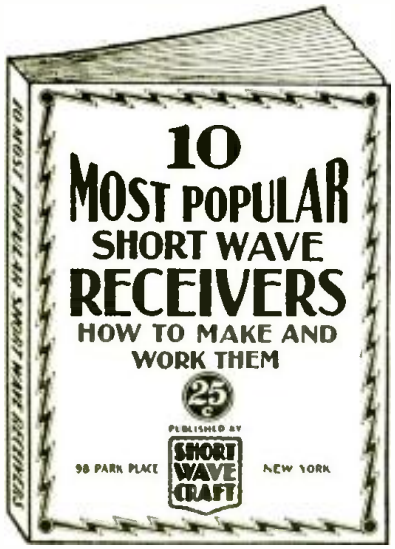
The 4 ESSENTIAL SHORT WAVE BOOKS

'ROUND THE WORLD FANS USE THESE GREAT SHORT WAVE BOOKS

These great books contain everything on short waves that is really worth knowing—they are books which have been most enthusiastically welcomed by short-wave fans. The cost of the books is extremely low in comparison with the valuable material which they contain.

There is not a short-wave fan, experimenter or interested radio-minded reader who will not want these books. Right up-to-the-minute with new material on outstanding developments in the short wave field. The books are authoritative, completely illustrated and not too highly technical.

Ten Most Popular Short Wave Receivers. How to Make and Work Them



This new volume is a revelation to those who wish to build their own short wave receivers. The editors of SHORT WAVE CRAFT have selected ten outstanding short wave receivers and these are described in the new volume. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hookup and all worthwhile specifications. Everything from the simplest one tube set to a 5-tube T. R. F. receiver is presented. Complete lists of parts are given to make each set complete. You are shown how to operate the receiver to its maximum efficiency.

CONTENTS

40 PAGES
OVER 75 ILLUSTRATIONS

IMPORTANT

THERE IS NO DUPLICATION BETWEEN THIS BOOK AND OUR OTHER VOLUME—"HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS." ALL THE MATERIAL PUBLISHED IN THE NEW BOOK HAS NEVER APPEARED IN ANY BOOK BEFORE.

25c

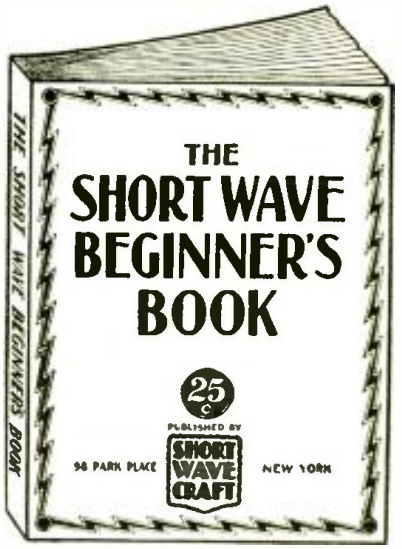
The Short Wave Beginner's Book

Here is a book that will solve your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage 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 with all sorts of photos, explanations and everything worthwhile knowing about short waves—the book is not "technical." It has no mathematics, no "high-faluting" language and no technical jargon. You are shown how to interpret a diagram and a few simple sets are also given to show you how to go about it in making them.

It abounds with many illustrations, photographs, simple charts hookups, etc., all in simple language It also gives you a tremendous amount of very important information which you usually do not find in other books, such as time conversion tables, all about aerials, noise elimination, how to get verification cards from foreign stations, all about radio tubes, data on coil winding and dozens of other subjects.

Partial List of Contents



40 PAGES
OVER 75 ILLUSTRATIONS

25c

How to Build and Operate Short Wave Receivers

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-wave sets are found in this book, which contains hundreds of illustrations; actual photographs of sets built, hookups and diagrams galore.

The book comes with a heavy colored cover, and is printed throughout on first-class paper. No expense has been spared to make this the outstanding volume of its kind. The book measures 7½x10 inches.

This book is sold only at such 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 wavee you will not wish to do without this book. It is a most important and timely radio publication.

Over 150 Illustrations
72 Pages 7x10 Inches

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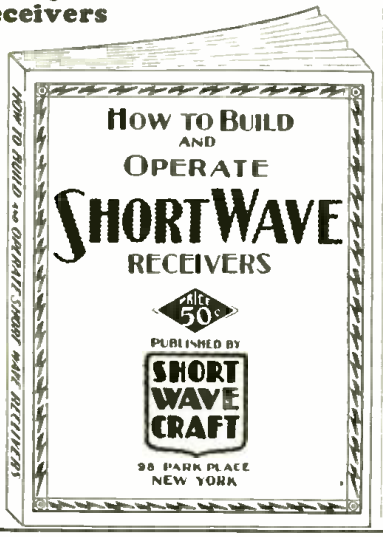
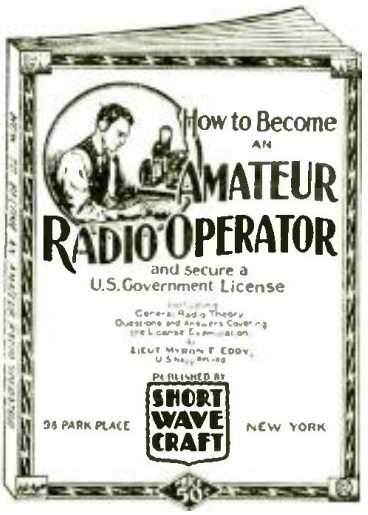


How to Become an Amateur Radio Operator



We chose Lieut. Myron F. Eddy to write this book because his long years of experience in the amateur field have 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, if you wish to prepare yourself for this important subject—this is the book you must get.

Partial List of Contents

Over 150 Illustrations
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(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.)

Short Wave Scouts

(*Continued from page* 339)

List of Unverified Short-Wave Stations

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GBS—24.69—Rugby, England—5/25/34.
KNRA—33.42—Schooner "Seth Parker"—5/6/34.
WNC—19.92—Hialeah Park, Fla.—5/19/34.
WOO—35.05—Ocean Gate, N. J.—5/12/34.
KEL—43.70—Bolinas, Calif.—5/13/34.
G6RX—69.44—Rugby, England—8/8/34.
KAY—20.63—Manila, Philippine Islands.
OER2—49.41—Vienna, Austria—5/16/34.
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ICL—49.9—Oslow, Norway—5/17/34.
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VE9BJ—49.26—St. John, N. B., Can.—5/26/34.
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WOO—70.22—Ocean Gate, N. J.—5/20/34.
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CNR—23.29—Rabat, Morocco—5/6/34.
CJRO—48.85—Winnipeg, Canada—5/25/34.
YV5RMO—49.42—Maracaibo, Venezuela, S. A.—5/4/34.
HJ4ABB—41.6—Manizales, Colombia, S. A.—5/5/34.
VK3ME—31.55—Melbourne, Australia—5/9/34.
RW15—70.20—Knabarovsk, Siberia, U.S.S.R.—5/12/34.
RW59—50.—Moscow, U.S.S.R.—5/6/34.
CNR—37.33—Rabat, Morocco—5/6/34.

Trophy Contest Entry Rules

● THE rules for entries in the SHORT WAVE SCOUT *Trophy Contest* have been amended and only 50 per cent of your list of stations submitted need be verified. If, for example, you send in a list of 100 stations with 50 verification cards, you will receive credit for the other 50 per cent or 100 stations total. 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 veris) this period need not be for the immediate month preceding the closing date. The complete list of rules appeared in the August issue of this magazine.

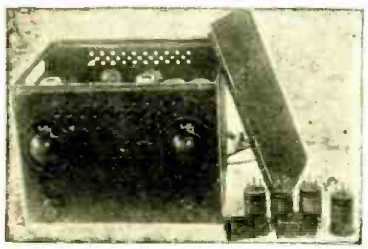
In the event of a tie between two or more contestants, each logging the same number of stations (each accompanied by the required 50 per cent veris), the judges will award a similar trophy to each contestant so tying. Each list of stations heard and submitted in the contest must be sworn to before a 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, October 1.

The judges of the contest will be the editors of SHORT WAVE CRAFT, and their findings 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 Street, New York City.

OFFICIAL DOERLE WORLD-WIDE Receivers

Presenting the Advanced Doerles!—



THE NEW *Advanced* "DOERLE A.C. Five"

15 to 200 Meters

With Built-in Dynamic Speaker

Nothing Else to Purchase **$26.95**

Complete—Nothing Else to Buy—15 to 200 Meters.

Well, you Doerle Enthusiasts, isn't this what you're been waiting for? A powerful 5-tube Doerle Receiver, complete with its hum-free power supply and dynamic speaker; all mounted on a single chassis and contained in a beautiful, black, crystalline-finished metal cabinet! **Two tuned stages, two A.F. stages with powerful 2A5 output and perfectly matched dynamic speaker; all contribute to the enormous power and superlative performance of this "top notcher" of the Doerle line.**

During its initial test, in one sitting, this receiver pulled in on its loud speaker, at good room volume, the following enviable log: DJD, DJC, and DJA, Germany; J1AA, Japan; GSD and GSC, England; CJRX, CJRO and VE9GW, Canada; EAQ, Spain; HJ3ABF, Bogota, Colombia; XDA, Mexico; FYA, France; 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 receiver employs a 58 as RF amplifier, a 57 as detector, a 56 as first audio amplifier, a 2A5 as power output tube and an 80 as full-wave rectifier. The antenna is coupled inductively to the first tuned circuit through the medium of the three-winding, 6-prong plug-in coils used in the first RF stage. This effectively eliminates the bothersome antenna trimming condenser. Provisions are made for plugging in earphones. The entire set measures, 11⅝" wide x 8½" deep x 8½" high. Ship. Wt. 19 lbs.

No. 226—The Official "Doerle A.C. Five," self powered, ready to use, complete with tubes, 2 sets of plug-in coils and dynamic speaker, as illustrated. YOUR PRICE $26.95

- Dynamic Speaker
- 8 Plug-in Coils
- 15 to 200 Meters
- 2 Tuned Circuits

Nothing Else to Buy **$25.25**

New "DOERLE A.C. Four"

And here's the "understudy" of the DOERLE A.C. FIVE described at the left. This DOERLE A.C. FOUR is, in practically every respect, the same as the Five-Tube Set except that it has one A.F. stage less and uses an external dynamic speaker. Most of the short-wave stations will come in with good volume on the loud speaker. Th more distant ones, however, will have to be tuned in with earphones, for which a jack is provided. Its two tuned circuits, together with its single A.F. stage and perfectly matched dynamic speaker, all contribute to the exceptional performance of this receiver.

If you are a regular short-wave fan, you probably know about the world-famous DOERLE 3-TUBE A.C. SIGNAL GRIPPER; about its fine performance and about the many thousands of unsolicited testimonials lauding it to the skies. Well, this DOERLE A.C. FOUR is that same receiver, with its special hum-free power supply mounted on the same chassis and all housed in a beautiful, black, crystalline-finished metal cabinet.

The receiver employs a 58 as R.F. amplifier, a 57 as detector, a 56 as first audio and output tube and an 80 as full wave rectifier. The antenna is inductively coupled to the first tuned circuit through the medium of the three-winding, 6-prong plug-in coils used in the first R.F. stage. This effectively eliminates the bothersome antenna trimming condenser. The dynamic speaker connects to the set through a convenient plug and socket arrangement. Provisions are also made for plugging in earphones. The entire set measures, 11⅝" wide x 8½" deep x 8½" high. Ship. wt. 19 lbs.

No. 227—The Official "Doerle A.C. Four," self-powered, ready to use, complete with tubes, 2 sets of plug-in coils and dynamic speaker, as illustrated. YOUR PRICE $25.25

2-TUBE 12,500 MILE BATTERY SET

$8.68

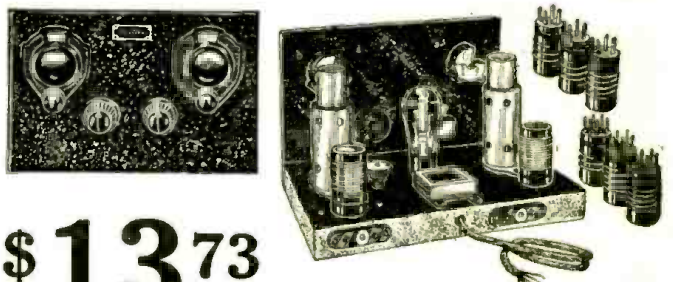
This world-famous receiver is a low priced set, and yet it pulls in short-wave stations from the far corners of the world. It is GUARANTEED to work. Utilizes 2—30 tubes which are extremely economical to operate. Requires 2—No. 6 dry cells and 2—45 volt "B" batteries. Four full pages of detailed instructions and diagrams, covering the assembly and operation, are furnished free with each set. Size of panel, 9x6¼"; base, 9x6¾". Set is beautifully finished in black crystalline. Ship. Wt. 5 lbs.

No. 2141—2-Tube 12,500-Mile Short-Wave Doerle Battery Receiver, in Kit Form, with All Parts Specified Above But Not Wired; including Blueprint Connections and Instructions, less tubes. Can be assembled in 1 hour. YOUR PRICE.. $8.68

No. 2140—2-Tube 12,500 Mile Short-Wave Doerle Battery Receiver, Completely Wired and Tested. Less Tubes. YOUR PRICE..... 9.88

No. 2142—Accessories Only Including 2 Six-Months Guaranteed R.C.A. Licensed 230 Tubes; 1 Set of Standard Matched Headphones; 2 No. 6 Dry Cells; 2 Standard 45-Volt "B" Batteries. Shipping weight, 22 lbs. YOUR PRICE..... 4.34

3-TUBE A.C. SIGNAL GRIPPER



$13.73

Convince Yourself

I now have your 3-tube Doerle set for a month. It sure brings in distant stations. Some of them are: FYA, DJD, 12RO, EAQ, CNR, HC2RL, HJ1ABB, HCIDR, VE9AP, YV3BC, VE9HX, W3XAL, W9XF, and others. Not so bad, eh?—Thos. P. Jordan, 1523 N. Main Ave., Scranton, Pa.

The results obtainable with this Doerle 3-Tube Electrified Signal Gripper will surprise even the most skeptical. Obviously, there must be a reason for its almost two years of world-wide popularity. Can be operated with either an A.C. power pack or batteries. When used with batteries the 58 tube is replaced with a 78, the 57 with a 77 and the 56 with a 37. Batteries required, 4—No. 6 dry cells and 3—45 volt "B" batteries. Four pages of detailed instructions and diagrams furnished free with each set. Ship. Wt. 7 lbs.

No. 2178—Electrified 3-Tube Doerle Signal Gripper, in Kit Form, with All Parts as Specified Above But Not Wired; Including Blueprint Connections and Instructions. Less Tubes. Can be assembled in 1 hour. YOUR PRICE..... $13.73

No. 2177—Electrified 3-Tube Doerle Signal Gripper. Completely Wired and Tested; Less Tubes. YOUR PRICE 15.18

No. 2179—Complete Set of Tubes: 1—58; 1—57; and 1—56. Special Short-Wave Hum-Free A.C. Power Pack including 280 tube. YOUR PRICE 9.78

GUARANTEE

We guarantee and warrant that all material furnished in the four sets described in this advertisement, whether they be complete sets or in the kit form, is first class in every respect; that the complete sets have been tested before shipping and that we will stand back of these sets and kits in every way. We will replace any parts, with the exception of accidentally blown out tubes, within three months. If parts are returned to us within that time.

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Hollywood, Calif.—Until I received my new Midwest radio, I had never thought it possible to bring in entertainment from half way around the world so clearly

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Amazing All-Wave Performance

Hollywood, Calif.—My Midwest is the best set I have ever tried. It gives me super foreign reception and new radio adventure. Its performance on all five wave bands amazes me.

RICHARD ARLEN,
(Paramount Featured Player)

Thrilling Foreign Reception

Hollywood, Calif.—Not until I tried out my Midwest 16 did I really appreciate what radio reception was. It thrills me to bring in distant foreign stations as clearly as local programs.

(Paramount Star)

Better Foreign Reception

Hollywood, Calif.—I am quite enthused with my Midwest. Many friends who have heard it are delighted with its performance. It brings in, without a doubt, the finest all-wave reception I have ever heard.

Thrill to Unequalled World-Wide Performance with this

Amazing NEW 1935 SUPER *Deluxe* 16-Tube ALL-WAVE Radio

9 TO 2,400 METERS (12,000 MILE TUNING RANGE)

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