THE RADIO EXPERIMENTER'S MAGAZINE

SHORT WAVE CRAFT

September

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HUGO GERNSBACK
Editor

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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Victor . Phipps . Möller . Shuart . Palmer . Kahlert

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

Contents for September, 1934

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An Efficient "Depression Portable"—Combination Transmitter and Receiver of Novel Design, by T. C. Van Alstyne, VE3LM.
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Which Audio Amplifier Should I Build? by Clifford E. Denton.
A 5-Tube Battery Superhet, by Mander Barnett.
"Musical Interval" Signals of "Foreign" Stations.
The "High-Gain" 2—In which 2 tubes = 4, by E. Kahlert.

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 front cover painting, this month, shows "The Kitchen Marconi." The young radio genius of the family has undoubtedly taken possession of the kitchen more times than tongue can tell, and most present day short-wave "fans" will probably recollect many such "touching" scenes as this in their own career. Is Mama mad or is she MAD?

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(s) H. H. PEEBLES,
6512 Carnegie Avenue,
Cleveland, Ohio.

"WOULDN'T TAKE $10.00 FOR IT"

Gentlemen:—

I received my copy of the OFFICIAL SHORT WAVE RADIO MANUAL (and autographed too) this morning. I have just finished looking it over, and say, **I wouldn't take a ten-spot for it.** Everything a ham could want between the two covers. I certainly am satisfied with my copy and know everyone else who gets one will be satisfied and proud too.

I am sure that this is the finest and most up-to-date book out, and consequently would like all of it.

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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We are proud to present the first modern and complete book on Short Waves which has appeared in the field.

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The Manual has been edited by Hugo Gernsback, Editor of SHORT WAVE CRAFT, and H. W. Secor, Managing Editor. If you are a reader of Mr. Gernsback's other publications, you know just about what to expect from this book—**his greatest effort in the short-wave field.**

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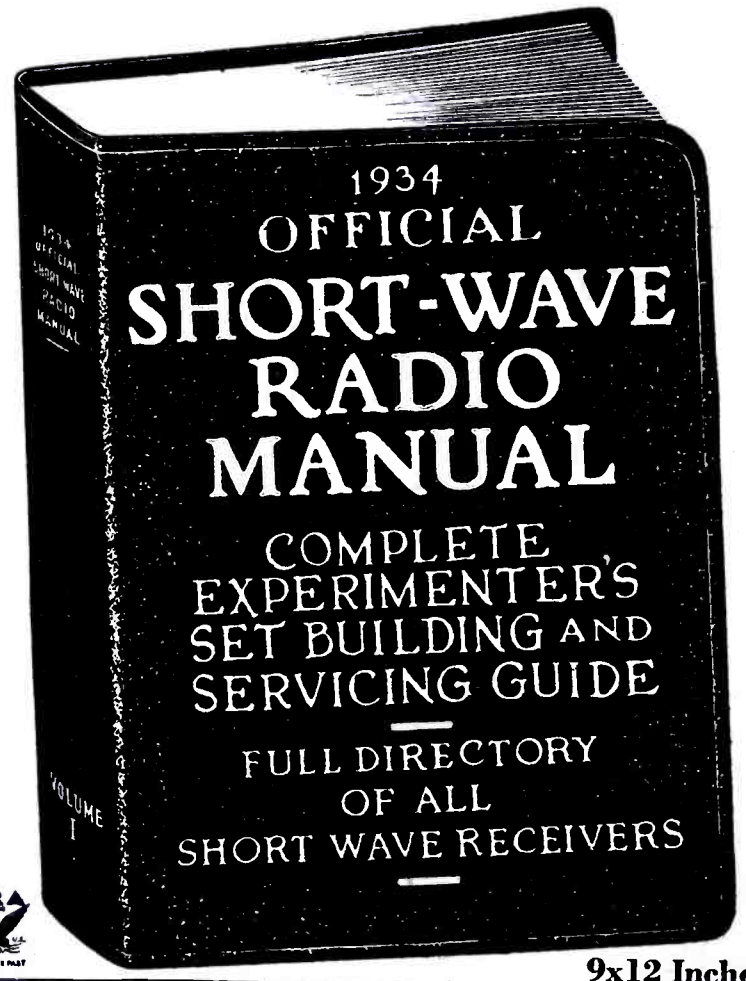
- A section for the Short-Wave Experimenter and short-wave kinks—hundreds of them.
- A section on the important new art of Short-Wave Therapy (treatment of diseases by short waves).
- A section devoted to Short-Wave Converters and their construction. Full servicing data on all commercial models is included.
- A special section on Short-Wave Antennae and noise eliminating procedures.
- A section on Short-Wave Superheterodynes. This section tells how to build them, including many commercial models of receivers. The latter with complete service data.
- 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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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

"Nothing New In Short Waves"

An Editorial By HUGO GERNSBACK

● Not so long ago, one of our readers wanted to know why we emphasized the performance of our constructional *one* and *three-tube* short-wave sets. He also wanted to know why we present as *new*, certain circuits which we have been publishing for some time. His contention was that no circuit is really *new*, but that all circuits are fundamentally alike, and that "any" short-wave set would pull in "foreign" stations—so why talk about it.

The answer to this and other similar questions is simple. When the wheel was first invented by man some 10,000 years ago, it was a fundamental discovery. Ever since that time, humanity has tried to use wheels. Entire books could be written on the subject, from the first wheel down to the last balloon tire wheels on our automobiles. There is nothing fundamentally new about wheels. The function of any wheel is still the same. Would you say there has been no progress from the first wheel?

Gutenberg invented the first movable type letters before 1450. From this, dates the making of books, such as we know them today. There is nothing fundamentally new between the metal letters of Gutenberg and the latest Monotype of today. Yet, perhaps, books could be written about the progress from the time of Gutenberg to the present, as far as revolutions in printing is concerned.

In principle, the first automobile built by Daimler in Germany in the year 1885 and the latest American automobile, are roughly the same. There are hundreds of different automobiles manufactured today, all working on the same principle; yet, there are *good* automobiles and there are *poor* automobiles—automobiles that out-perform others in speed, in workmanship, in performance, and many other points too numerous to mention.

It is exactly so with short-wave radio accomplishments. It is true that the *regenerative* circuit which experimenters use in their sets today goes back to de Forest and the year 1912. That is the *fundamental* radio circuit used in short waves today; but de Forest would be the last to deny that there has been a tremendous amount of new development from that point to today's sets.

The reason, of course, is that we have at our disposal today many new instrumentalities which we did not have ten—yes, even three years ago. The old sets used to squeal and howl. It was impossible to bring in the same station at the same point on the dial, even if we had a dial. The set suffered from *hand-capacity*, so you couldn't bring your hand near it without its going into violent oscillation. As for covering long distances, this was not "in the cards" either, because there were no powerful short-wave stations ten years ago.

In the meanwhile, the technique of short-wave reception has made tremendous progress. We have better tuning condensers, we have excellent vernier dials, we have low-loss plug-in coils and, above all, we have radio tubes that even de Forest himself did not dream of. These *multi-element* tubes make it possible for present-day engineers to evolve *entirely new combinations* and variations of circuits that were never heard of before. In other words, today we are getting a tremendous increase in efficiency; and, as a rule, one tube can now do the work that four used to.

We are now getting to the point where a one-tube battery set can be compressed into a space smaller than a cigarbox—battery, tubes and all—and such a set will receive "foreign" stations thousands of miles away, with neither aerial nor ground. That is a thing we did not dream of a few years ago.

And while the fundamentals of the radio circuit are roughly the same as they were when de Forest first invented his *feedback* circuit, we certainly are justified in saying that the progress in short-waves has been tremendous. There are still *good* short-wave receivers and also *poor* short-wave sets. Even a two- or three-tube set which, in the hands of the amateur, will bring in, day after day, stations from the Antipodes at will, impresses us; because other sets, not so efficient, would probably not perform as well. The inferior set will bring in a few stations, where the efficient set will run circles around the inefficient one, day in and day out.

Nor will this sort of thing stop during the near future. Those who think that the short-wave experimenter will die out very soon is certainly mistaken. Instead, the movement is gaining more adherents every month. This might be conclusively learned from the circulation figures of this magazine which, instead of receding, keep on increasing from month to month. This alone, is a healthy sign, and shows that more and more short-wave radio experimenters are coming into the fold, and wish to become initiated into the "thrills" of long-distance reception.

And let no one believe that we are at the end of short-wave research. As a matter of fact, the surface has only been scratched. *The really "great" short-wave inventions still lie in the future.* The most important developments in short-waves are still to come. What these will be, it is extremely hard to predict.

Pocket sets that can be slipped into a coat-pocket, batteries and all, and with which you can hear "foreign" reception, are no novelty even today.

The various nations are only beginning to understand the tremendous importance of their short-wave emissions at the present time. *Commercial sets*, now being put on the market, are so well engineered that "foreign" broadcasts, replete with music, entertainment, etc., can be received in your home just like "locals"; and, as a matter of fact, German and English stations frequently come in louder in U. S. A. than semi-locals fifty miles distant from your set.

And what will happen when *television* finally hits these sets, no one can conjecture as yet.

There may not be anything fundamentally new in short-waves, but there certainly is a tremendous amount of new development going on.

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

This is the September, 1934, Issue—Vol. V, No. 5. The next Issue Comes Out September 1st

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How Our NAVY Uses "Short Waves"

By George W. Shuart
W2AMN

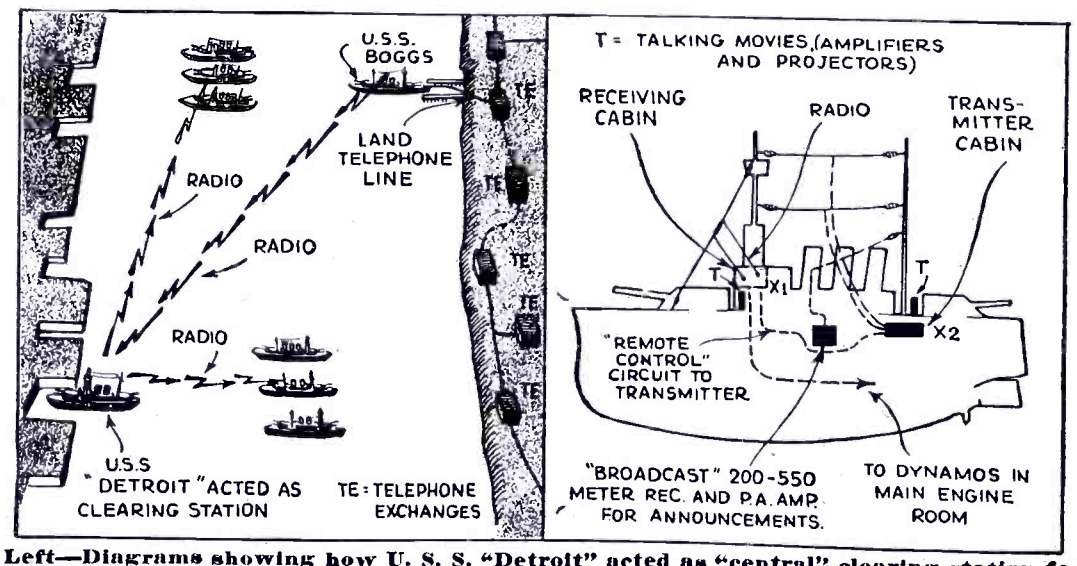
The U. S. S. "Detroit," whose radio apparatus is described in the accompanying article. Several antennas are employed.

Short waves play a very important rôle in the U. S. Navy, and we are fortunate in being able to present this authoritative article, which has been approved by the U. S. Navy Department. Many interesting radio angles are given by the author and as the radio "shack" aboard war-vessels is NOT open to the general public, our readers may consider themselves lucky indeed to have all these facts made available.

● AS everyone knows by this time the United States Navy, that is a good part of it, spent from May 31 to June 17 in New York. For the benefit of those who did not have an opportunity to board some of these magnificent men-of-war, the writer will endeavor to give an accurate report on the radio activities, together with a few of the interesting mechanical details. Being landlubbers, we will endeavor to leave out the "prows," "bows," "starboards," "ports" and the rest of the nautical terms with which few are familiar.

Some one hundred ships were at anchor in the Hudson River, and needless to say, the streets of New York were flooded with the boys in blue uniforms and white caps.

The writer had the privilege of boarding one of the larger vessels and was kindly escorted through the entire ship. A good many interesting things were seen, and knowing that the readers of this magazine would undoubtedly be interested in the radio angle, we must say that we have never beheld a more complete radio installation than those aboard Uncle Sam's fighting vessels. One ship in particular and about which we will comment is the "Detroit."



Left—Diagrams showing how U. S. S. "Detroit" acted as "central" clearing station for radio messages during fleet's visit to New York harbor. Right—Typical location of radio cabins on a warship.

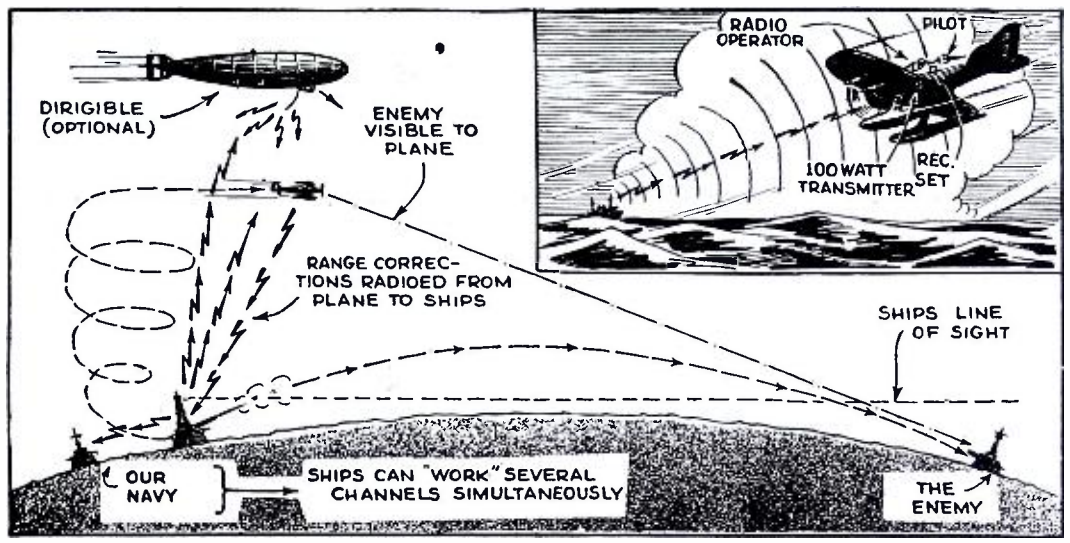
Typical Set on Warship

This boat has aboard four magnificent transmitters, one, one-kilowatt transmitter; one 500 watt transmitter; one 100 watt transmitter and one having five kilowatts output. The lower-powered jobs are crystal-control, all being master-oscillator power-amplifier affairs with the crystal not being used on the higher-powered installations. There are two separate "shacks" on the ship, one for the transmitters and the other for the receivers and all transmitters are operated by remote control, the transmitting shack being located in the rear of the vessel and the receiving shack up near the front of the boat, just behind the forward gun turret.

Handling Traffic in the Navy

The receivers used at the present time aboard the "Detroit" have only recently been installed and they are of the most up-to-date design. They are multi-tube superheterodynes and each receiver is tuned to a certain channel. A perfect system of communication has been worked out whereby there are two *active* channels at all times for handling traffic. The arrangement is such that all the vessels higher in rank than the "Detroit" operate on one frequency, while all those of lower rank operate on another frequency, this particular ship serving as a clearing center. There are two receivers and two transmitters in active operation at all times. *Break-in* is used for high-speed traffic handling and it really works out very fine and eliminates the necessity of the operators tuning from one station to another. All he has to do is set his receiver at 404 kc., which is the frequency of all the ships of either *higher* or *lower* rank than the "Detroit" (which ever the case may be). All transmitters with which he talks are tuned to this same

frequency and all he has to do is work the *sensitivity control* and he can communicate with any of the ships on that frequency. If several ships were to call him at the same time it would only be necessary for him to "break" them and to tell one particular ship to *go ahead* with the traffic and the others would "stand by." This same thing, of course, takes place with the other receiver, only working on the other frequency channel. These two frequencies, 404 kc. and 215 kc., are the most prominent in use and are employed entirely for inter-fleet communication during maneuvers and while in port. The other two transmitters operate on 8,870 kc. and 13,155 kc. These are for "long-haul" communication, especially the 13,155 kc. transmitter, which was used while the fleet was in New York, to communicate with the supply ship which was located at that time off the Pacific Coast. *Constant daily communication was maintained* and the schedule was "sure fire" over the 3,000 miles!



Left. How airplane radios information about "shots" aimed at enemy ship over the horizon. Right—How plane finds its way back to "mother" ship by radio.

Antennas

The transmitting antennas, of course, as used on most ships are multi-wire affairs, strung between the masts. For receiving a doublet is used for the high frequencies and a single wire antenna is used for the lower frequencies. Surprising as it may seem the two channels, 404 and 215 kc., are worked *simultaneously* for hours at a time, *with no interference whatsoever*. The receivers are all located on a single panel spread across a large desk, at which the various operators sit. There is about four feet of space between the operator of the 404 kc. receiver and the operator of the 215 kc. receiver, and only by glancing over can one operator tell that the other is transmitting, there being not the slightest trace of "interference." There were 15 operators in the radio "gang" aboard the "Detroit," four or five, of course, being on duty at one time, and you should see the way those boys handle traffic! It is only a matter of seconds with them in exchanging messages!

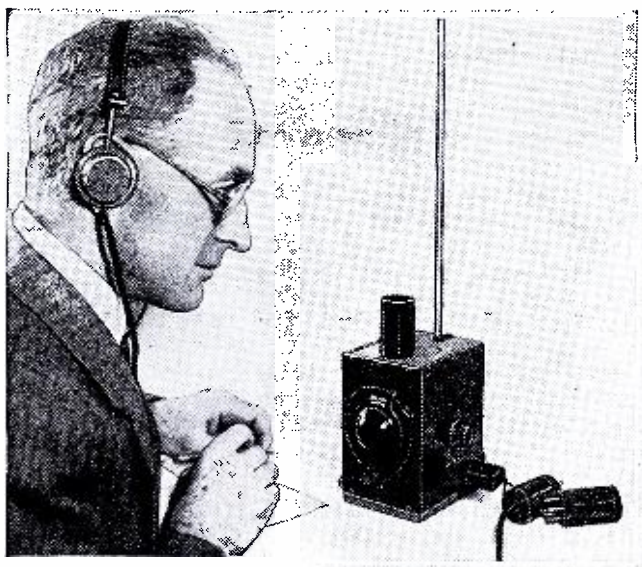
Separate Set Used for "Entertainment"

For *musical entertainment* a separate broadcast receiver is located in the central part of the ship and is used entirely for picking up broadcast programs for entertainment purposes. The output of this receiver is fed into loudspeakers located all over the ship, so that the entire ship is "flooded" with music. The telephone box located on the "quarter-deck" is arranged so that when a button is pressed, the microphone is connected into the amplifier circuit of the broadcast receiver and an emergency call can be given through the entire line-up of loud speakers. This system is used for calling the various officers and men when they are needed.

(*Continued on page* 296)

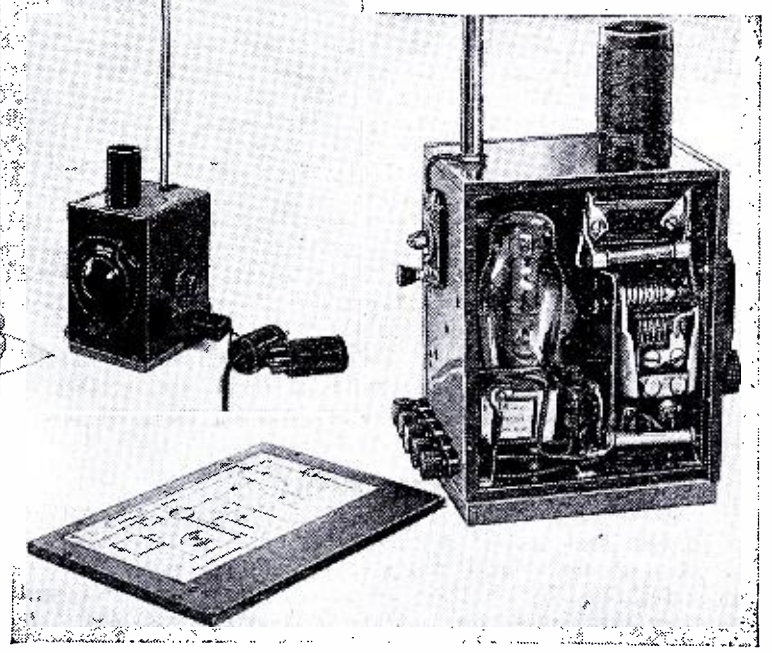
"19" Twinplex Sails Around The World

● THE 19 *Twinplex* receiver is unquestionably one of the most popular receivers that has ever been described in this magazine. Mr. Ormsby of California, who is a sea-going radio operator with 20 years of experience to his credit, built the 19 *Twinplex* which was described in the March, 1934 issue of SHORT WAVE CRAFT on page 650. This set has accompanied him to nearly every part of the globe. The photograph shows Mr. Ormsby listening in on his Twinplex. He has dubbed it the "Pigmydyne." The set is built in a 4"x 5"x6" bakelite case of $\frac{3}{16}$ inch stock. He has made no changes in the circuit except for the addition of the filament-control phone jack. This eliminates the rheostat and two volts only are supplied to the tube from the battery; when the phone plug is inserted in the jack, the tube lights automatically. This is about the most compact version of the *Twinplex* that we have had the pleasure of seeing. We wish to commend Mr. Ormsby highly on his very neat constructional job. Mr. Ormsby reports that signals from all over the world have been picked up on this receiver. In fact, he uses it constantly aboard ship to receive press reports, etc., in order to provide "news" for the crew. Many times he says this receiver has been used in place of the standard equipment for traffic handling, inasmuch as the sensitivity of the *Twinplex* was greater and provided better signal-to-noise ratio. The coils have been constructed to provide complete coverage from 15 meters up to the 600-meter commercial channel and are plugged into the socket which is mounted on top of the case, as indicated in the photograph. This is a very interesting set and just goes to prove what can be done with some of the simple 1 and 2 tube receivers which are described from month to month in SHORT WAVE CRAFT magazine. (Editor's note: Very fine work, Mr. Ormsby, and we wish you "Bon Voyage.")



Above, we see Mr. Ormsby copying press on his "Pigmydyne". Note that the vertical rod is only about one foot long and is used as an antenna. Signals from all over the world are received in this manner without difficulty.

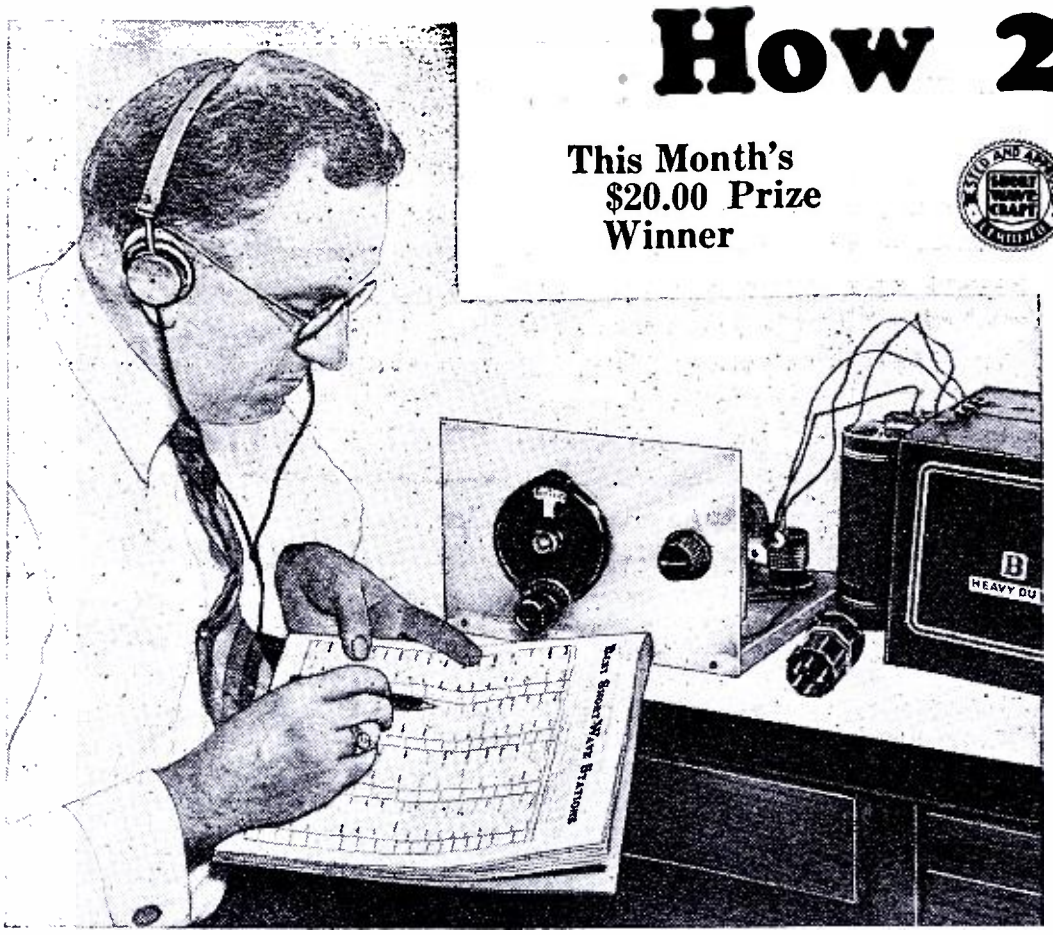
Below, the "Pigmydyne" with one side of cabinet removed to show the "insides" and how the various parts are placed in order to present such a compact version of the famous "19 Twinplex".



How 2 Tubes =

This Month's $20.00 Prize Winner

By LEONARD VICTOR



Although many of us are always a little skeptical when one of these "two tubes equal four or three tubes equal six" sets come along, really surprising reception results, including "Europeans", were obtained on the Quadradyne.

● FOLLOWING Mr. C. E. Denton's admirable "New Standby" receiver, we decided to make a simple receiver suitable for the experimenter, using the push-pull detector circuit. After the usual amount of experimental work an excellent layout was arrived at which performs in a manner that leaves nothing to be desired. The sensitivity and selectivity of this circuit is greater than any single triode regenerative detector that has yet come within our ken, bar none. For the short-wave "hound" that does not desire to delve into the complicated ramifications of superhet reception, the push-pull detector circuit is the ideal. There are boundless opportunities for the experimenter to attempt improvements of various kinds on this arrangement, although tests left very little indication that a regenerative circuit could be much better.

A reiteration of what has been heard on a set tells the reader very little, as there are certain factors such as location, antenna, skill of operation, etc., that have a very great effect on the results obtained. However, located in the suburban area of New York City, with a standard doublet antenna in an attic about thirty feet off the ground, far greater than mediocre results were obtained. All the standard run DX stations such as EAQ, GSC, I2RO, came in under normal atmospheric conditions with enough volume to work a magnetic loudspeaker. Hunting for heavy DX was not very productive of results, although VK3ME and RNE were heard and held for short periods of time.

On the twenty and forty meter ham bands sufficient DX was heard in our rather limited test period to indicate that there is something in this little set worthy of quite a bit of attention.

The Circuit

A type '19 twin triode is utilized as the push-pull detector. The higher the mu of a tube, the greater its sensitivity. The '19 is about as high mu a triode as it is possible to use. This is followed by another '19 used as two stages of audio-frequency amplification. The first stage is resistance-coupled and the second transformer coupled. Resistance coupling is used in the first stage of audio because grid detectors react unfavorably to inductive loads, frequently causing fringe howl. As an audio amplifier, the '19 is an excellent tube, giving a gain of approximately 700 with very little signal input.

Layout

The physical construction of the receiver is extremely simple, and if an adequate amount of attention is given to careful soldering and neat wiring, a fine-looking job will result. There are only two controls on the panel, the tuning vernier and the regeneration control. A piece of 16 gauge aluminum (3/64ths) seven inches by eleven, is used for the panel. The good old-fashioned bread-board, carefully sandpapered and varnished, is used as the base for the set. The board is eleven inches long by ten inches wide. Along the front edge of the board, from left to right, are the coil, .0001 mf. tuning condenser, detector tube, and .0001 mf. regeneration control. Since both the tuning and regeneration condensers are in "hot" parts of the circuit, it was necessary to mount them on little aluminum angles and turn them through bakelite rods connected to couplers.

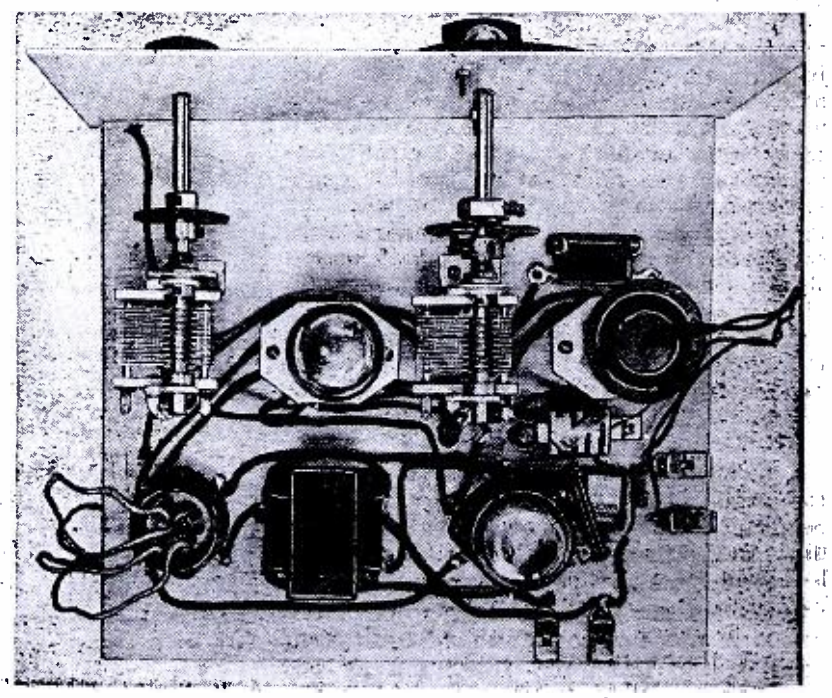
Along the back edge of the baseboard, from left to right, the parts are: '19 audio tube, audio transformer, hand power supply plug. An old tube base with four long leads soldered onto its prongs is used to simplify connection of batteries to the set.

Coils

The coils for the set are wound on standard five-prong plug-in forms, with number 30 double-cotton covered wire. When winding the coils, remember all windings are wound in the same direction. That is, the coil should be just as if one continuous winding were cut in one spot and made into two separate sections of the coil. Make the coils as symmetrical as possible. Although slight differences can be tolerated because of the bypass condenser and output R.F.C., however, the less the better.

Antennas

A set of this type was obviously made for the doublet system of antenna, but any ordinary "sky-wire" will give creditable results. A Lynch short-wave coupler is used to connect the antenna to the grid coil. This unit is a piece of tubing of slightly smaller diameter than the coil form, with



Here is a top view of the Quadradyne, in which 2 tubes actually do the work of 4, and without reflexing. A very neat and clean-cut job.

4 in the "Quadradyne"

and ERNEST KAHLERT

Radio engineers are constantly striving to improve the efficiency of short-wave receivers; Messrs. Victor and Kahlert have accomplished very interesting results in this direction for they have worked out a practical circuit in which 2 tubes do the work of 4. The 19 twin triode is utilized for a push-pull detector stage. Then follows a second type 19 tube, which gives us two stages of audio frequency amplification, the first being resistance-coupled and the second transformer-coupled. This set works on 2 volts D.C., the PLATE supply being taken from batteries or a good "B" eliminator.

a winding of enamel wire for the antenna coil. Inside the form are the two small resistors necessary for matching to the impedance line to the aerial. A home-made coupler will function just as well. Tuning of the antenna is of very great importance in this set, and will depend on the type of aerial used. Previous articles in SHORT WAVE CRAFT have gone very deeply into the subject of *doublet* antennas. Remember that the performance of the set depends largely on the aerial, and put up as good a "skyhook" and feed-line as you possibly can.

Exact dimensions cannot be given for the coils, especially the ticklers of them, as these will naturally vary with different tubes, antennas, and types of construction. A little time given to the age-old system of "cut-and-try" will be amply repaid with the better results obtained. After the coils have been adjusted to the point of optimum results, fix them in place with a little collodion, airplane wing paint, or clear lacquer.

There it is ladies and gentlemen, step right up and try your luck. With a little perseverance, good parts, and a careful job of building, an excellent receiver should result, for which the sky's the limit, conditions allowing. Also, there's always the chance to make something better, so go to it, and let us know what results you have.

COIL DATA—15-200 METERS
All Coils Close Wound, No. 30 D.C.C. Wire.

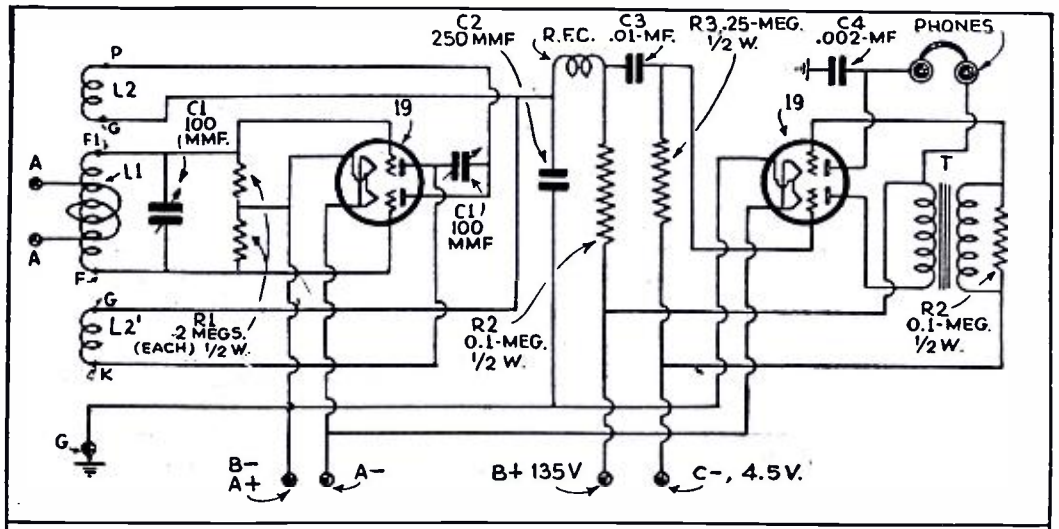
	Grid Turns	Tickler Each Coil
Coil No. 1....	5	2
Coil No. 2....	11	3
Coil No. 3....	20	3
Coil No. 4....	45	4

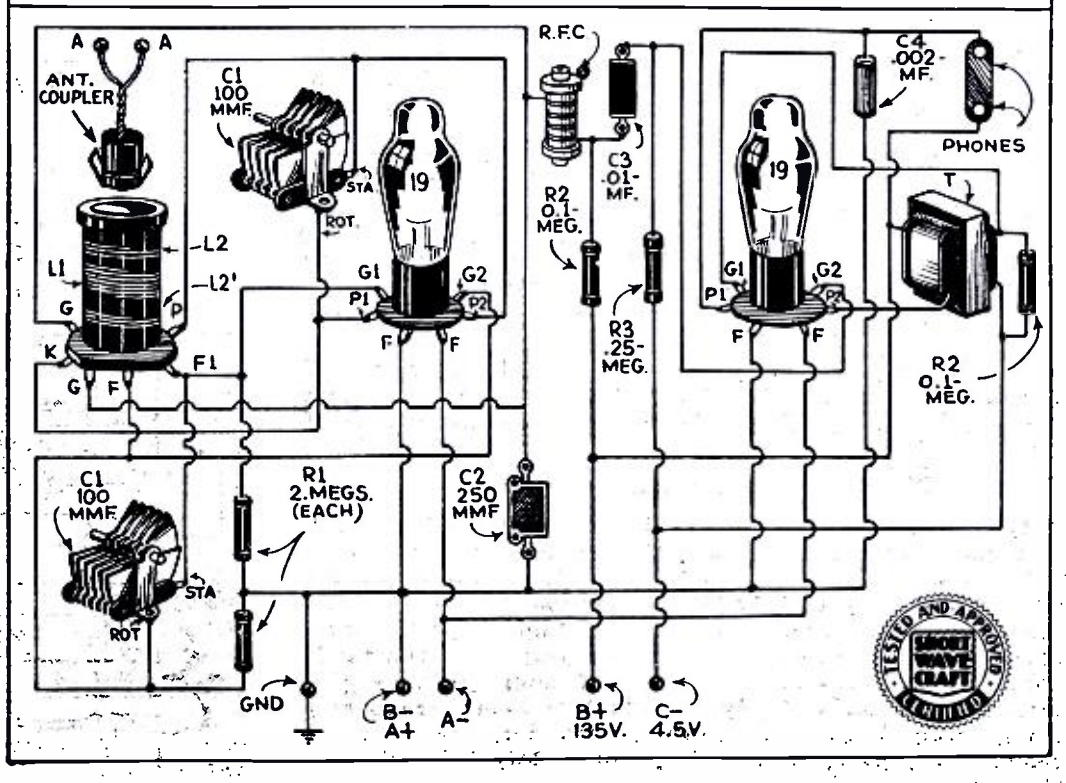
Space between Tickler and Grid Coils, ⅛ inch.

In designing the coils, if too great a number of tickler turns is used for any given band, the set is likely to break over into *super-regeneration* when the regeneration control condenser is adjusted. Fewer turns, of course, will be necessary to eliminate this trouble. Too many turns on the tickler will also decrease the sensitivity considerably. It is advisable to have the tickler so constructed that the detector tubes will go into oscillation when the regeneration condenser plates are meshed half-way. By winding on nearly the proper amount of turns and then sliding the windings either closer to, or further away from the grid winding, the correct condition can be obtained.

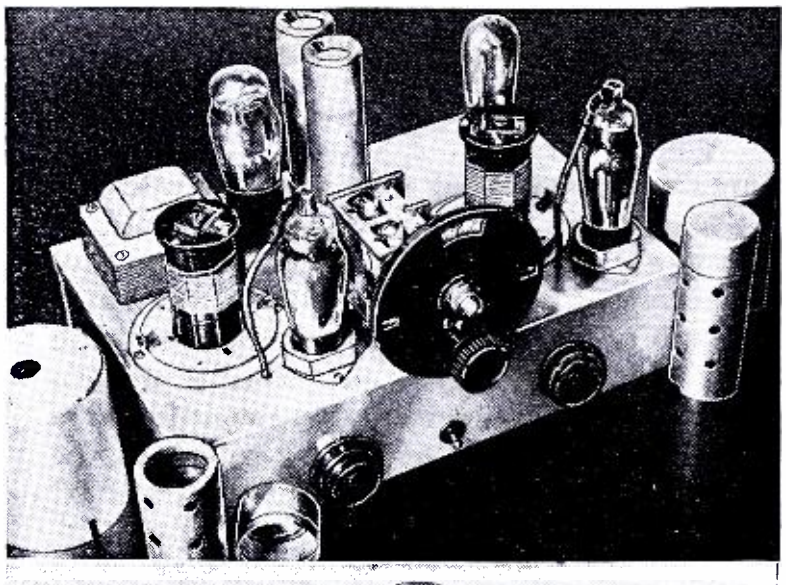
Tuning

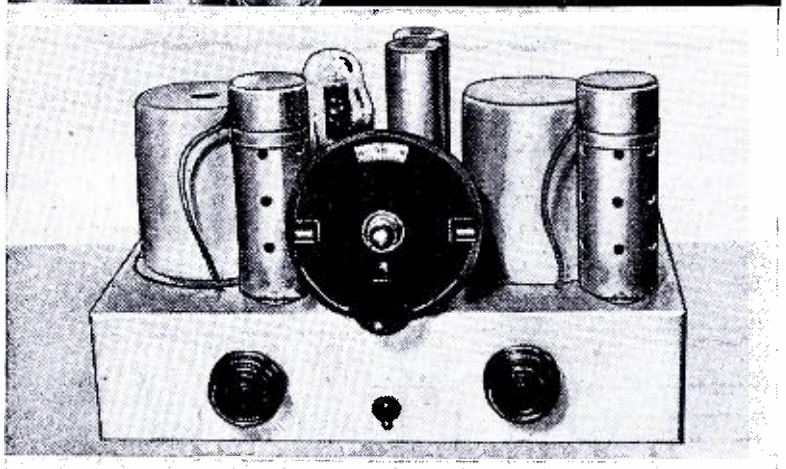
The tuning of this set is essentially the same as all other regenerative receivers. Tuning is done with the large dial, and, of course, extreme care must be taken in adjustment, as one is easily liable to pass over a distant station. Turn the regeneration control condenser until a slight rushing sound is heard; this will denote oscillation of the detector tubes. Then rotate the main tuning dial, keeping the tubes in oscillation at all times, until a whistling sound is heard. This indicates the *carrier wave* of a station. Then back off the regeneration control until the whistle just disappears. It will then be necessary to readjust the tuning condenser for maximum signal strength. This is the adjustment for phone reception. However, for CW (code) the detector remains in oscillation at all times.

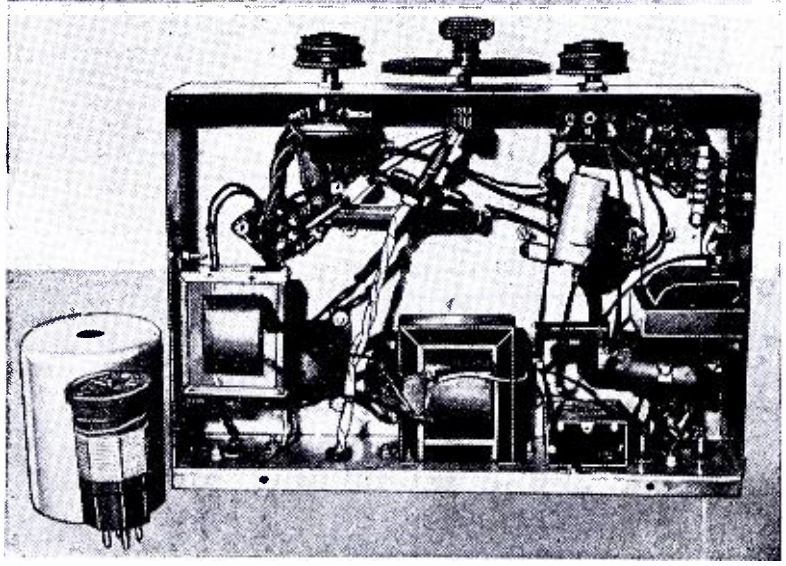




You will experience no difficulty in building the "Quadradyne"—as both wiring diagrams are given above. Of course, it always pays to use high quality parts if you wish to obtain maximum results.







A Dandy 4-Tuber for Beginner Or Old-Timer

By J. CALEB PHIPPS

This easily constructed receiver, suitable for picking up either code (or phone broadcasts) from "foreign", as well as "domestic" short-wave stations, employs two 58's, one 56, and one 80 as a rectifier. A powerful tuned radio-frequency stage serves to "boost" the weak signals; then comes a well-designed regenerative detector stage and a sturdy A.F. stage. Band-spread is provided.

this set will prove very useful, therefore band-spread on any frequency up close to 100 dial degrees can be obtained.

Another advantage this set has over many others is that all parts, coil shields, chassis, etc., are ready-made and no "tin smith" work is needed.

The backbone of the set is a standard undrilled 8" x 12" x 3" cadmium plated steel chassis. Upon the top of this is mounted the removable coil shields, tube shields, tuning and filter condensers and the power transformer. On the "front side" of the set the tuning, volume and regenerator controls are located. While the aerial and ground posts and phone connections are on the back.

A steel chassis has many advantages over an aluminum one. Using the steel chassis as a ground shortens many leads. These are no more losses than if aluminum were used if the windings are kept ¾" from the steel.

The rest of the parts are mounted under the chassis and all of the wiring kept there.

The resultant set is very workmanlike in appearance and if desired may be mounted in a cabinet.

Because of its complete shielding the set immediately gives the seasoned operator a thrill. Signals come in without "wobbulation", those interested in C.W. reception finding that a strong signal will not blanket a weaker on a few hundred cycles difference in frequency.

The photographs show clearly the placing of the component parts and as each builder may find it impractical to get the identical parts detailed dimensions will not be given.

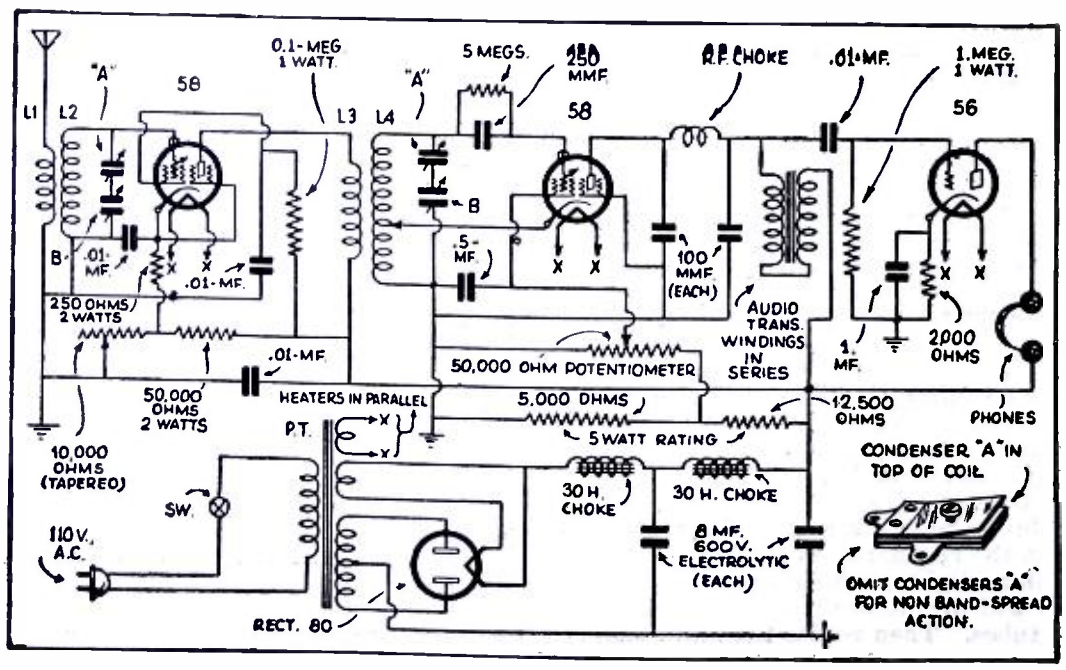
This set was built at home using only hand tools except for the larger holes for sockets, which were drilled at a nominal sum on a drill press.

(*Continued on page* 297)

Above—We have three very good views of the 4-tube receiver here described by Mr. Phipps. The line-up of stages is—one tuned R.F.; regenerative detector, and one A.F. "output" stage.

● There seems to be a tendency for some to suggest that one should start in short wave radio with a simple set. Just what constitutes a simple set has been answered many times by various authors. A fair estimate of the cost of most of these sets is in the neighborhood of ten dollars, which includes tubes, batteries and phones. After a short while these sets are laid aside and more selective and sensitive ones substituted. This entails the junking of much valuable equipment which is undesirable.

The set described in this article can be built complete for about twice the cost of the average beginner's set and when one wants to improve the equipment, it needs but the addition of a power amplifier for which there is ample room and power provided in this set and the deed is done. Should the owner branch out into the transmitting game



Wiring diagram to be used in constructing Mr. Phipps' 4-tube receiver, suitable for code or phone reception.

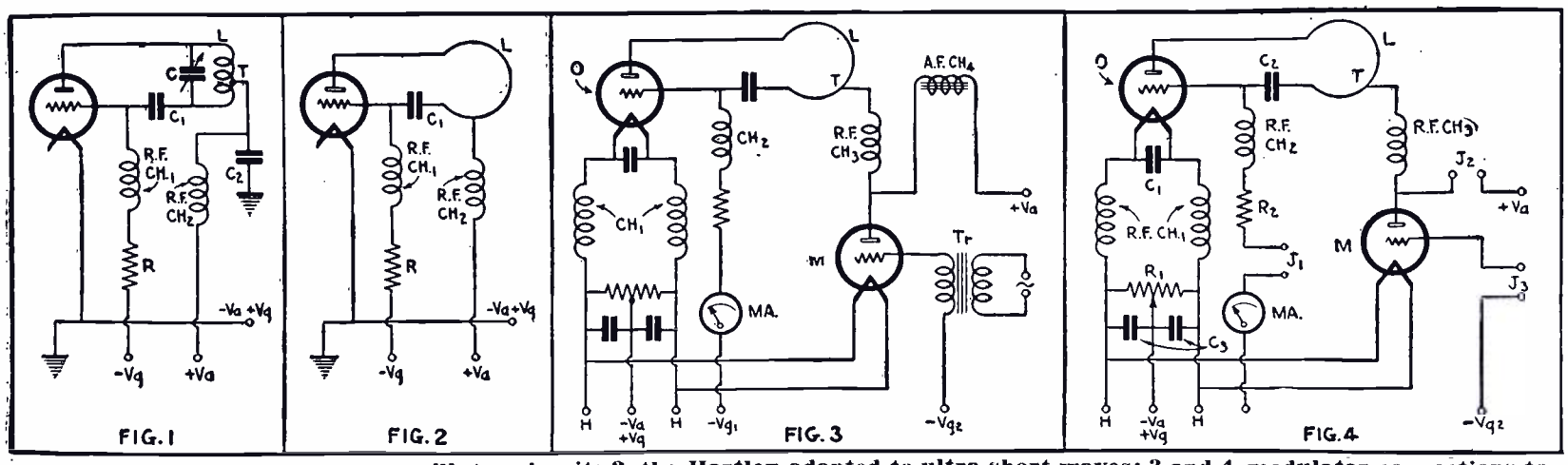


Fig. 1—Fundamental Hartley oscillator circuit; 2, the Hartley adapted to ultra short waves; 3 and 4, modulator connections to oscillator.

3.1 METER Transmitter and Receiver

By DR. W. MÖLLER, Germany

PART I.

This article by one of the foremost German experts on ultra short-waves, explains the action and also the construction of a transmitter and receiver for operation on 3.1 meters. Due to the growing activity among amateurs in the 5-meter band, this article is particularly timely.

● A WIDESPREAD opinion exists that an ultra short-wave transmitter is heard only where it can be seen. That this general statement is not true will be proven in the following article.

Transmitter and Modulation: The starting point in the development of an experimental, ultra short-wave transmitter circuit is the Hartley circuit, sometimes known as the "three-point circuit," which is shown in Fig. 1. The position of the tap, T, on the coil, L, through which the plate voltage, Va, is supplied depends upon the amplification constant of the tube. The R.F. choke coil, CH, can be omitted when C2 is large enough and when the connections between T and the ground are short. C1 protects the grid from the plate voltage Va. The negative grid bias is provided by Vg and by the voltage drop caused by the grid current in the grid leak, R. For long or medium waves the elements controlling the frequency of the oscillatory circuit are L and C. The plate-to-grid capacity is relatively too small to be taken in consideration. For shorter wavelengths, however, the inter-electrode capacity has to be considered as a parallel capacity to C. When we reach the range of the ultra-short waves the condenser, C, is completely eliminated and L is transformed to a single turn, as shown in Figure 2. The inter-electrode capacity Cga is now as important a factor for the generated frequencies as the dimensions of L. C1 has an insignificant influence on the frequency, because it is in series with the tube capacity Cga.

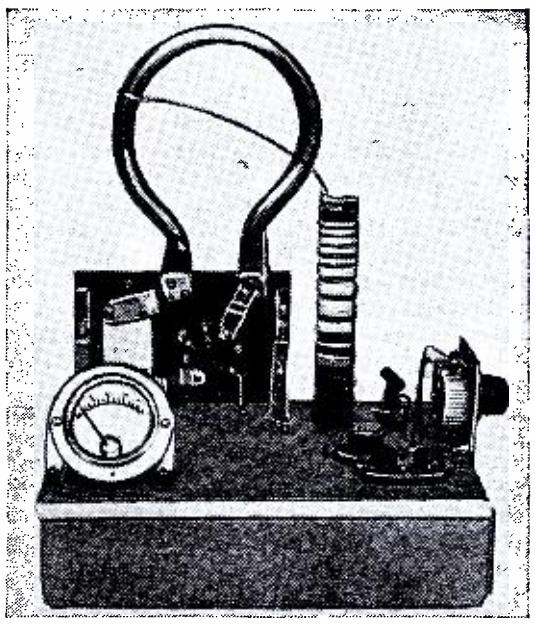


Fig. 6—Oscillator built in accordance with diagram of Fig. 4.

The wavelength of the oscillator shown in Fig. 2, can be varied by changing the dimensions of L, or by using tubes with different grid-plate capacities. In this way wavelengths as low as 1.2 meters can be reached without excessive difficulties. The practical limits, however, are set up by the fact that the power output of the transmitter drops enormously with the decrease of the wavelength. For this reason we selected a wavelength of 3.10 as the object of our investigations. Constructive details are given elsewhere.

Modulation Needed

For the experimental determination of its carrying distance the transmitter should be modulated. With this in view, the circuit is so designed as to permit the use at will on any of the three following modulation methods: either the parallel tube system (Heising-Latour), or the grid or plate voltage modulation. Fig. 3 shows the circuit of the first system. The modulator, M, should be at least as powerful as the oscillator tube O, to which it is connected in parallel. The R.F. choke coil, CH.3, prevents the high frequency oscillations from flowing into the modulator and into Va.

(*Continued on page* 302)

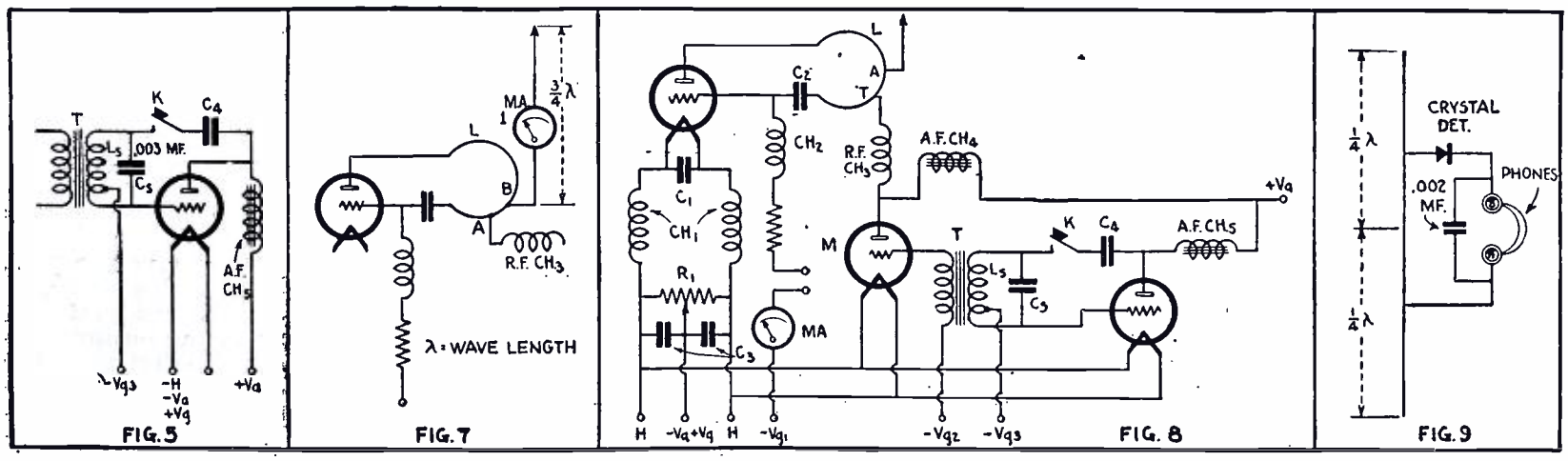
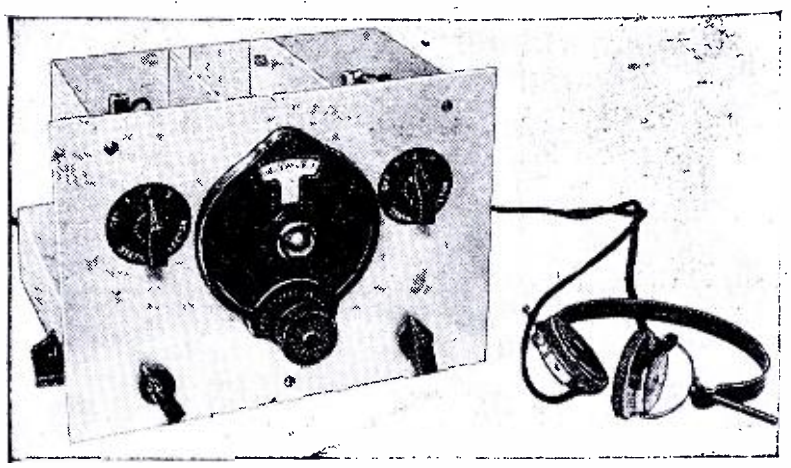


Fig. 5—Hartley audio signal generator; 7, method of connecting antenna; 8, complete 3.1 meter transmitter; 9, crystal receiver used in testing transmitter.

NEW! The T.R.F. MONO-



The T.R.F. Mono-Coil Receiver employs switches to change the various short-wave "broadcast" bands to which it can be tuned. The R.F. stage uses a 6D6 tube, the regenerative detector a 6C6, the audio amplifier a 43 pentode, and the rectifier a 25Z5.

The T.R.F. Mono-Coil receiver described this month provides a sensitive short-wave receiver, which enjoys the benefits of a stage of Tuned R.F. ahead of the detector—with no *plug-in coils to change!* All the benefits of the simple band-switch described in last month's article by Mr. Shuart, are also found in this set; the coils in both the R.F. and Detector stages have their inductance changed so as to tune in the different short-wave "broadcast" bands—all by means of simple switches. This set operates on 110 volts A.C. or D.C.

● SINCE the publication of the article last month covering the two-tube "*Mono-Coil*" set, there has been an avalanche of correspondence "singing its praises." It is hoped that this 4-tube tuned r.f. (radio-frequency) set using the "Mono-Coils" meets with the same approval.

The Mono-Coil, as we said last month, is the result of much experimentation and the writer is surely grateful for the privilege of presenting it in SHORT WAVE CRAFT magazine. While it is probably not the "ultimate" in the way of eliminating plug-in coils, it sure does the trick very nicely. The coils used in this TRF Mono-Coil set are of the same design as that used last month. The set here presented uses the well known AC-DC circuit, where there is no power transformer. The 110 volts from the lighting circuit is rectified and applied directly to the tubes. This circuit has several advantages and disadvantages which will be discussed further on in the article.

What the Mono-Coil Is

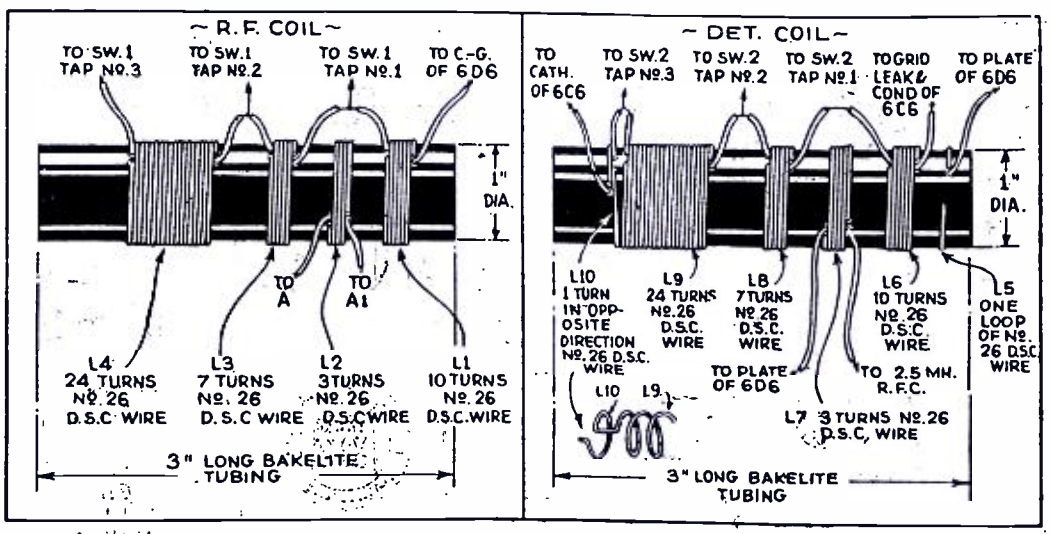
A brief resume of just what the new coil is, may be in order. The secondary or grid winding is tapped to give the various band coverages necessary to receive the short-wave stations located in the different frequency bands. Each section of the coil is separated from the other sufficiently to provide a minimum of "dead-end" losses. Each section has its turns close wound, in order that the field of the coil will be as small as possible, and not be affected by the *shorted* unused windings. Then, each section is designed to cover a specific short-wave broadcast band with a small enough tuning capacity to provide easy tuning (band-spread effect) with an efficient L/C ratio. This means that it is designed entirely for short wave broadcast and full coverage of the short-wave spectrum is not effected. As pointed out in the first article covering this coil, the average listener should not be concerned with what goes on in the other bands, such as police, public telephone and airplane channels. Covering these extra bands has always rendered our short-wave receivers less effective in the SW broadcast bands. The large tuning condenser used to cover all bands resulted in a crowding of the broadcast bands into a few points on the dial, also the L/C ratio was not optimum, and a loss in efficiency was present near the high capacity tuning range of the condenser. These inefficiencies are also overcome with the *Mono-Coil.*

The problem of obtaining *regeneration* with a simple tapped coil was overcome with the *single-turn* cathode coil, together with the three-turn plate feedback (tickler) coil. These two windings remain *fixed* over the entire range of the coil. The coil covers a range which takes in the 19, 25, 31 and 49 meter international "broadcast" bands; those carrying speeches, music and other entertainment.

Novel Method of Coupling R.F. Stage

The main problem in this set was the coupling between the r.f. stage and the detector. With tuning circuits covering only a short range in frequency the constants in the ganged tuning circuits must match nearly perfect in order that they will track with a fair degree of precision. Inductive coupling, that is a separate plate winding for the r.f. stage, was tried and the amount of loading upon the detector grid circuit made it unworkable. Condenser coupling was also tried and this was still worse than the inductive method. It was discovered in the first *Mono-Coil* set that the whole detector circuit was so much more sensitive than the ordinary method, that very little coupling between the detector grid circuit and the antenna was necessary to produce a strong signal. This sensitivity permitted the peculiar method of coupling used in this set between the r.f. stage and the detector.

What kind of coupling is it? Well, many arguments will probably be started if a direct statement is made! Some will say it is *capacitive*, some *inductive* and still others will say *electro-magnetic.* Our good friend, Dr. Nikola Tesla would possibly call it *unipolar-induction.* Whatever the principle, it comprises a single turn of wire placed in *inductive relation* to the grid coil, and serves as the coupling medium. It has the least "loading" effect upon the grid circuit of any method tried and sufficient coupling is effected to produce plenty of *gain.* The plate load of the r.f. tube is provided by the radio-fre-



The drawing, above, provides data for winding the radio frequency and regenerative detector stage coils. Spacing between each section of grid coil is one-half inch.

COIL

By GEORGE W. SHUART, W2AMN

quency choke and of course this load remains more or less constant.

R.F. and Detector Coils Similar

Both the r.f. and detector coils are identical in construction, except that the r.f. coil has no cathode turn as regeneration is not needed. The three-turn coil forming the *plate tickler* on the detector coil is used as the *antenna* coupling coil on the r.f. coil assembly. There is sufficient coupling between the antenna and grid of the r.f. tube via this coil on all the bands that the coil is designed to cover. The diagram shows the connection of the doublet antenna. The dotted line represents the connection made when an ordinary antenna and ground are used. Another drawing clearly shows the construction of the coils. Follow the instructions carefully for best results!

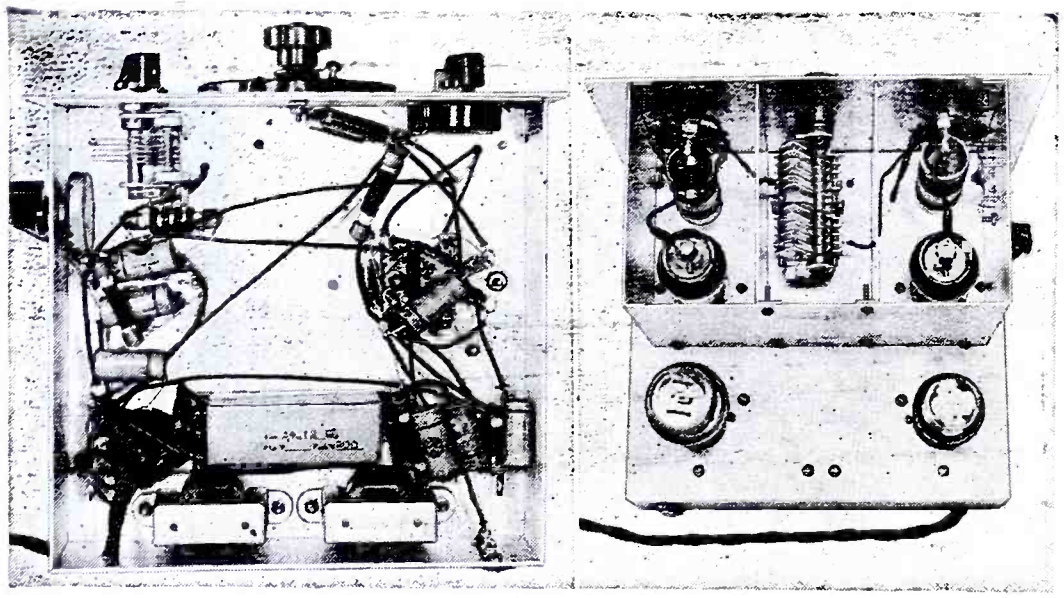
Circuit Is Simple!

The circuit is very simple and the builder should have little trouble in getting the set to "perk" right off. The tubes used are of the type used in all A.C.-D.C. sets. A 6D6 is used for the r.f. stage, a 6C6 for the regenerative detector, a 43 pentode is the audio amplifier and a 25Z5 is used as the rectifier.

In a "line-up" of this type there is only approximately 110 volts on the plates of the tubes and of course the volume is not as great as it would be if a transformer were used and in the neighborhood of 250 volts applied to the plates of the tubes. For this reason a diagram of a "power-supply" is shown in one of the drawings, thus giving the builder the choice of using the A.C.-D.C. principle or a transformer to obtain the higher voltage. There is also quite a bit of *hum* when the A.C.-D.C. circuit is used due to the half-wave rectifier. A single section filter is shown in the main diagram while a two-section affair, using two chokes and three condensers gave slightly less hum; however, it was not improved enough to warrant the use of the extra parts. In the power-pack diagram two chokes are shown and recommended, as this resulted in absolute *hum-less* reception.

Using the power pack the signals were pleasantly loud on a speaker, while with the A.C.-D.C. circuit speaker operation was not entirely satisfactory. When using the power-pack, the rectifier tube will be an 80 and the power amplifier will be a 41; the two other tubes still

(*Continued on page* 314)

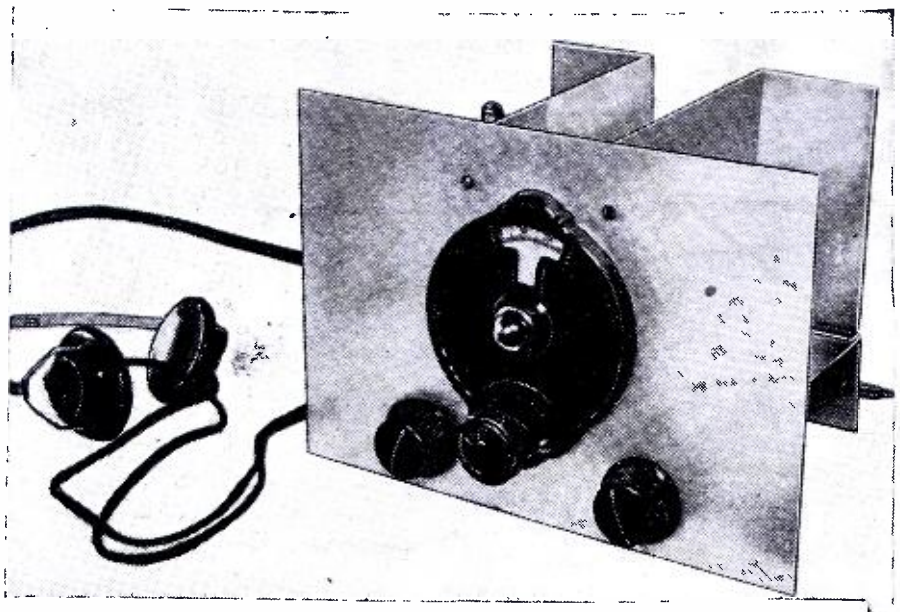


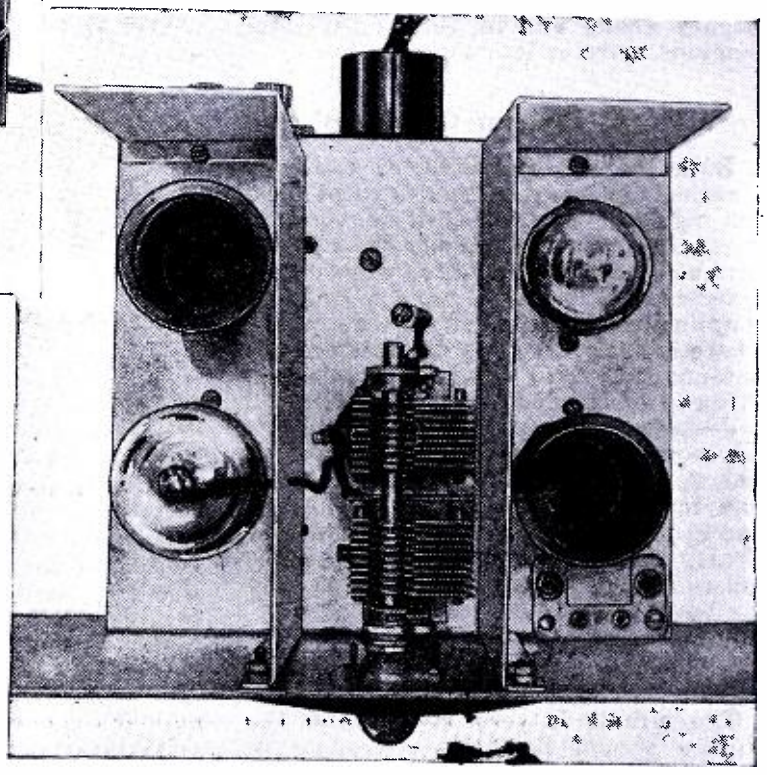
The photos above show respectively bottom and top views of the T.R.F. Mono-Coil receiver, as successfully built and tested by Mr. Shuart.

The T.R.F. Mono-Coil set is not difficult to build, as will be evident upon a little study of the above schematic and picture diagrams.

The "19"

By LEONARD VICTOR and E. KAHLERT

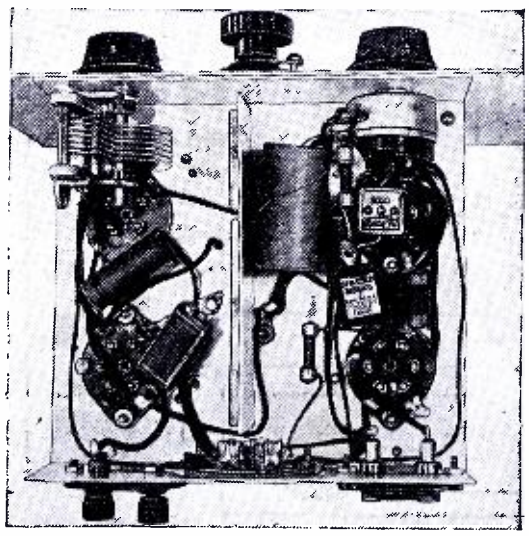




Front and top views of the "Improved 19 Twinplex," which now "sports" a Tuned R.F. Stage.

Thousands of our readers have written to the editor, loudly praising the virtues of the "19 Twinplex" receiver originally described in the March, 1934 issue. Now we take great pleasure in presenting a greatly improved "19 Twinplex," which boasts of a tuned R.F. stage with which to boost those elusive "weak" signals, before they are passed into the detector stage. Also, this set makes 2 tubes do the work of 3; it operates on a 2-volt battery or equivalent "A" supply, while the "B" supply may be taken from batteries or a well-filtered "B" eliminator or power-pack.

● THE short-wave receiver here described is an improved version of the *Twinplex* circuit, introduced in the March '34 issue of SHORT WAVE CRAFT. This set utilizes a type 34 tube as a stage of *tuned radio frequency*, followed by a type 19 twin tube, as *detector* and *one-step of audio amplification*. The 34 is a pentode tube designed primarily for r.f. (radio frequency) amplification, and it performs very creditably at the higher frequencies. The 19 was originally designed as a twin Class "B" tube, and is really two triodes in one envelope. However, experimentation has shown it to be both an excellent detector, and a good straight Class "A" audio amplifier. The 19 is the 2-volt battery brother of the 53 A.C. tube.



Bottom view of the "Improved 19 Twinplex" Receiver.

The Circuit

The electrical circuit of the set is highly conventional. Briefly explained, the theory of the set's operation is as follows. Incoming signals pass through coil L-1 and set up currents in coil L-2, the secondary coil, which is tuned, to any frequency within the range of the coil condenser combination, by the .00014 mf. variable condenser. The *ground end* of coil winding L2 is connected to ground through a .006 mf. mica condenser, instead of directly, so that it may be possible to apply bias to the grid of the 34 r.f. pentode tube. The 34 amplifies the signal which has been tuned in by the L-2-C-1 circuit and through the transformer action of the detector coil circuit L-1, L-2 the incoming signal is applied to the detector grid of the 19 tube. Detection is accomplished by means of the grid-condenser grid-leak combination, R1-C4. The detector tuning circuit C1-L2, must be tuned to exactly the same frequency as the r.f. tuned circuit. It is here that the .0001 mf. midget variable padding condenser plays its part. Although both tuned circuits have the same capacity condenser, and identical coils, still there is some difference in the resonance of the two circuits due to internal tube capacities, mechanical considerations, etc. The trimmer, C2, is used to adjust the r.f. circuit into exact alignment with the detector circuit so that maximum amplification may be obtained.

The winding L-3 on the detector plug-in coil is used to feed back a portion of the r.f. current flowing in the plate circuit of the tube, to the grid. This causes regeneration of the signal and allows the tube to oscillate. Oscillation is controlled by varying the voltage applied to the detector plate of the tube. This variation of voltage is accomplished by means of the 50,000 ohm potentiometer, R-4.

R.F. current flowing in the plate circuit is by-passed to ground by the small .0005 mf. fixed condenser, C5. This condenser is too small to bypass audio frequency current, but provides a good path to ground for the r.f.

The pulsating d.c. current (audio current) flowing through resistor R-3, sets up corresponding voltage variations in the grid circuit of the audio amplifier section of the tube. The .01 condenser, C-6, is used to prevent the plate voltage of the detector from being applied to the grid of the amplifier section, and serves as the audio coupling link. Negative bias is applied to the grid of the amplifier tube through the 250,000 ohm resistor R-2. The amplified audio signal in the form of pulsating direct current is passed through the earphones from the plate, and converted into audible sound.

Parts

As with everything else, a person gets as much out of a set as he puts into it. If you were to use cheap variables instead of isolantite insulated types, the difference would be hardly noticeable, yet the sum total of the losses, when cheap condensers, both fixed and variable, poor sockets, and "bootleg" tubes are used, is quickly seen. Hence it pays in the long run to use *good parts*, since they will give you better results, longer

Advanced TWINPLEX

The authors have vastly improved the famous "19 Twinplex" receiver, previously described in this magazine, by adding a tuned R.F. stage. Also, 2 tubes are made to do the work of 3 in this highly improved circuit.

service, and no "headaches" about whether they are functioning properly or not. A manufactured kit of coils was used, although data is furnished for constructing the same, if the builder wishes to "roll his own."

Layout

The set is built on two pieces of aluminum, 7"x10" in size. One piece is used as the panel; the other having two, two-inch, right-angle bends, is used as the sub-panel. On the front panel, from left to right, the controls are: a .0001 mf. trimmer condenser, the two-gang .00014 mf. main tuning condenser (with the vernier dial), and the 50,000 ohm regeneration control. On the top of the sub-panel, in front, are: the 34 r.f. tube, the main tuning condenser, and the detector coil socket. To the rear of the 34 is the r.f. coil socket, and behind the detector coil socket the 19 tube socket is located. On the rear bend of the sub-panel are mounted the twin binding posts (antenna-ground) and the phone-jack assemblies. In the center of the rear bend is mounted the five-prong tube socket for connection to the battery cable. All resistors and by-pass condensers are mounted on the lower side of the sub-panel, directly on the prongs of the sockets, as shown in the accompanying photographs.

Construction

With the pictorial and schematic diagrams given, it should be a very simple matter to construct a set of this type. The old rule of short leads holds true in this, as in every other case. It is permissible to make long and square leads for neater appearance in filament, and "B" and "C" potential connections, but all r.f. leads, especially in grid circuits, should be made as short as humanly possible. This accounts for the direct mounting of the condensers and resistances on the socket terminals. Good solder connections are likewise a primary requisite for satisfactory results. The use of cheap solder, acid-core solder and a dirty or half-heated iron have caused countless poor and noisy connections which have been the reasons for many set-builders landing within the portals of the "insanitarium."

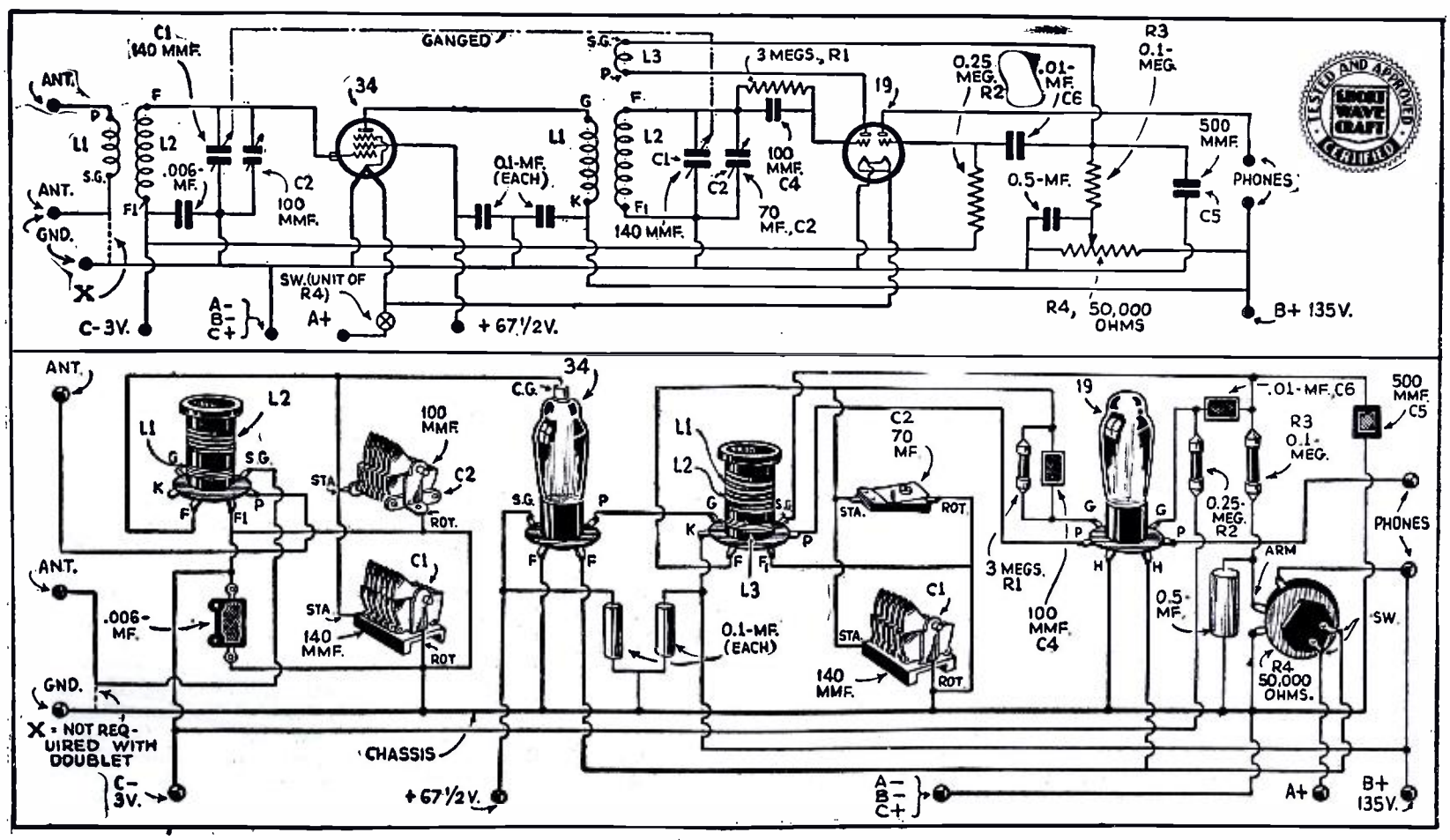
Antenna

The primary connections on the antenna coil are brought out to two insulated binding posts so that the doublet type of antenna system can be used. If you have never used the *doublet* and a well-designed transposed lead-in, I would strongly advise that you try it. A carefully constructed antenna of this type will produce amazing results in lowering background noise-level and raising signal strength. If a doublet is not available, a good single wire antenna as high as possible and at least 40 feet long should be used. Whether a doublet is used or not, remember that a good *ground* is just as essential now, as it was in the days when the "old-timers" used to bury copper plates underground and wet them with pails of salt water every day. When a single wire antenna is used, the other side of the primary should be grounded as shown in the drawing and indicated by the dotted line. Several articles in previous issues of SHORT WAVE CRAFT have given full constructional data on various types of doublets and a perusal of these articles will be both edifying and instructive.

Batteries

The filament drain of the two tubes is .32 ampere, and a pair of No. 6 dry cells, connected in series should run this set satisfactorily for at least six months of normal operation. If dry cells are used instead of the two-volt cell of the storage battery, either a regular 10-ohm rheostat, or a 3-ohm fixed resistance should be used in series with the "A" positive lead. Since the total plate current of this set is only seven milliamperes,

(*Continued on page* 299)

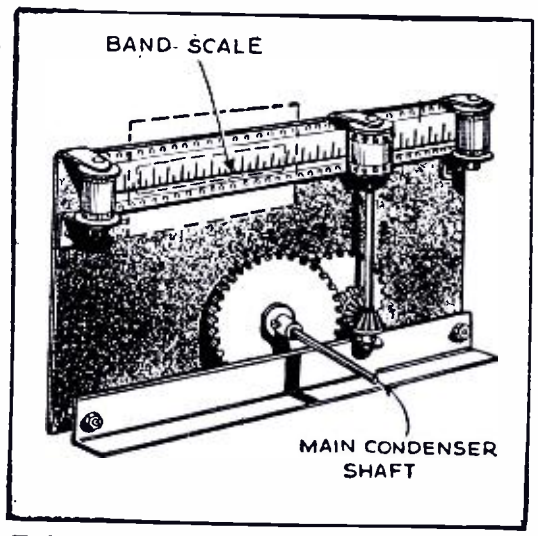


Wiring diagrams, both schematic and physical, are here presented so that even the beginner will experience no difficulty in building this excellent short-wave receiver. This set is designed for headphone operation and works as smooth as silk.

WORLD-WIDE SHORT-

A Wide-Band Tuning Scale

● THE tuning dial for all-wave receivers shown in the accompanying illustration appeared recently in *Wireless Magazine* as a solution to the problems presented by multi-scale tuning dials. As shown, it consists of a long translucent band driven by a sprocket which meshes with holes on the



This tuning dial has a celluloid scale moved like motion picture film.

edges of the strip, similar to the drive used for motion picture film. The advantages of this dial over previous types are the fact that only one tuning scale appears at one time which simplifies calibration. The sprocket is driven by a chain of gears from the main tuning condenser shaft, which moves it back and forth as various stations are tuned in.

Tubes for Ultra-Short-Wave Transmitters

● IN a recent issue of *Funk Magazin*, a German radio publication, some interesting facts concerning the selection of tubes for use in ultra-short-wave transmitters were published.

Experience with small transmitters operating on the regular amateur bands points out the advantage of indirectly heated tubes as oscillators. Because of the larger surface of their cathodes, the indirectly heated tubes have a greater electron emission and a lower internal impedance, thus supplying a higher output than directly-heated tubes. In spite of these facts, directly-heated tubes seem to be more efficient in ultra-short-wave transmitters and they oscillate more easily.

The reason for this fact has been determined after a long series of investigations; it is the capacity between the heating filament inside of the cathode and the cathode which causes the trouble. High frequency currents are to a certain extent shunted by this capacity and pass into the filament supply where they can do no useful work. To eliminate this capacitative leak, the resistance between the cathode and heater has to be increased considerably which reduces the efficiency of the circuit as an oscillator.

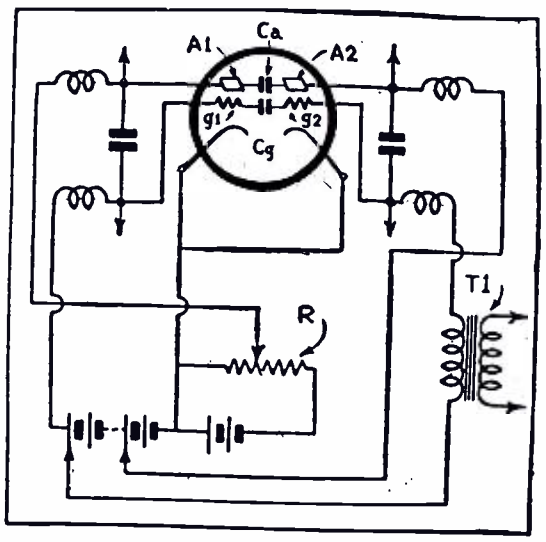
However, by the use of a coil, L1, of the correct inductance and resistance, the capacitative leakage is prevented without the ill-effects of increased resistance. It will be noted from the accompanying illustration that the filament-cathode capacity and the coil, form an oscillatory circuit which increases rather than reduces the oscillation in the circuit.

● 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.

Barkhausen-Kurz Circuit

The accompanying simplified circuit which appeared recently in *Radiowelt Magazine* and is an improvement over the original circuits. According to the sketch, the new tube developed for the purpose has two grids and two plates, each pair being connected respectively with a small condenser Cg and Ca. The first system A1, G1 is connected to the antenna (A Lecher wire system instead of a closed oscillatory circuit) and operates as a regenerative amplifier. Oscillation is controlled by adjusting the negative plate bias by varying potentiometer R.

A very small positive voltage is applied to the second plate A2. The received signal which is amplified in the A1, G1 circuit is coupled through Ca and Cg to the second stage A2, G2, where it is rectified. The A.F. amplifier is connected through transformer T1. The second tube circuit A2, G2 provides very little amplification as mentioned previously but the sensitivity of the receiver is greatly increased by the R.F. amplifier A1, G1.

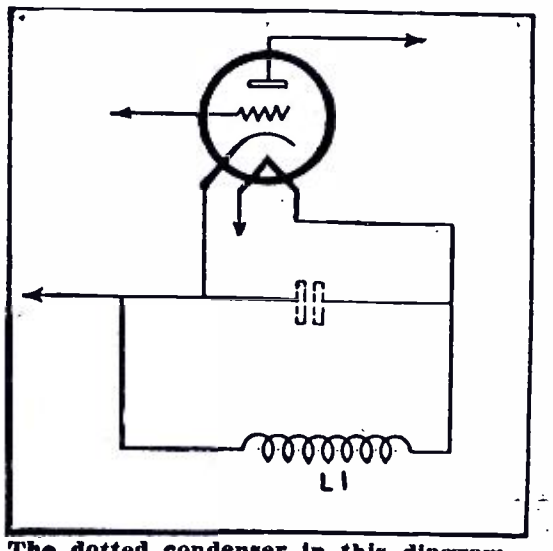


This improved Barkhausen-Kurz tube provides R.F. amplification.

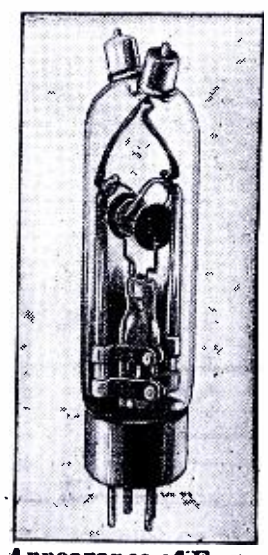
More About Magnetron Oscillators

● FROM time to time on this page we have mentioned the use of "magnetron" tubes for the generation of ultra high frequency waves. These experiments, however, have been limited to the laboratory as no commercial tubes of the magnetron type were available. Now, however, a large tube manufacturer has placed on the European market a practical magnetron generator, which will no doubt find much interest among ultra-short-wave "fans." In the tube illustrated, the individual sections of the plate are not brought out of the tubes separately as in the laboratory models, but are connected internally so that only two plate caps are required for plate connections. This tube is designed to be supplied with filament current from a battery while the plate voltage up to 1500 volts can be applied.

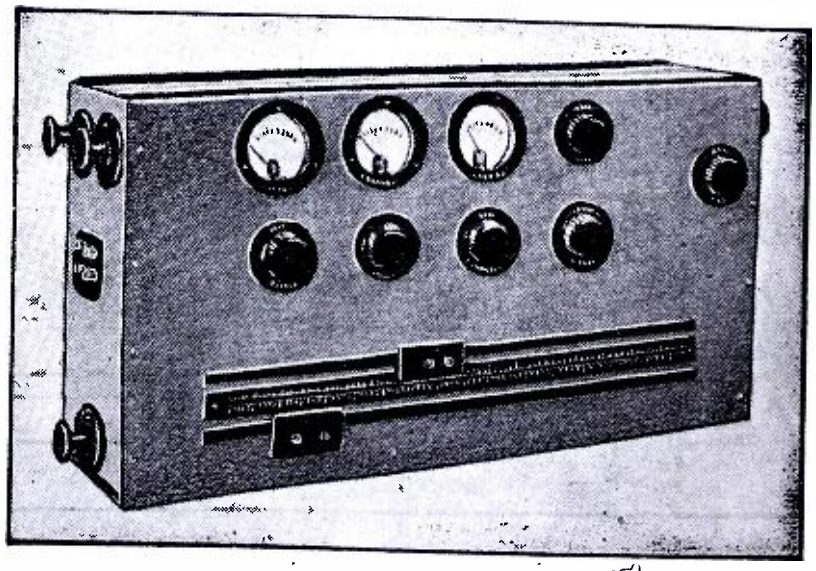
This tube was described in a recent issue of *Australian Radio News* which also showed the picture of a receiving set for the magnetron signals which appears here. This set is so constructed that it is suitable for use on airplanes.



The dotted condenser in this diagram represents the filament cathode capacity.



Appearance of English Magnetron generator.



Here is a receiver for magnetron generated signals. Note the tuning controls.

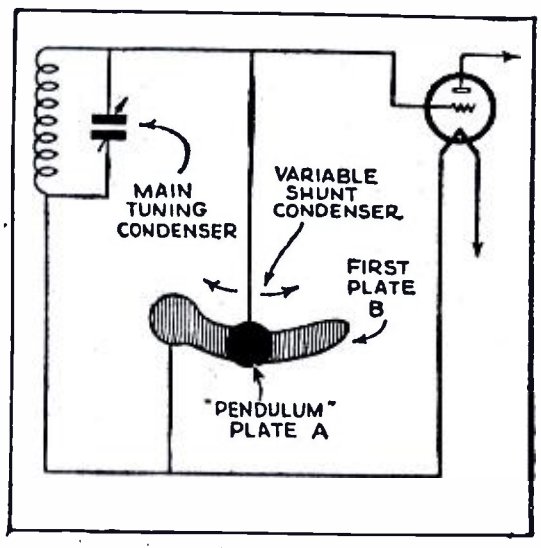
WAVE REVIEW ●● Edited by C. W. PALMER

A Novel Tuning Aid

● IN a recent issue of *Wireless Magazine* a novel aid for the short-wave "fan" was described. As shown in the accompanying illustration it consists of a small continuously variable condenser which produces the effect of a continuous band-spread action as the main tuning condenser is moved from one end of its scale to the other.

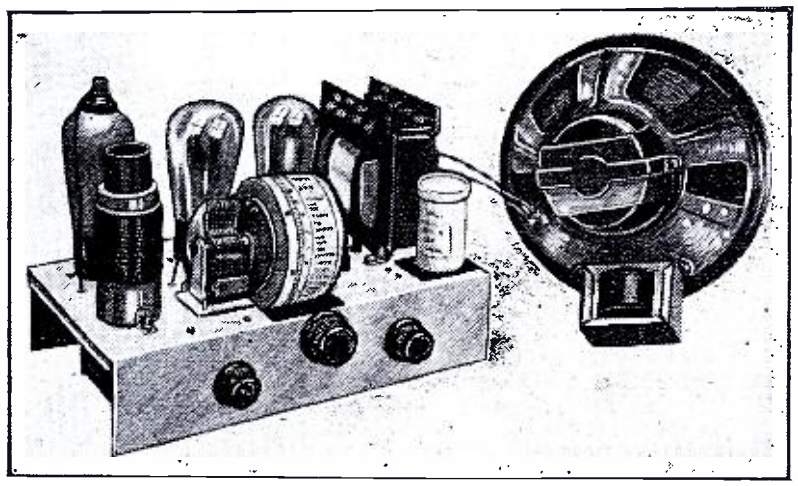
One plate of the condenser is in the form of a curved metal strip, while the other is a small disc supported from a pendulum arm so that it is continually moved back and forth parallel with the surface of the first plate. The effect is, that for each setting of the main tuning condenser, the tuning remains constant for about half the full period of the pendulum swing, *i.e.*, for as long as disc A follows the parallel sides of strip B. Then for a quarter swing the tuning capacity is slightly increased; as disc A reaches the wide end of strip B. This serves to sweep in any signal of a slightly longer wavelength than the one to which the tuning condenser is tuned. Next follows a similar sweep in the downward direction as disc A moves across the narrow end of strip B, thereby slightly reducing the effective tuning capacity.

In searching for a station, the pendulum is first set swinging by hand and the main tuning control is then slowly rotated, stopping after each slight movement in order to give the pendulum condenser time to function. A long pendulum arm is advisable so that the swing is sufficiently slow.



This tuning aid comprises a small two-plate continuously variable condenser.

A 2-Tube All-Wave Receiver



Here's how the finished 2-tube Austrian All-Wave receiver looks. It works a dynamic speaker; the tuning coils are thrown into or out of circuit by means of the simple switches shown in the diagram below.

● A RECENT issue of *Radio Amateur*, an Austrian publication, contained an interesting circuit for a two-tube receiver which is designed for use on the long, broadcast and short waves. In this set an R.F. pentode is used as the detector while the output pentode supplies sufficient output to operate a dynamic speaker for "local" reception.

The tuning arrangement on this set is interesting as it supplies optimum operation on each wave band. Coil L1 is the short-wave tuning coil; Coil L2 tunes the broadcast band, while Coil L3 includes the long-wave broadcasts. It will be noticed that for short-wave operation Coils L3 and L2 are "short-circuited"; for broadcast reception, L3 is "short-circuited" leaving L1 and L2 to act as the complete tuning inductance. For long-wave reception all three of the coils are connected in series.

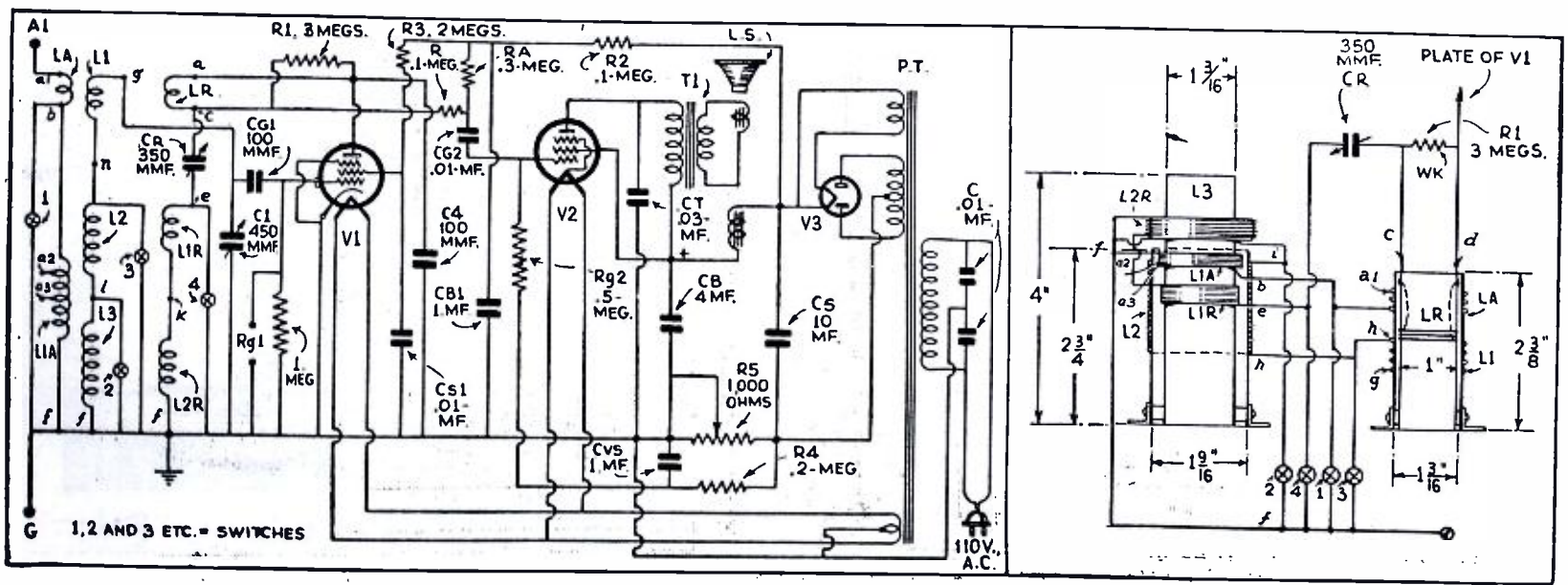
For operation on both the broadcast and long waves, the receiver is coupled to the antenna by a common coupling coil, L1A, while on short waves a special antenna coil LA is used. For short-wave reception the switch, 1, short circuits coil L1A and connects the end of coil LA directly to ground.

Coil LR controls the regeneration for short-wave reception and in order to maintain this value constant over the entire short-wave range, the resistor R1 is shunted across the coil. For reception on the broadcast bands and long-wave bands coils L1R and L2R supply regeneration. Since the tuning coils for the broadcast and short-wave lengths are short-circuited, it is only necessary to provide a single switch for regeneration control. For short waves coils L1R and L2R are short-circuited, while for reception on the broadcast and long waves, coils Lr, L1R and L2R are all left in the circuit.

The coils are constructed as follows: Coil L2 is wound on an insulating tube 1 9/16-in. in diameter and 2¾-in. long. It contains 86 turns of No. 28 enameled wire. Coil L3 and Coil L1A are wound in several layers on a tube one and 3/16-in. in diameter, with No. 30 single silk wire. Coil L3 contains 220 turns and L1A has 40 turns with a space of about 5/16-in. between. The long wave regeneration coil L2R is wound on top of L3, in the same direction. It contains 30 turns. The broadcast regeneration coil L1R is wound on the 1 3/16-in. inner coil and contains 12 turns of No. 30 single silk wire.

The short-wave coils are wound separately from the intermediate and long wave coils. Coil L1 contains five turns, spaced so that the coil is approximately ⅜-in. in length. The antenna coil LA contains three turns also slightly spaced. These two coils are wound on the same form which is 1 3/16-in. in diameter and 2½-in. high. The regeneration coil LR wound on a coil 1-in. in diameter which is located inside coils L1 and LA. It contains three turns wound in the opposite direction to coils L1 and LA. All three of the short-wave coils are wound with No. 18 enameled wire.

The values of all the remaining parts are shown on the schematic drawing while the appearance of the complete set appears in the accompanying photograph. The switching of all of the inductances is accomplished with a single multi-pole, multi-throw unit.



The schematic circuit of the A-C all-wave receiver. Coil construction for the two-tube set at right.

Short Wave Scout News

"Listening In" With Heinie Johnson

(First Scout Trophy Winner, "Official" Listening Post located at Big Spring, Texas)

● THE 25.63 meter French signal wins the honor of reaching this "listening post" better than any of the several European carriers during the past 30 days. At no time over a period of the past three years have we been able to receive the French signals as well as is now possible. The 19 meter signal is also coming in good in the mornings to be sure, but that 25.63 meter carrier is by far the outstanding quality signal of all the Europeans. It is received mighty well during the afternoon hours and especially good between 9:30 and 11:00 P.M., C.S.T. (Central Standard Time; 1 hour earlier than E.S.T.)

We are also hearing DJD and GSD at this same hour. This is a "real treat" to Central States' listeners because, until recently, the 25 meter band died out in the evening with the setting of the sun. Even the powerful and closeby 25 meter W8XK signal faded out at sunset two months ago.

The most interesting of all the Oriental signal is the new "JEM" Japanese station on 27 meters. This signal, put on the air from the same transmitting station as JYR and the 30 meter signal on frequency formerly used by J1AA, is by far the strongest of the three on our receivers here in Big Spring. This station is "dandy" to listen to with your *Duo-Amplidyne* set, that keen little one-tube super-regenerative set described in the June issue of SHORT WAVE CRAFT. We have found that by careful coil construction, this little set will reach down to the 5-meter band!

Surprisingly good reception is still possible on the 48 and 49 meter band by use of simple 1 and 2 tube two-volt sets, due to their low *noise-level*.

"*Hello America*" from HC2RL in Guayaquil, Ecuador, S. A., was heard (June 19) very well over a 2-tube job, while the "regulars" on this band are heard consistently by use of this small set, where as when listened to over our powerful superhet the 49-meter band as a whole is now suffering from "*Summer Noise Level*."

Of course, signals between 15 and 40 meters are brought in best with the larger receiver and quality is running "mighty good," considering the fact that the whole of this district is suffering from dry weather and high winds.

Listeners in their thirst for "DX" (distance) should not overlook the Mexican signals on 31 and 49 meters.

Your report to these signals will get a nice confirmation by return mail, which will include a small "novelty" phonograph record.

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

The record will play and you'll treasure it a long time. The announcer gives the P. O. Box address every night when "signing off".

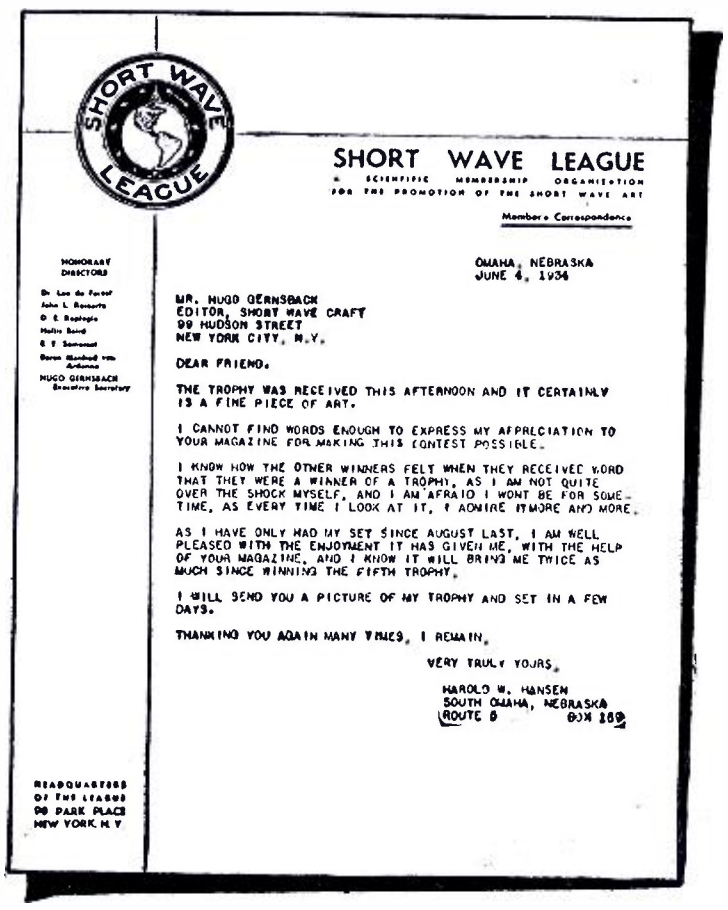
New signals heard this month include VK3BL and LCL. The quality of VK3BL is very good, but we won't brag of the other. This post is tuning and tuning plenty hard in our efforts to catch one of the *African* signals. We will appreciate information from any Central States listener who has had success in this direction.

It seems several Eastern States' listeners have heard them, but so far we have failed at this "listening post".

Tune across the 22 meter section of your dial every time you are near your radio, regardless of the hour. Admiral Byrd is using this frequency for a good portion of his work and you stand a good chance of catching his signal. It has been picked up here after dark, as well as during daylight hours. While we have heard their signal on lower frequency (higher meters) we also have had no really good reception thereon. Twenty-two meters is your "best bet" and an antenna made especially for the job won't hurt. The one we use is a *doublet* made of No. 6 weather-proof copper wire; length of each end of doublet is 16½ feet. The doublet is buried 18 inches under ground with the outer ends as well as center ends brought up out of the ground and housed in small boxes to protect from weather. The doublet runs slightly off of East and West, thereby being directional to North and South. Outer ends of this doublet are tuned instead of center ends. This is accomplished by small midget .00035 mf. condensers connected in series between the ends of the doublet and ground. The lead-ins are transposed from center ends of doublet. You will find it requires help of two other people to properly tune and balance the tuning condensers while you stay at the receiver, but it will prove worth while inasmuch as you can "peak" any desired frequency from 16,000 to 9,000, and since you have made it all for the exclusive purpose of catching Byrd on the 22 meter signal, you need not move out end tuners after once adjusted. The only reasons found for readjusting have been changes in moisture due to heavy rains, which are "scarce as hens' teeth" right now. An *underground antenna* lowers your noise level a noticeable degree but has also hurt our signal strength until we hit on our present plan. This doublet has been used in the "raw" so to speak—no coupling transformers on either end of the "lead-ins". You can try the same plan for any desired frequency by properly lengthening the ends of the doublet. It's a good "specialty" antenna.

HEINIE JOHNSON.

(*Continued on page* 298)



SHORT WAVE LEAGUE
A SCIENTIFIC MEMBERSHIP ORGANIZATION FOR THE PROMOTION OF THE SHORT WAVE ART
Members Correspondence

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Dr. Lee de Forest
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Owen Blackwell 9th Alabama
HUGO GERNSBACK Executive Secretary

OMAHA, NEBRASKA
JUNE 4, 1934

MR. HUGO GERNSBACK
EDITOR, SHORT WAVE CRAFT
99 HUDSON STREET
NEW YORK CITY, N.Y.

DEAR FRIEND.

THE TROPHY WAS RECEIVED THIS AFTERNOON AND IT CERTAINLY IS A FINE PIECE OF ART.

I CANNOT FIND WORDS ENOUGH TO EXPRESS MY APPRECIATION TO YOUR MAGAZINE FOR MAKING THIS CONTEST POSSIBLE.

I KNOW HOW THE OTHER WINNERS FELT WHEN THEY RECEIVED WORD THAT THEY WERE A WINNER OF A TROPHY, AS I AM NOT QUITE OVER THE SHOCK MYSELF, AND I AM AFRAID I WONT BE FOR SOME TIME, AS EVERY TIME I LOOK AT IT, I ADMIRE IT MORE AND MORE.

AS I HAVE ONLY HAD MY SET SINCE AUGUST LAST, I AM WELL PLEASED WITH THE ENJOYMENT IT HAS GIVEN ME, WITH THE HELP OF YOUR MAGAZINE, AND I KNOW IT WILL BRING ME TWICE AS MUCH SINCE WINNING THE FIFTH TROPHY.

I WILL SEND YOU A PICTURE OF MY TROPHY AND SET IN A FEW DAYS.

THANKING YOU AGAIN MANY TIMES, I REMAIN,

VERY TRULY YOURS,

HAROLD W. HANSEN
SOUTH OMAHA, NEBRASKA
ROUTE 8 BOX 169

HEADQUARTERS OF THE LEAGUE
99 PARK PLACE
NEW YORK, N.Y.

What Mr. Hansen Thinks of His Scout Trophy

Harold Hansen with his Short Wave Scout "Trophy."

SHORT WAVE SCOUTS

Seventh "Trophy Cup" Winner—George D. Sallade, Sinking Spring, Pa.
96 Total Stations; 48 Veris

● TIME is flying and here we are awarding the seventh Trophy to George D. Sallade, who used an 11-tube Philco model 16B All-Wave receiver. A simple antenna composed of a single enameled wire, about 100 feet long, together with a connection to a water pipe for a ground, enabled Mr. Sallade to roll up this very ambitious total of 96 stations. We congratulate Mr. Sallade for this fine piece of work.

As we have mentioned previously, the list of stations submitted may be for any 30-day period. Don't send in a list of stations until you have received at least 50 per cent veris, so as to make the list eligible for entry in the contest, and send in list and all veris in one package. The verification cards must be those received in answer to inquiries made regarding programs heard during your selected 30-day Official Listening Period! In writing or typing your list of stations, frequencies, etc., it is best to arrange the stations in two lists, the first *verified* and the second the *unverified* stations. Also state the total number of stations, and the number of verified ones submitted. Don't forget to go before a local notary public and take an oath to the effect that the person submitting the list has *personally* listened to the stations named.

Mr. Sallade Describes His Set

Editor, SHORT WAVE CRAFT:

I submit herewith, my list of stations for entry in the SHORT WAVE SCOUT Monthly Contest. Enclosed with my letter will be found verification of all stations marked with an asterisk.

I have followed all the rules of the contest; and have dated my list from *April* 19, 1934 to *May* 18, 1934, during which period of time the stations listed were received.

The receiving set used in working up the "log" of short wave stations is an eleven-tube Philco 16B All-Wave Set. The antenna is a single enameled wire about one hundred feet long. The ground is connected to an ordinary water pipe.

This contest that you are sponsoring is a wonderful thing, and I wish to thank all persons who have made this possible.

Yours sincerely,
GEORGE D. SALLADE,
649 Vester Place,
Sinking Spring, Pa.

"Log" of Short-Wave Stations Submitted by Mr. Sallade

CEC—15.86—Phones with LSQ in P.M.—Santiago, Chile.
CEC—19.68—Heard in afternoon—Santiago, Chili.
*CFU—5.56—Irregular (see letter)—Rossland, B. C.
*CJRX—11.72—7-9 P. M.—Winnipeg, Man.
*CNR—12.8—Phones Ste. Assise—Rabat, Morocco.
CNR—8.03—Sundays 3-5 P. M.—Rabat, Morocco.
*COC—5.99—See card—Havana, Cuba.
CP7—15.3—10-10:30 A.M.—La Paz, Bolivia.
CT1AA—9.6—Tuesday, Friday, 4-6 P. M.—Lisbon, Portugal.
DFB—17.51—Calls German Ships A. M.—Nauen, Germany.
DFL—10.85—Relaying Graf Zeppelin—Nauen, Germany.
DGU—9.6—3-4 P. M. Irregular—Nauen, Germany.
*DJA—9.56—See card—Zeesen, Germany.
*DJB—15.2—See card—Zeesen, Germany.
*DJC—6.02—See card—Zeesen, Germany.
*DJD—11.76—See card—Zeesen, Germany.
*EAQ—9.8—See card—Madrid, Spain.
FTK—15.8—Phones FZS in A. M.—Ste. Assise, France.
GBC—12.78—Phones N. Y. daily—Rugby, England.
GBU—12.2—Phones N. Y daily—Rugby, England.
*GCW—9.79—Testing with N. Y.—Rugby, England.
*GSA—6.05—6-8 P. M. (Not used since April 22), Daventry, England.
*GSB—9.5—1-4 P. M.—Daventry, England.
*GSC—9.58—6-8 P. M.—Daventry, England.
*GSD—11.75—6-8 P. M.—Daventry, England.
*GSE—11.86—11 A. M.-12:30 P. M.—Daventry, England.
*GSF—15.14—9-10:45 A. M.—Daventry, England.
*GSG—17.7—9-10:45 A. M.—Daventry, England.
*HBL—9.59—Saturdays 5:30-6:15 P. M.—Geneva, Switzerland.
*HBP—7.79—Same as HBL—Geneva, Switzerland.
HCJB—4.1—Evenings—Quito, Ecuador, "La Voz de los Andes."
HC2RL—6.65—Tuesday 9:15-11 P. M.—Guayaquil, Ecuador.
HIZ—6.37—3:40-4:15 P. M.—San Domingo, D. R.
*HI1A—6.27—See card—San Domingo, D. R.
HJ1ABB—6.45—5-10 P. M.—Barranquilla, Col.
HJ3ABD—7.4—7:30-9 P. M.—Bogota, Col.
HJ3ABF—6.2—7-9 P. M.—Bogota, Col.
HJ5ABB—6.5—Tuesday 7-10 P. M.—Cali, Col. "La Voz delle Valle".
HJB—14.9—Phones LSQ evenings—Bogota, Col.
HPF—14.45—Phones WNC about 5 P. M.—Panama City, Panama.
HVJ—15.12—5-5:30 A. M. except Sunday—Vatican City.
*I2RO—11.8—2-5:30 P. M.—Rome, Italy.
KEJ—9.01—Tests evenings—Bolinas, Calif.
KKH—7.52—Evenings about 10 P. M.—Kahuku, Hawaii.
KKP—16.03—Evenings about 10 P. M.—Kahuku, Hawaii.
KKZ—13.69—Tests with KKP—Bolinas, Calif.

* Verified.

SEVENTH "TROPHY CUP" WINNER

Presented to
SHORT WAVE SCOUT
George D. Sallade
Sinking Spring, Pa.

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

John Tammermagi, 1417 Webster Ave.., Apt. 26, Bronx, N. Y. 90S; 45V.
Mr. A. L. Mainhofer, 1898 Billingsley Terrace, Bronx, N. Y. 90S; 38V.
Ensign C. Balch, M.D., 1319 State Ave., Coraopolis, Pa. 87S; 58V.
Arthur F. G. Bruder, 11 Everett St., Alton, Mass. 84S; 43V.
Howard Eckert, New Albany, Ind. 68S; 40V.
Merrill Bushong, Williamstown, Ohio. 66S; 33V.
Henry W. Mier, Ionia, Michigan. 54S; 31V.

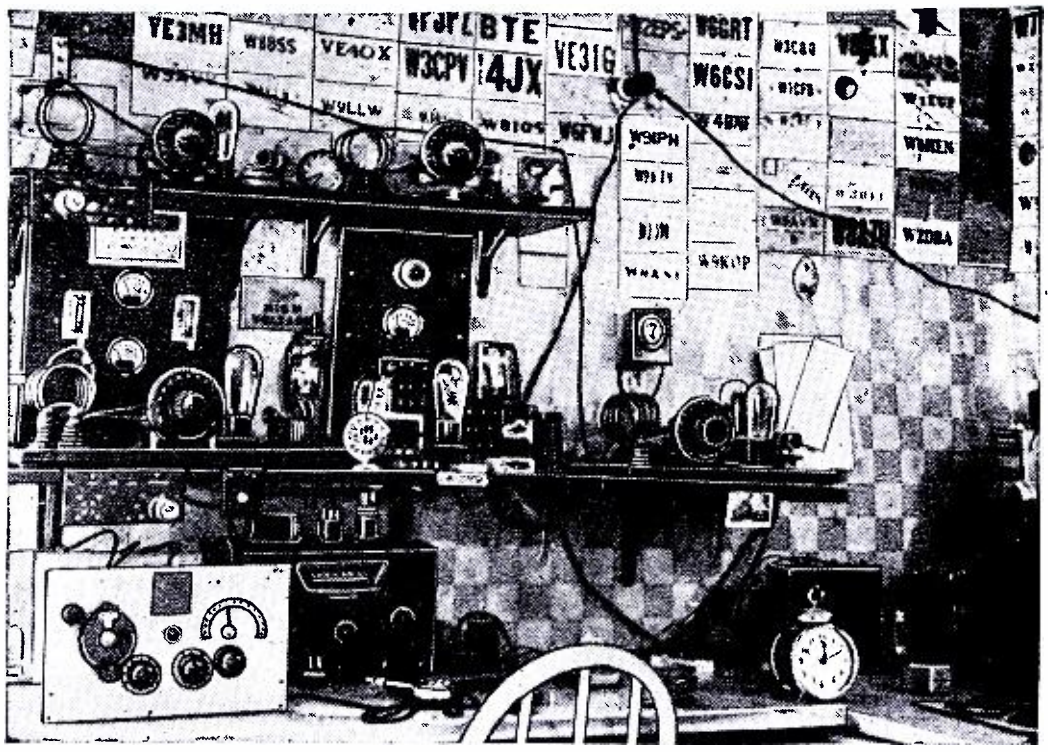
S—Total number of stations submitted.
V—Total number of verifications submitted.

(*Continued on page* 317)

SHORT WAVES and

W5DFO Gives Thanks For Our Designs

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



"Some baby" this station—and it answers to the call of W5DFO. All of the apparatus used in this station was built from diagrams and descriptions given in SHORT WAVE CRAFT.

Editor, SHORT WAVE CRAFT:

SHORT WAVE CRAFT is worth twice the price asked to anyone interested in short waves.

Everything was built from diagrams given in SHORT WAVE CRAFT. I have a transmitter for 20-40 and 80 meter band. Can change from one band to another by *switches.* This makes it very convenient for me, because I can get QSO's through QRN, or "what have you." I use a single 45 TNT with about 250 volts and it covers U. S. A., Southern Canada, VE2-3-4-5; K5; VP5; X1 and TI. I have one 40-meter "rig" using Single 210 TNT, 600 volts. Another 40-meter "rig" using a pair of 45's-TNT P.P. with 250 volts. "R.T." transmitter circuit described in Oct., '33, issue, page 343.

I work ZL and VK regularly with the 40-meter "rig" and work all districts in U. S. A. on 80 meters, with fair weather conditions.

I had QSO with W3JRL who was using a 500-watt "rig" and he said he was going to rebuild his "rig" and that he was going to install a pair of 45's—Hi! Hi! I was using the P.P. 45's with 250 volts. Then, he said my "rigs" were F.B. QSA5-R8 and plenty of sock!

The receiver is a *Doerle* using 30 detector and 30 audio—and of course I use "band-spread."

We "low-power" Hams can sure have a big time until—"QRM 500 watts R9 and then Cuagr OB." Hi! Hi!

Wouldn't it be grand and so much less cost if 15 watts was the limit? Hi!—Then "DX" would be a thrill and most everyone would have an even break.

Now in the photo: upper left is 40 meters 210; upper right is 20 meter 45; lower left is 80 meter P.P. 45's; lower left is 250 volt power supply; extreme right P.P. (40 meter) 45's; plate meters and switches can be seen on wall between transmitter. On table at the left is 2-tube receiver; back of it and a little to the right is the monitor.

FRANK MILTON, W5DFO,
Wolfe City, Texas.

(*Fine business, Frank, and we are pleased to note that you have had such excellent success with the transmitter and receiver designs published in* SHORT WAVE CRAFT.

AGAIN THE "DOERLE" WINS

Editor, SHORT WAVE CRAFT:

I am writing to you to let you know that I have completed my short-wave receiver, which is the *Doerle* 2-Tuber.

I have received the following short-wave broadcasting stations: VE9GW, Bowmanville, Canada; W8XK, Pittsburgh, Pa.; W3XAL, Bound Brook, N. J.; W9XF, Chicago, Ill; also, the following amateurs and radiophone stations: W9QAX, W4CCN, W1QV, W9VEL, W1BBA, W1APQ, W3AQR.

ROBERT GONDREAU,
87 Washington St.,
Biddeford, Me.

(*Fair enough, Robert, and it sure does seem as if the Doerle receiver is going to top the number of votes on the "honor roll," as the Editors have received more letters commending this receiver than any other one described in* SHORT WAVE CRAFT. *One of the excellent points, of course, about the Doerle is that it represents the simplest and most reliable hook-up ever conceived.—Editor.*)

"HATS OFF" TO THE ARGONAUT!

Editor, SHORT WAVE CRAFT:

I wrote you some time ago telling you of my remarkable success with one of your receivers, but since then, I have received so many more stations I feel that I should write again. Since building the *Argonaut,* your 2-tuber (described in the August, 1933, issue), I have received over 200 stations—some of the more distant ones are: DJB, Zeesen, Germany; W8XK, Pittsburgh, Pa.; GSF and GSD, Daventry, England; VE9JR, Winnipeg, Can.; VE9GW, Bowmanville, Ont., Can.; HJB, Bogota, Columbia, S. A.; EAQ, Madrid, Spain; W2XE, New York; W8XAL, Cincinnati, Ohio; W9XF, Chicago, Ill.; W3XL, W3XAL, Bound Brook, N. J.; W9XAA, Chicago, Ill.; XETE, Mexico City, Mex.; VK3ME, Melbourne, Australia; VK2ME, Sydney, Australia; YV1BC, YV2BC, Caracas, Venezuela; HJ4ABB, Manizales, Colombia; HCTRL, Equador, S. A. Some of the amateurs received are: CM2JM, Havana, Cuba; X1G, Mexico City, Mex.; VE2BE, St. Santa, Quebec; VE5BJ, Vancouver, B. C., Can.; VE2CA, St. Lamberts, Que., Can.; OA1B, Peru; VE3HE, Toronto, Can.; VE3BW, Bowmanville, Ont., Can.; VE1BA, St. John, Can.; VE4MV, Manitoba, Can. Besides all of these "hams," I have received them from all U. S. districts. I also buy every issue of SHORT WAVE CRAFT and think very highly of it. I wish you would publish more "fiction."

W. BRAINARD CASEY,
5031 Woodland,
Kansas City, Mo.

(*We are pleased to hear that the 2-tube* ARGONAUT *receiver has brought in so successfully the DX short-wave stations you mention in your letter. The circuit of this receiver is a very simple and stable one. You have certainly had fine success with it. We intend to publish more short-wave "fiction" in a very early number, possibly the next one. Thanks for your interest in* SHORT WAVE CRAFT *and "o'mup 'n see us sometime" in our new headquarters.—Editor*)

QUICK, WATSON—THE NEEDLE!!

Editor, SHORT WAVE CRAFT:

It seems a letter from "Yours Truly" is due at last. Since SHORT WAVE CRAFT began and up to now, every issue has been debated over pro and con with not only friends but also my "common-sense self." It boils down to this:

Such circuits and sets as the Doerle (which you made quite a "fuss" over), as well as 80 per cent of all you describe are fundamentally the same. Their only difference lies in their modifications or additions to the original Reinartz circuit described 13 years ago. Their only value, aside from starting the beginner (which is a worthwhile purpose, I admit) is to point out features which, in compromise with others, will produce a really practicable receiver—all OK so far—but don't give credit where credit isn't due.

Such articles as "Power Transformer Data," by O. K. Tipsel in your January, 1934 issue, are decidedly informative and important to any "ham" or experimenter. They are altogether too "rare," however. It is articles like this one that make "back number" *value* a reality for reference work and indispensable to those in my class. About your 5-meter code argument—as I always was in favor of a stiff exam. by the F.R.C., I shall not abide by any decision abolishing "CW" exams., etc., unless they are genuinely imperative. I wish, however, that action would be taken about the issue. So far, only "talk" has resulted.

One Year's Subscription to
SHORT WAVE CRAFT
FREE
for the "Best" Station Photo

Closing date for each contest—60 days preceding date of issue; Sept. 1 for Nov. issue, etc. The editors will act as judges and their opinions will be final. In the event of a tie, a subscription will be given to each contestant so tying.

I have built over 150 S.W. receivers and find that as a result of this experience, any well-constructed set, no matter whether it be a single 99 or a 16-tube "super" affair, is capable of 12,500 mile DX, provided that a reasonably efficient aerial is used in a normal location. Therefore why all the bunk on "This set when tested received, GSA, DJA, VK2ME, etc."—why shouldn't they? Are not the peculiarities of Short Waves so designed to include DX among their offers and in a normal way too?

If your magazine be printed as a radio experimenter "mag."—why include "advs" like Hotels, Insurance, etc., which are totally irrelevant to the subject of *Radio*—

(*Continued on page* 317)

LONG RAVES . . . OUR READERS' FORUM

O.K. "YL'S"—HERE'S YOUR CHANCE!

Editor, SHORT WAVE CRAFT:

I have been reading SHORT WAVE CRAFT for almost two years, and I regard your magazine as an excellent and very helpful one to both short-wave "experimenters" and licensed "Hams." I have built many of the receivers described in your issues, such as the 2 and 3 tube *Doerle* hook-ups, the *Oscillodyne*, and many other sets which I sold to friends. At present I am planning to build the 6-tube superhet described in the May issue of SHORT WAVE CRAFT, by Herman Cosman. In answer to your call for more station photos, I am sending one of my radio "shack" which I hope to make a center of activities when I obtain my license.

On the extreme right is a "power supply" panel which supplies power for the whole "shack." On top of this panel is a broadcast receiver controlled by three switches at bottom of panel. The instrument on the left of the power supply panel is a circuit-breaker, which is used to protect the line from "over-load" currents. To the left of the power panel, is a small *speech amplifier* which is used for small jobs, where public address systems are needed. To the left of the speech amplifier is a home-made panel with a few of the many receivers I have built (each one is shielded from its neighbor) on it. The receiver which is in back of the OM is an 8-tube superhet, which was bought from the proceeds of the receivers I have sold. With my various receivers, I have received QSL's from W1, W2, W3, W4, W5, W6, W8, and W9, districts and VE1, VE2, VE3, and K4SA, and GSC, GSD, England. I have sent cards to many other stations but have not yet received answers. Cards were sent to J2GX, Tokio, Japan, on May 23, 1934, and four Cubans. I am at present building the most popular phone transmitter, mainly the "rig" using a string of 46's, modulated class B. I am a "listener" now but soon expect to be a full-fledged "ham." I would be glad to correspond with any short-wave listeners or

(*Continued on page* 317)

We Want More *Good* STATION PHOTOS

Be sure they are CLEAR!!! And if small size, include the negative, so we can make ENLARGEMENTS if necessary.—Editor.

Zowie! What An S-W Station!

Max Fiegen has a very fine short-wave station which boasts an elaborate array of apparatus, including a 11-tube short-wave receiver and also a 5 and 10-meter set.

ZOWIE! WHAT A STATION!

Editor, SHORT WAVE CRAFT:

Herewith is an answer to your "C.Q." call for Short Wave Listener's Stations. On the table to the left of the picture you see a plug-in coil set, using 56, 57 and 58 tubes. The receiver above the speaker cabinet is a 11-tube delayed automatic volume control-superheterodyne with dual dynamic speakers and class "B" Amplification. The tubes are: R.F. amplifier-58; suppressor-57; modulator-58; oscillator-56; I.F. amplifier-58; 2nd detector-55; 1st Audio-57; Driver-59: power output-59; rectifier-82.

There is a converter having 57, 58 and 80 tubes. Above the 11-tube receiver is a 5 and 10 meter receiver. In the window at the right is a short-wave receiver using 6A7 modulator-oscillator; 6F7 1st I.F. and 1st A.F.; 6B7 2nd I.F. and 2nd Det.; 42 output and an 80 rectifier. The unit on the floor is a "checker" and contains an oscillator, a beat-oscillator, a monitor, a wavemeter and power supply.

I am a member of the SHORT WAVE LEAGUE and a reader as well as a builder of the sets described in SHORT WAVE CRAFT.

MAX FIEGEN,
2024 Lane Court,
Chicago, Ill.

(*Where did you get it all, Max? Looks like you had enough apparatus for two ordinary S.W. stations. We'll bet you roll in the DX short-wave stations like nobody's business.—Editor*)

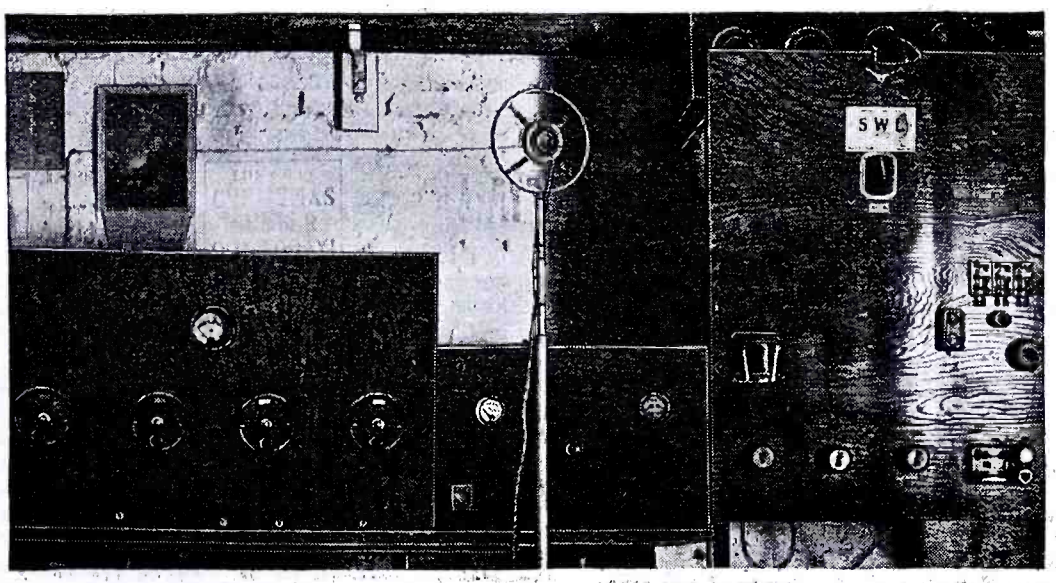
"TRIPLEX 2" KNOCKS 'EM DIZZY!

Editor, SHORT WAVE CRAFT:

I have in my radio "shack" one of the best little sets I have had the pleasure of making, and let me thank you and Mr. Shuart for his great "masterpiece." Boy, I can't get over it, I can't put my feelings in writing as if I were talking to you personally, but I sure thank you and Mr. Shuart for the "*Triplex* 2." I have no trouble in getting England, Germany and Italy. I have not logged "France," but if it is on the air I will get it. I have made an amplifier which I use and boy. Germany or England will "drive you out of the house!" The amplifier I use is a 4-tube job—two 45's and two 27's. When I say these stations will "drive you out of the house" I mean it. I hope you continue to describe "good" sets. And thanks a lot.

J. T. MAHER, JR.,
406 Maple St.,
Holyoke, Mass.

(*Hot Ziggedy, J. T. M., but Holyoke must be a "cracker-jack" location for short-wave reception and we hear plenty of "hot news" from your neck of the woods. We are quite tickled that you have had such a lot of success with the "Triplex* 2." *The editors, while testing the "Triplex* 2," *found it to be a particularly efficient and very smooth working set.—Editor*)



Here y'are, YL's—Mr. Treiber says that he would like to communicate with the Young Women amateur station operators—so grab that key and let's go.

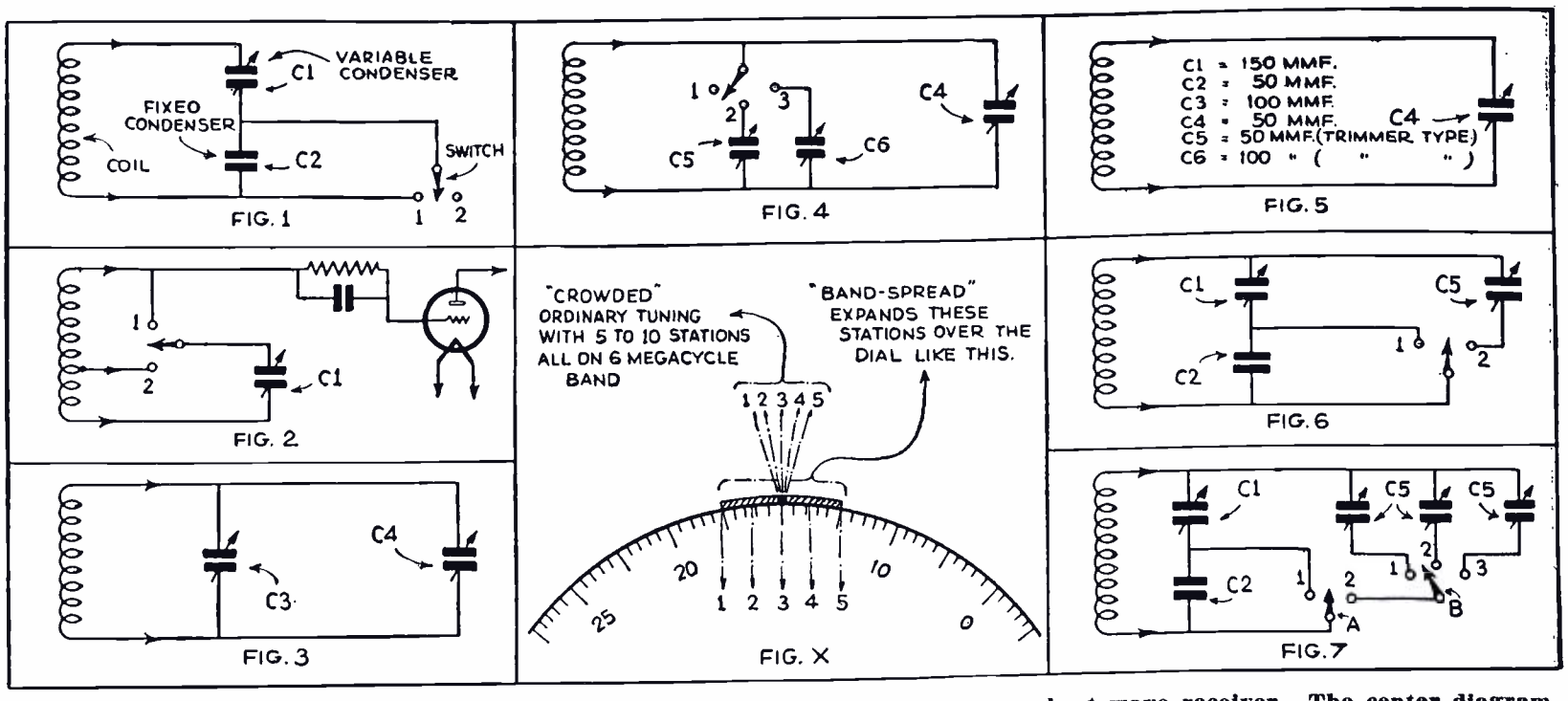
HOORAY FOR THE "PENTAFLEX"!

Editor, SHORT WAVE CRAFT:

I can't help wondering why there are no comments on the "*Pentaflex*" as described in the September issue. I have built this outfit and it works like "nobody's business!"

I have used some new parts and some "junk-box" parts. I can get *loud-speaker* reception over the "single lunger," police,

(*Continued on page* 317)



The diagrams above show how simple it is to provide "band-spread" tuning on your short-wave receiver. The center diagram illustrates the benefits derived from "band-spread" tuning.

BAND-SPREAD Methods

Explained By Jerrold A. Swank

● FIRST of all, I do not think it would be amiss to consider just what *band-spread* is. It is a method whereby any portion of the short-wave spectrum is spread out over a greater portion of the tuning dial than it would ordinarily occupy. The average plug-in coil covers so much territory that careful and extremely slow tuning is necessary in order to locate and "tune in" a station when using the usual tuning condenser. By dividing sections of this territory into "bands" we may use any one band at a time, and tune it only with a condenser arrangement which will not cover more than the desired band. Many fans think that this separates the stations more than straight tuning. It does so only mechanically. Electrically there is no advantage. *If two stations are so close that they interfere with an ordinary tuning unit, they will still do so when it is "band-spread".* Band-spread merely makes it easier mechanically to search for stations. It does NOT improve selectivity. So much for that.

Different Examples Given

There are many methods of band-spread, and which one you use depends a great deal on just what use you intend to make of your receiver. If it is only for *amateur band* use, the matter is simple. However, most fans desire to cover all frequencies, but also wish to be able to spread any portion of the spectrum at will. This article will cover many methods, and the reader may select the one which best serves his purpose. After studying the examples given, you should be able to devise many other combinations so that you may even have a sort of "band-spread de-luxe" which will almost necessitate a written "combination", like a safe.

Figure 1 shows a simple but effective method of switching from *band-spread* to *full coverage.* The drawings only show the *grid* or *tuning portion* of the coil, since this is the only portion affected. There is in addition the usual tickler coil, with which all of us are familiar. With this method shown in Figure 1, when the switch is open, there is a fixed capacity (C2) in series with the main tuning condenser (C1), which makes the large capacity of the tuning condenser decrease in accordance with the rule for series capacities, and it has the same effect as though a single condenser, of much smaller capacity were used. The coil in this case must just reach the high frequency end of the band desired when the condenser is open. Then when the switch is closed, the tuning condenser resumes its former full capacity, and full coverage is given for the normal range of the coil. The disadvantage of this method is that the coil must be wound to start at the end of the band which it is desired to spread.

"Band-spread" is, today, one of the most important terms discussed whenever short-wave "fans" get together. And rightly so, for after all why be satisfied with split-hair tuning, like that found on many short-wave receivers, with half a dozen European and South American stations crowded into one degree on the tuning dial? For by using one of the simple methods here described by Mr. Swank you can spread out the 6 megacycle band, for instance so as to make the tuning of foreign stations a "real pleasure" instead of a "headache".

However, if you will refer to Figure 6, you will see how this disadvantage may be easily eliminated. Here, instead of throwing the switch to an open position, it is thrown to connect C5 across the other capacity combination. C5 is an ordinary small trimming condenser of the screw-driver adjustment type, and is adjusted so that the desired band is properly placed on the tuning dial. Then when the switch is thrown back to position 1, the circuit is restored to normal, and C1 becomes alone the tuning condenser, giving the *normal full coverage.*

Figure 7 shows a "deluxe" version of this which the writer tried, and it works well, but rather limits the flexibility of the set. However, it shows to what extent the idea can be carried. Switch "A" is the switch which throws the set from *normal* to *band-spread,* and switch "B" determines the range of the spread portion. For example, in the instance cited the writer had the three trimmers (C5- set so that with switch "B" in position 1 the 49-meter broadcast band was on the dial, in position 2 the 40-meter *ham band* was "up", and in position 3 the 31-meter broadcast band was on deck. Thus I could tune in S-W broadcast stations when I wished without disturbing the settings of the *ham band,* so that I could find stations whose dial settings I had recorded.

Tapped Coil Method

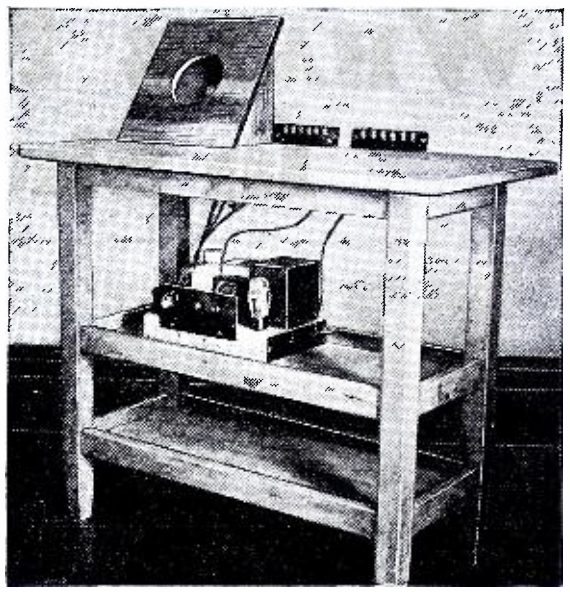
Figure 2 depicts a method popular in certain commercially built receivers, but changed to permit switching it *in* and *out.* A tap on the coil is made at such a place that the regular tuning condenser when placed across this portion will spread the desired band over a large portion of the dial. If you have a receiver that uses this method, such as the National SW3, and have band-spread coils, you can take out of the coils the band-spread arrangement they have, and by installing a simple single-pole double-throw toggle switch as shown

(Continued on page 301)

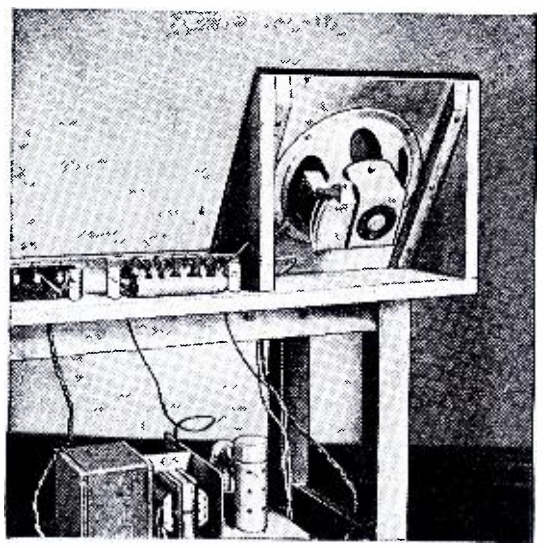
A High Quality AUDIO-AMPLIFIER and Power-Supply

By EUGENE V. CYRAN

The author has endeavored to provide a "high-quality" Audio Amplifier for use with any short-wave receiver, the amplifier having been designed to give a relatively high output, free of any annoying "hum." He also describes the construction of a substantial table and baffle to support the amplifier and loud-speaker.



Above—Note the very neat appearance of the substantial wooden table and loud-speaker baffle described by the author in the accompanying text.



A "close-up" of the dynamic-speaker baffle-board and one of the terminal boards.

● IT has been found from my experience that in trying out the various circuits presented by SHORT WAVE CRAFT or circuits of my own design, a "hum-free" power-supply, a good amplifier, and a table on which it is convenient to work, are indispensable requisites. For greater efficiency in our work and for greater pleasure that comes from "dabbling" in short wave radio, these things are the "berries."

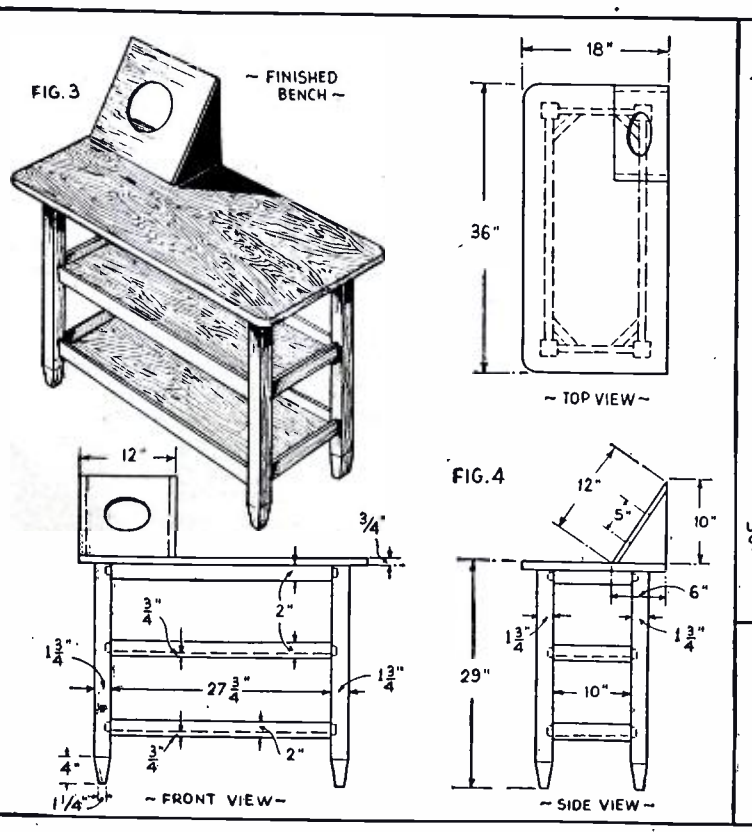
Three Essentials of Every Set

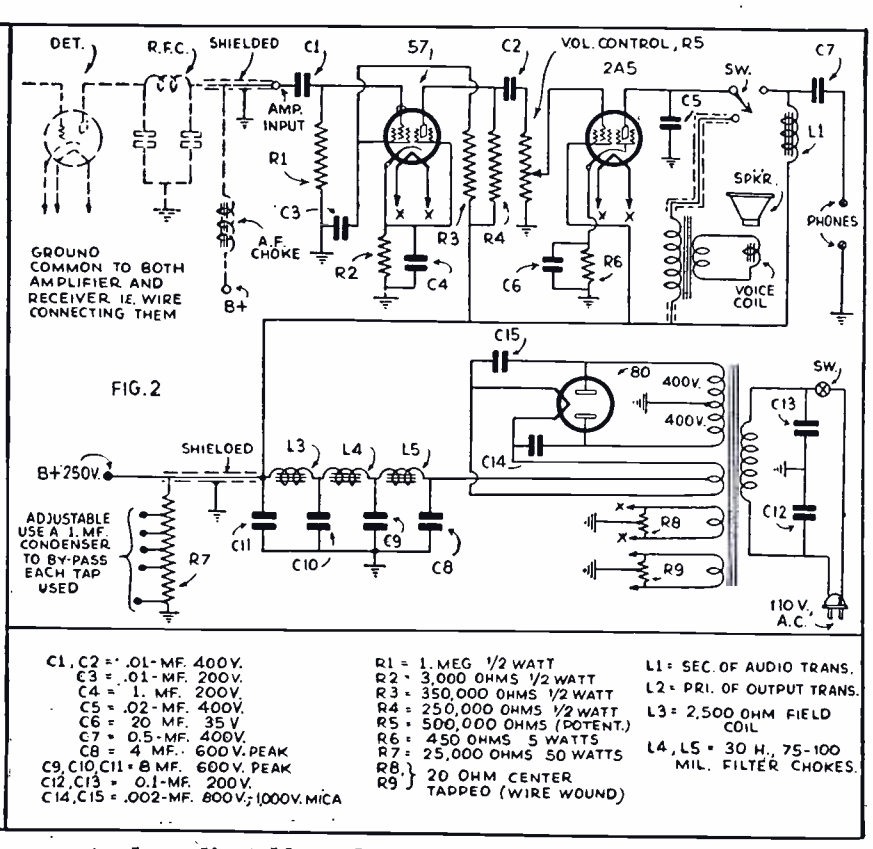
It is generally acknowledged that an *audio amplifier* is a prime "constant" in any radio circuit. Then why not design a *good* audio amplifier that can be used in conjunction with any receiver—an amplifier that has high "gain," high sensitivity, and relatively high output. The power-supply is another "constant." The supply should be capable of producing pure D.C.—with no trace of hum. It should be well by-passed so that "tunable" hums do not appear. In this respect *autodyne* receivers are especially susceptible. It should also be capable of giving enough current to meet the needs of all of our experiments with receivers. The amplifier and the power unit may be mounted on the same chassis. The third "constant" is a bench suitable for our purposes. The speaker should be "built in." Space should be available for our *amplifier* and *power supply* besides for our tools, tubes and all other odds and ends necessary for the "fan."

Resistance-Coupled A.F. Used With High Gain

After much experimentation, I have worked out a combination that is "unbeatable" in all of these respects. Upon glancing on the diagram of the amplifier (fig. 2), it is found that a 57 pentode is the first audio tube, and that it is resistance-coupled to the second tube, the 2A5. Resistance coupling is used because it offers a better audio response than transformer coupling. Impedance coupling would give a slightly higher gain, but it would not be enough to compensate for the higher costs of the impedances and the extra room which it would take. Audio transformers would offer a considerable more gain, but remember that as it is now (resistance coupled) the 57 has a volt-

(*Continued on page* 304)

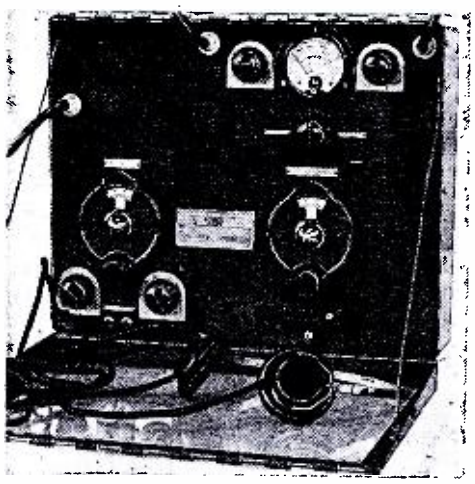


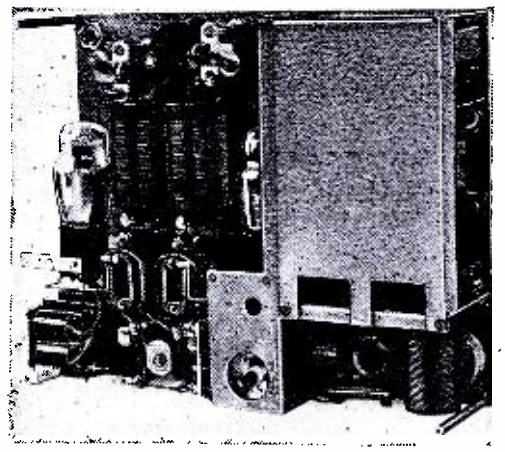


The drawing above includes dimensions for building the very sturdy radio table and speaker baffle-board, as described by the author, and shown also in the photos above. Wiring diagram for the A.F. amplifier is given at the right.

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.





Above: Portable Transmitter-Receiver "open"; also, rear view of chassis. Diagram of connections given below. (No. 196)

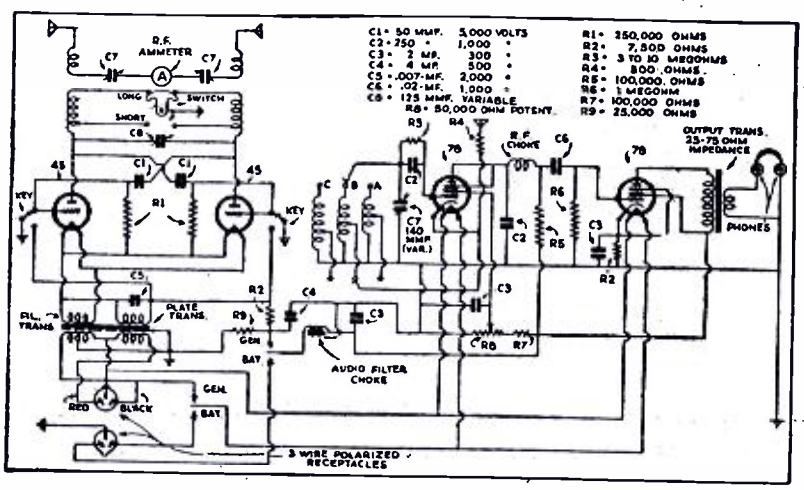
● THIS *portable* "transmitter-receiver" requires no batteries, is all A.C. operated, obtaining its power from a manually-operated generator. A separate three-wire polarized plug receptacle is provided so that both "A" and "B" battery supply may be plugged in to the set to operate the receiver for "stand-by" service. By means of a double-throw switch on the front panel, either the batteries or the generator may be used on the *receiver*.

The total weight exclusive of the antenna masts, batteries and battery cable is 29 pounds; 13¾ pounds for the generator complete with cord and 15¼ pounds for the transmitter-receiver complete with antenna wire, reels, insulators and phones. The antenna reels with wires, insulators and the phone are packed under the front cover, which becomes the operating table when opened. The calibration charts for both the transmitter and the receiver, as well as a few instructions for choosing antenna lengths, are secured to the inside of the front cover under celluloid for handy reference. The generator has a very flexible clamping arrangement and with the corner fasteners on the set, make it possible for a convenient set-up so that one person can operate the complete station. The complete set is housed in a rectangular heat-treated Dural box.

An Unusual Transmitter-Receiver

TRANSMITTER—The transmitter circuit employs two type 45 tubes in a push-pull oscillator which has high-frequency stability. It has the advantage that it will still oscillate if one tube burns out. The tank circuit consists of two coils, each with a tap for the *short-wave* range.. The two coils are placed so that there is very little external magnetic field. This allows the tank

(*Continued on page* 313)

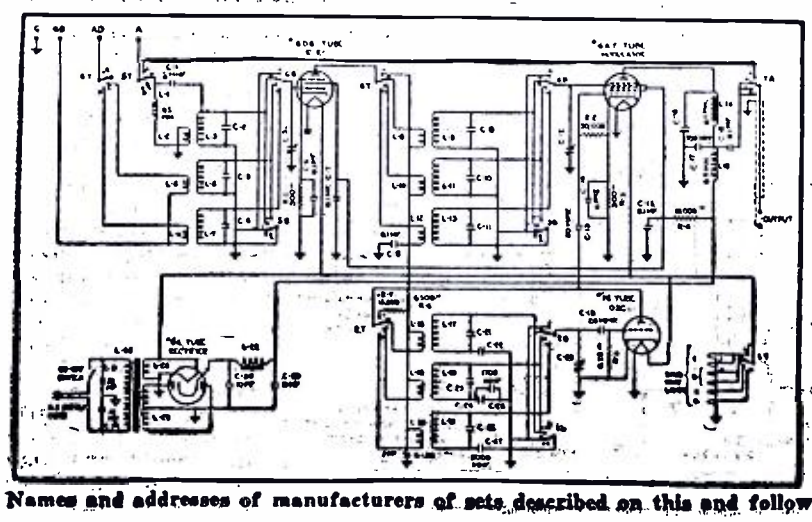


A Super-Power S-W Converter

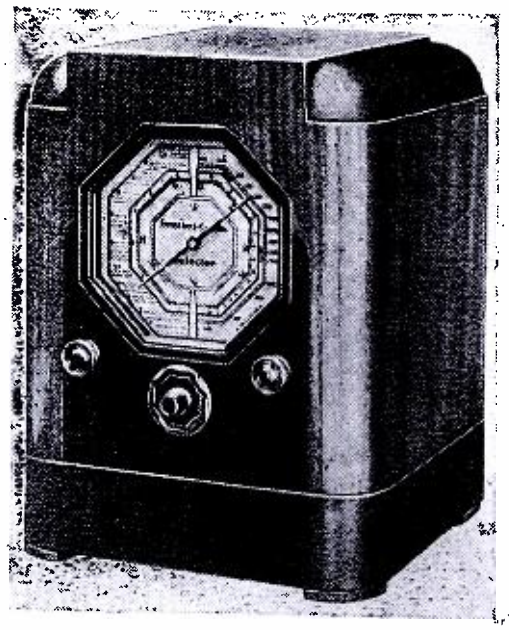
● HERE is a really powerful smooth-working converter which can be added to your present *broadcast* set. This converter, added to your present *broadcast* receiver, will allow you to "tune-in" the various short-wave broadcast stations located in all parts of the world. This 4-tube converter connected to your broadcast receiver converts it into a modern *short-wave superheterodyne*. It is only necessary to connect the *output* terminals of a converter of this type, directly to the *antenna* and *ground* connections of your broadcast set. It then extends the range of your receiver down to approximately 11 meters! The photograph shows the general design, together with the beautifully arranged tuning dial, which is divided off into sections, each section representing a separate short-wave channel. In the circuit diagram, we find that a 6D6 tube is used as a radio frequency pre-amplifier, a 2A7 as the first detector, or modulator tube and a 76 as the *local oscillator*. A type 84 full-wave rectifier, together with a power transformer and filter circuit provide the plate and heater power for the converter..

The switching arrangement which provides reception on the various "short-wave broadcast" bands, which bring in music and song from the "foreign" stations, is a very cleverly designed affair. Just a flip of the switch and the different coils are brought into play. Each set of coils are for a different wave range. Also there is a newly perfected "dual" tuning knob which gives coarse and extra fine adjustment of the dial needle.

Provision is made for the use of different types of antennas. The ordinary *antenna* and *ground* combination can be used or the now famous "doublet" can be employed, with far better results. There is no question of this, and it is highly recommended that a doublet of the latest type be erected wherever possible.

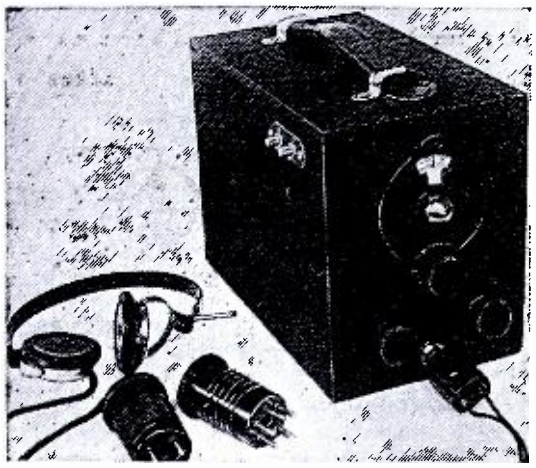


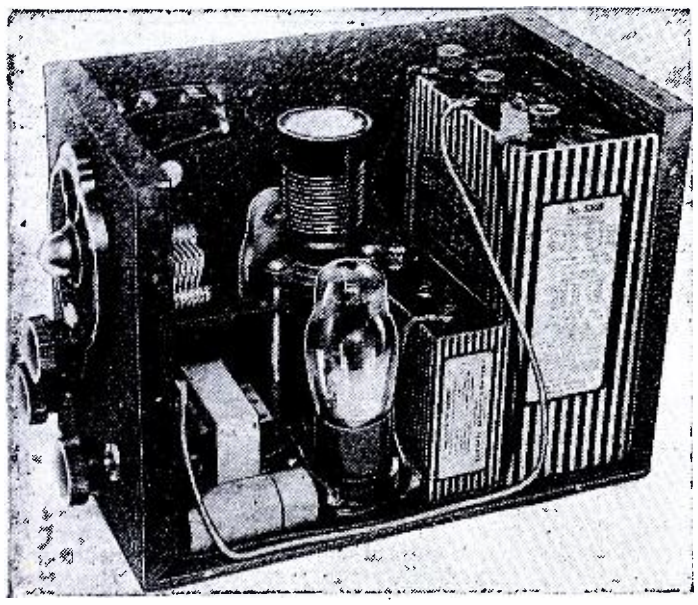
To the right is the diagram of this 4-tube super-powered short-wave converter, showing the connection of the various parts and just how the various tubes are used.



Above, latest highly-engineered S-W converter which will change any "broadcast" receiver into a modern short-wave superheterodyne. (No. 197)

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





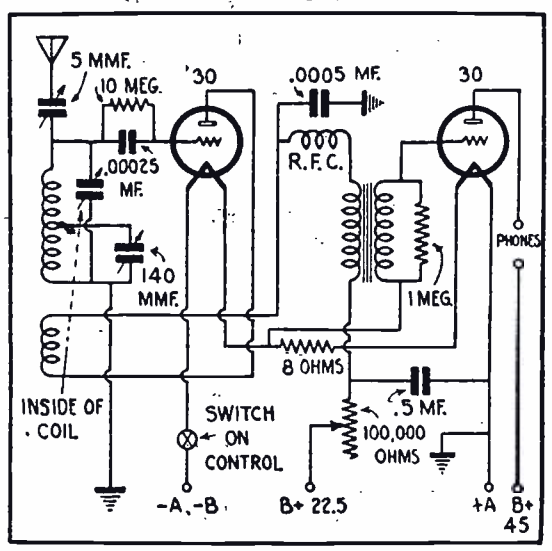
Two views of the "Band-Spread" Portable. (No. 198.)

The "Band-Spread" PORTABLE

By FRANK LESTER, W2AMJ*

THE portable receiver shown in the photographs is one of the most compact and cleverly designed short-wave portables to make its appearance so far. The overall size is 5¼ inches wide, 7 inches high, and 8¾ inches deep. "Believe it or not," even the entire complement of batteries is included within the case. The circuit, of course, is orthodox. However, it is designed so that *band-spread* operation can be obtained by merely using the new band-spread plug-in coils. The complete range from approximately 15 to 600 meters can be covered with this portable receiver, providing not only enjoyment on the short-wave bands but on the regular broadcast bands as well. Two type 30 tubes are used. One is a regenerative grid-leak detector and the other is a transformer coupled audio amplifier. One of the photographs shows a fine view of the receiver, with the top and side portion of the cabinet removed. Due to judicious placement of parts there is absolutely no crowding. The batteries in the rear consist of an upright style, 45-volt battery for the plate supply or "B" power, and a 4½-volt "C" battery used for the filament supply. The two filaments are connected in series and an 8-ohm fixed resistance limits the voltage applied to the tubes to four volts or two volts per tube. The grid return of the audio amplifier is returned to one side of this voltage-dropping resistor, which will permit a negative grid bias to be applied to the tube. The front view shows the tuning controls and head-phone jack. The control on the left is the antenna trimming condenser and that on the right is the regeneration control potentiometer. An "On-Off" switch is also attached to the potentiometer, meaning that in order to render the receiver inoperative it is only necessary to turn the regeneration control all the way to the left. In this position the filament circuit will be

(*Continued on page* 315)

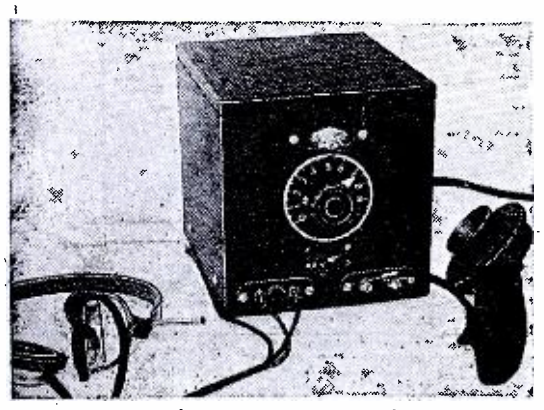


Wiring diagram for Midget 2-tube Portable "S-W" Receiver.

* Engineer, Wholesale Radio Service Co.

The Federal 5 and 10 Meter Transceiver

By Mr. LEONARD WERNER*

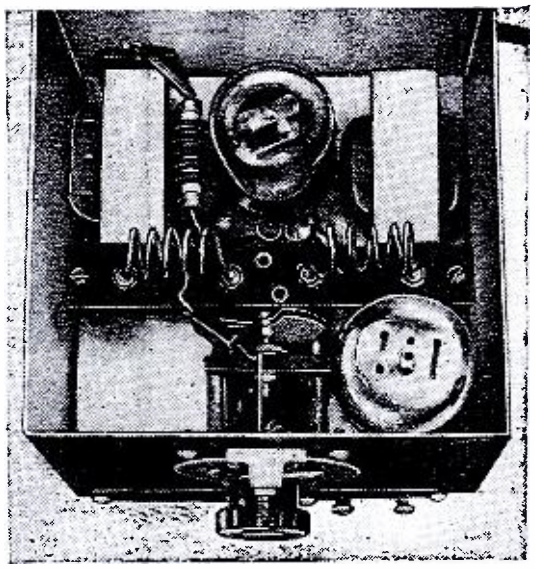


This photograph shows the front view of the new Federal 5 and 10 meter transceiver. (No. 199)

● TRANSCEIVERS, no doubt, hold the spotlight insofar as the short-wave amateur is concerned at the present time. They can be used in airplanes, automobiles, boats, and on many other vacation journeys. The transceiver shown in the photograph is a very compact and lightweight affair and packs a "mighty wallop." It is designed to be used in either the 5 or 10 meter band over short distances where *two-way telephone* conversations can be heard almost any time of the day or night. This transceiver can be used either with batteries or with an A.C. power-pack or from a small motor-generator designed to work on a 6-volt storage battery. For battery operation a 76 is used as a detector and 41 as the amplifier. In transmission, of course, the detector becomes the power-generating *oscillator* and the audio amplifier becomes the *modulator*. For A.C. operation, that is from a power-pack, a 56 and 2A5 are used. A type 30 and 33 can be used if dry-cell battery operation is required. However, this will necessitate a slight change in construction of wiring. A simple toggle switch which is mounted on the front panel just below the tuning dial, is used to change from the *receiving* to the *transmitting* position.

The white insulator above the tuning dial is used for the *antenna*. The earphones and microphone are connected to the terminal strip along the lower edge. The photograph showing the inside view clearly illustrates the placement of the parts and shows the neat plug-in inductances. The antenna to be used with this transceiver should be a single wire approximately 8 feet long, with the lead-in tap approximately 13 inches from the center. This is known as the Hertz single-wire-fed antenna and functions beautifully with a 5-meter transceiver. The complete instrument is housed in a cabinet 5½ inches wide, 5½ inches high and 5½ inches deep. It weighs approximately 6½ pounds. The case is finished in black crackled baked enamel. The diagram clearly shows the various connections and values of parts should anyone desire to build an instrument of this type.

This is a really compact transceiver and should find high favor among our short-wave fans.



Inside view of the transceiver showing placement of the various parts.

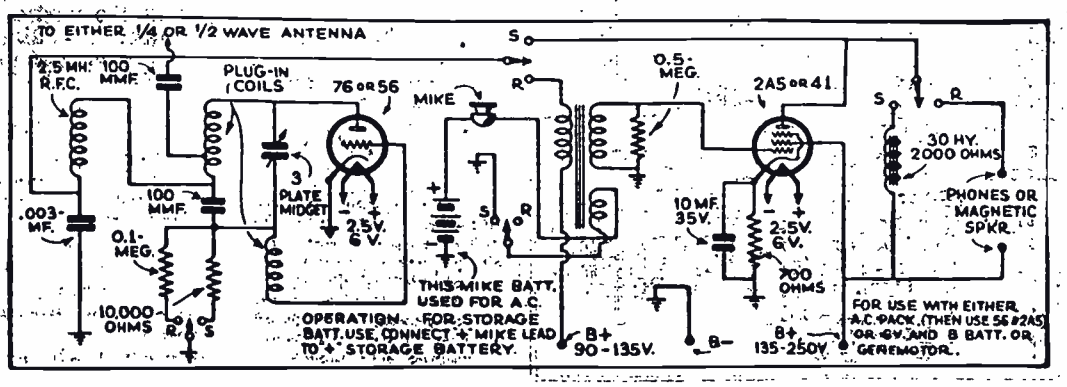
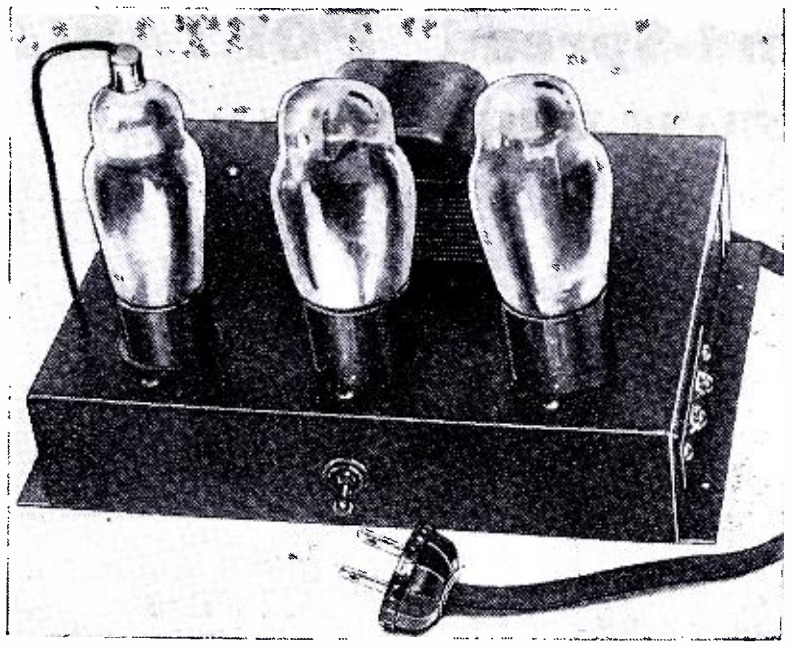
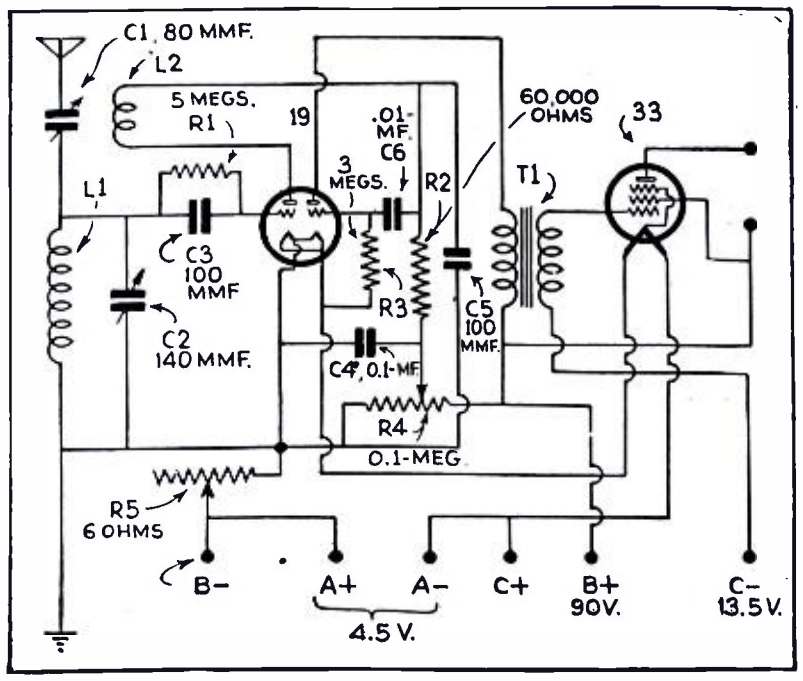


Diagram of connections used in 5 and 10 meter transceiver.

*Federal Engineering Co.



The "DC3" is not only sturdy in looks but performs very smoothly.



Hook-up of the interesting new "DC3" All-Wave Receiver, using the latest tubes. (No. 200)

The "DC3" ALL-WAVE Receiver

By L. J. MILES*

● THE all-wave receiver to be described in this article has been designed for those who wish an extremely powerful and sensitive receiver, but who either from necessity or preference must limit themselves to the use of dry batteries as a source of power. This receiver has shown remarkable results in this direction. Foreign stations are readily received with great volume, some of them with sufficient strength to actuate a good loudspeaker.

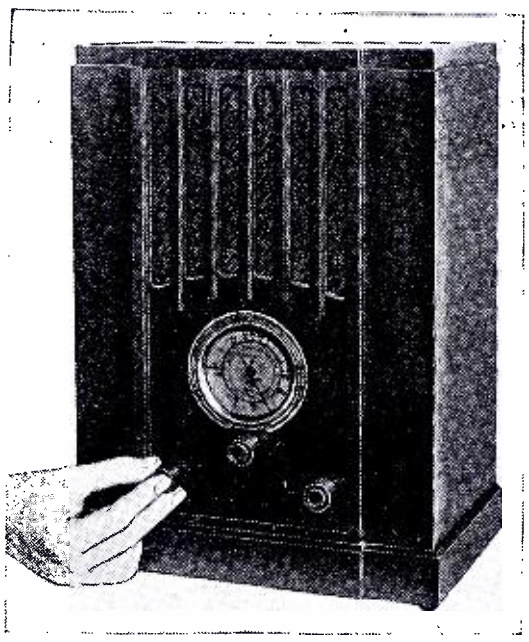
Inspection of the circuit diagram reveals that three-tube performance is obtained from two tubes. This results from the application of the type 19 dry battery tube. This tube is quite popular with short-wave "fans," and its characteristics are such as to be readily adaptable to this receiver. Two triodes are contained in the bulb of this tube, the first being utilized as a regenerative detector and the second as a resistance coupled audio frequency amplifier. The output of this section is transformer coupled into the grid of a type 33 power pentode audio stage. Due to the high amplification factor of this tube, one obtains tremendous amplification and great volume from this receiver.

In order to obtain a high level of sensitivity, grid leak and grid condenser detection is used. Tuning is accomplished by means of the midget variable condenser C2 which shunts the grid coil L1; feedback is furnished by the plate coil L2. Regeneration is controlled by means of the potentio-

(*Continued on page* 313)

* Ellen Radio Laboratories.

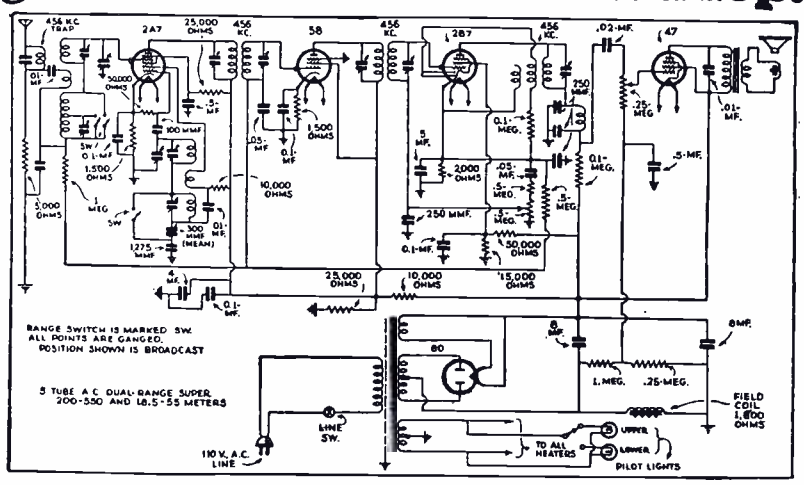
"Dual Range" Receiver Packs A Wallop!

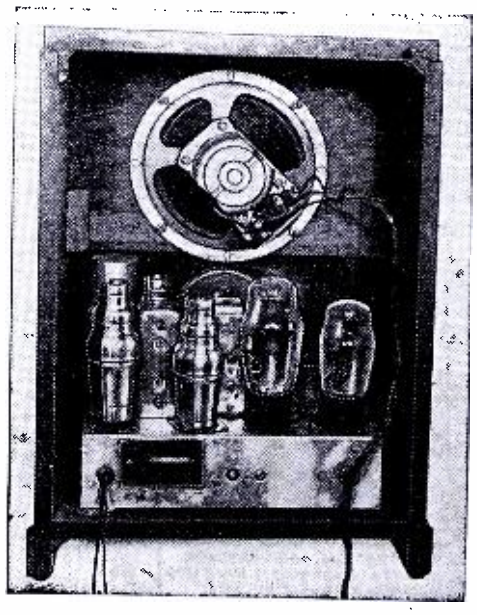


To the right, we find the diagram for this modern "dual wave" all-electric receiver. This unique circuit produces tremendous volume, especially on the short-wave stations. (No. 201)

●

The photo to the left gives an idea of the handsome appearance of this 5-tube receiver. Below we find a rear view, showing how the various parts are mounted.



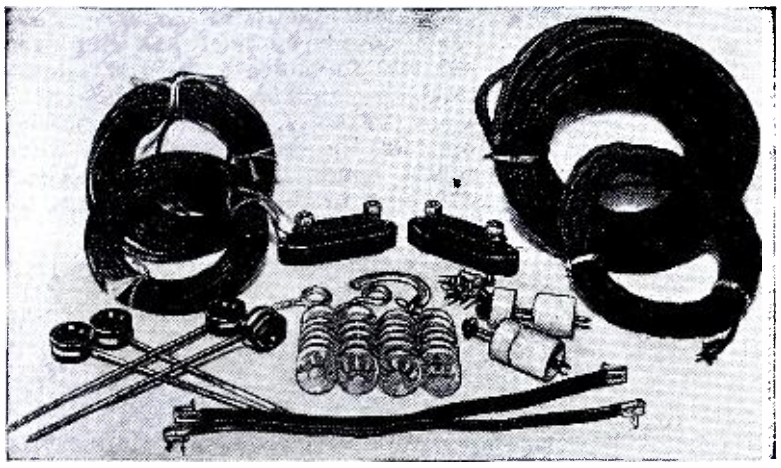


● ONE of the latest dual-range receivers to appear on the market, is this handsome and efficient 5-tube receiver. It uses the very latest circuit design and uses the new multi-purpose tubes. In the photographs we find a general view of the set, together with a rear view, showing the placement of the various parts. The circuit diagram is shown for those interested, and in it we find a 2A7 used as the first detector and local oscillator with *band-changing switches* to cover the 18.5 to 55 meter "International S-W Broadcast" bands and the 200 to 550 meter regular domestic broadcast band.. The switching arrangement, although simple, is unique in design, in that it reduces *dead-end* losses to a minimum. A 58 is used in a single high-gain intermediate amplifier stage which, in turn, is coupled to the 2B7 tube which serves four different functions. First, as a reflex I.F. amplifier, then as a diode detector, A.V.C., and audio amplifier. This, in turn, is coupled to the 47 pentode output tube. Due to the ingenious method in which the 2B7 tube is used, sufficient audio volume is obtained to drive the 47 to full ouput; full speaker volume is obtained on all stations. The automatic volume control reduces fading to a minimum and really increases the enjoyment that can be obtained from the various "foreign" short-wave programs. The dial is divided into two sections, the upper and lower portions being devoted, one-half to the broadcast band and the other half to the short-wave bands. When the tuning range switch to the right of the cabinet is turned in the short-wave position, one portion of the dial lights up and when it is thrown in the other direction, that is the regular broadcast band, the other half of the dial is illuminated. While this receiver only has 5 tubes in all, its performance is equal to a set having at least 8 "single purpose" tubes. By using the latest multi-purpose tubes superior performance, together with economical operation is obtained on the international broadcast bands.

New SHORT-WAVE Apparatus of Interest

New Short-Wave Aerial Kit

● THE photograph shows a complete kit of parts for a modern short-wave antenna which is being marketed by the Belden Mfg. Company. The kit consists of two rolls of 7 strands No. 20 enameled wire each 50 feet in length, 75 feet of special tested pair lead-in wire with weather-proof braid, 25 feet of twisted pair for the interior lead-in, lightning arrestors, stand-off insulators, knobs, ground clamp, screw-eyes—in fact everything that is necessary including staples. The illustration clearly shows the essential elements of this modern short-wave doublet antenna. The lead-in wire is very easy to handle because there are no spreader insulators to install. Stranded wire with rubber covering is used and the two wires are tightly twisted together and covered with weather-proof sheathing. This lead-in wire is run directly from the center of the antenna and is fastened to the building with metal screw-eyes, making a very neat and handy arrangement. Many commercial and amateur stations are using a system similar to this and are obtaining very fine results with it. The heavy stranded antenna wire (7/20) employed in this kit is another fine feature, as there is a decided advantage in this over the finer wire which has a higher resistance to the feeble radio-frequency currents that the antenna has to deal with. Doublets of this type are the most popular with many short-wave "fans".



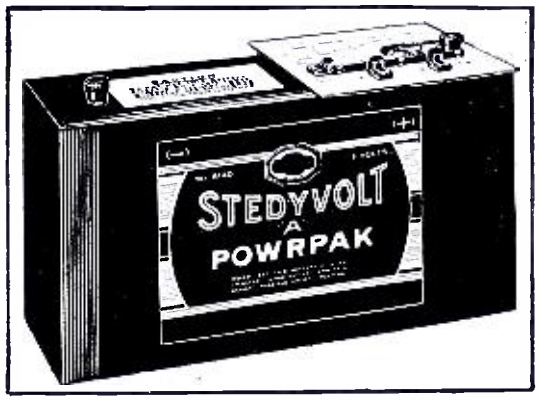
Complete kit comprising wire, insulators, and lead-in strips—also lightning arrestors, for constructing the latest type short-wave "doublet" antenna. (No. 202.)

New 3-Volt "A" Power Battery

● FOR the modern 2-volt radio sets, an eastern concern announce a new "A" power dry battery. It is a 3-volt battery of constant power performance and long life, accurate service and extreme compactness, state the makers. The laboratories have developed a special mix to meet the requirements of this service, enabling the new battery to deliver from 300 to 400 hours of service on the most modern battery-operated radio set.

Each cell is hermetically sealed and grouped into "close-pack". All internal contacts are tested to insure permanent connection. The entire group of cells is then tightly sealed with a special flex-o-matic binder material which prevents breaking of connections. Terminal posts are securely anchored and equipped with knurled, molded caps.

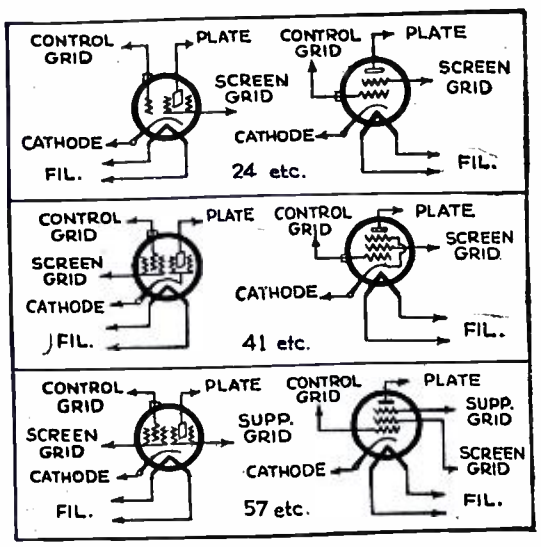
(*Continued on page* 300)



The newest type of "long-life" A-battery which delivers from 300 to 400 hours of service, when operating a battery-type radio receiver. (No. 203.)

Change In Tube Diagrams

● OUR readers have probably recognized the sudden change in the tube symbols that has taken place in this issue. Referring to the diagram, Fig. 1, we find six tube symbols illustrated. The column to the left is the method used in past issues of SHORT WAVE CRAFT. The column to the right represents those in the present issue and which will be continued. We have made this change because we believe that the new method is much simpler and will be to the benefit of the inexperienced reader. This method has been adopted as a standard by all of the radio manufacturers and engineering companies, together with other radio publications. We trust that our readers will have less difficulty when reading our diagrams hereafter.



Above—We find two methods of drawing tube symbols. Those in the column to the left represent the style used in past issues of SHORT WAVE CRAFT. In the right hand column are those used in this issue and all future issues. We trust that our readers will be benefited by this change.

In OCTOBER Issue!

The Mono-Coil short-wave "Converter" is scheduled for the next issue. It uses four tubes and will permit tuning in all the important short-wave bands on your present "broadcast" receiver, by means of a simple switch.

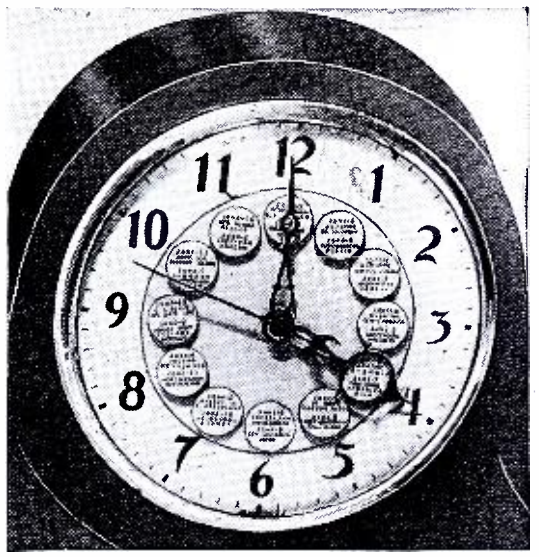
More about short-wave receiving antennas! This is in answer to many requests—the latest data on receiving aerials will be given.

An efficient **"Depression"** Portable — combination short - wave "transmitter" and "receiver" by T. C. Van Alstyne, VE3LN.

Around-The-World Clock

● A VERY interesting and singular development is this "Around-the-World Clock Dial" invented by Mr. A. Eklund of New York City.

It consists of a circular metal disc upon which is mounted twelve lettered smaller discs, each representing a time zone. It is possible with this arrangement to read directly from your clock, the time in hours, minutes, and seconds, in any part of the world. It is only necessary to know, or to have a chart showing the various countries located in each particular zone. In setting up the dial, it is only necessary to adjust it so that the particular small disc representing *local* time or *local time zone*, appears within the oval circle of the hour hand. In our particular case, *Eastern Standard time* is Zone plus 5, indicating G.M.T. minus five hours. If we want to find the time in South Africa, turn to Zone minus 2, and whichever hour this particular disc is next to will indicate the approximate hour. The time in minutes and seconds can then be read off the regular clock dial by the minute and second hands. Another example: If Eastern Standard Time is shown as 11:40 a. m., in order to find the equivalent time in Germany, follow the zone plates from the hour hand in a clock-wise direction until you reach the zone plate that is marked on the lower half "*zone minus* 1, *Germany*". You will find this plate between 5 and 6, indicating the hour in Germany is 5:40 p. m. This clock dial is not available to the general public, yet; however, when it is, we believe it will become very popular with short-wave fans.



The very latest in "Around-the-World" Clock Dials—the small dials are always easy to read, as they are cleverly arranged to remain in a horizontal position at all times. (No. 204.)

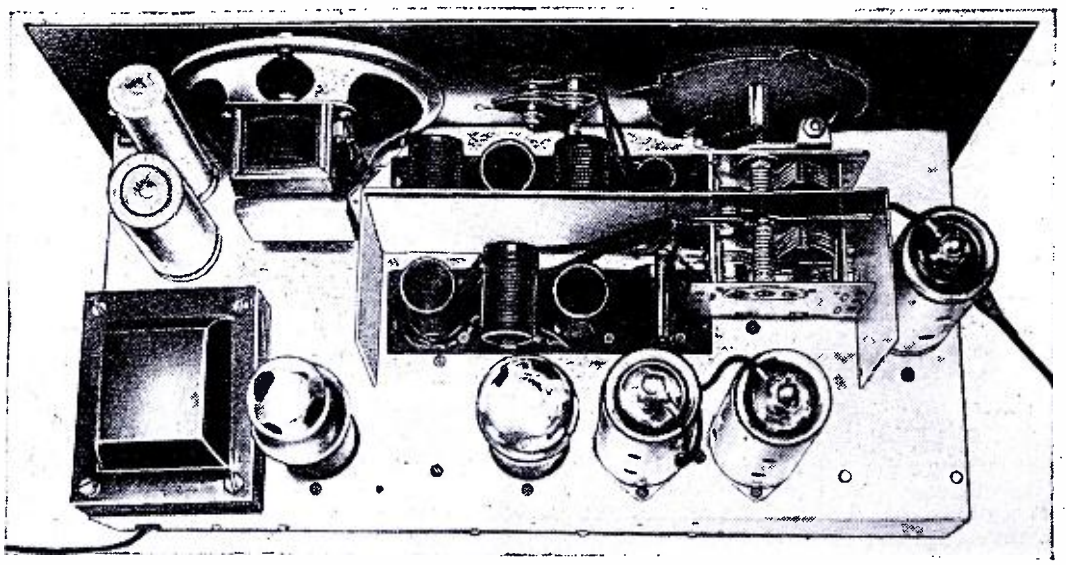
A 5-Tube LOUD-SPEAKER Set With "Band-Change" Switch

No "plug-in" coils are used in this compact, self-powered short-wave receiver. The specially designed dial has a double scale and is calibrated in megacycles and meters.

To the left is shown the new Hallicrafter compact "loud - speaker" S-W receiver in operation. "Regen." control at right.

●

The photo below shows inside view of the chassis; note the well-planned arrangement of the various parts.



● THE trend lately has been towards compact, self-contained and self-powered short-wave receivers. The receiver shown in the photographs is one of the most compact short-wave sets to appear on the market. Even the dynamic loud-speaker is mounted directly in the cabinet and is placed on the right-hand side as shown. The main tuning dial is located on the left-hand side and has a dual scale.

The circuit consists of one stage of tuned R.F., regenerative detector and two stages of audio; the audio stages are resistance coupled. The tuned R.F. and detector stages are tuned by a two-gang variable condenser, resulting in the single control. A small trimming condenser is used for maintaining the R.F. and detector stages in alignment. No plug-in coils are used with this set, but a very efficient coil-switching arrangement is employed instead. The four coils for the R.F. stage are located on one side of the shielding partition and the detector coils are located on the other side, in order that a minimum of reaction will be present between the two stages. The leads of these coils are brought out to a special low-loss switch having four settings. It is only necessary to turn a single knob when changing from one band to another.

The set covers the entire short-wave spectrum from approximately 15 to 200 meters. The new 6C6 and 6D6 automobile type tubes having 6.3-volt heaters are used for the R.F. detector and first stage of audio, while a type 42 is used as the power amplifier. Resistance coupling is used in the audio stages in order that the highest quality production may be obtained.

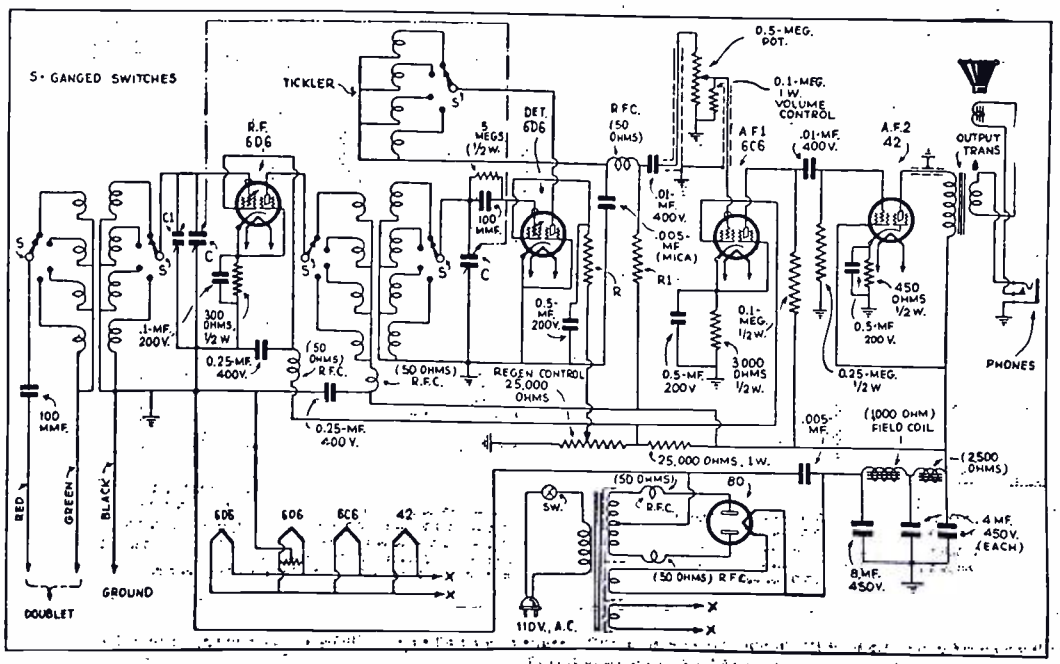
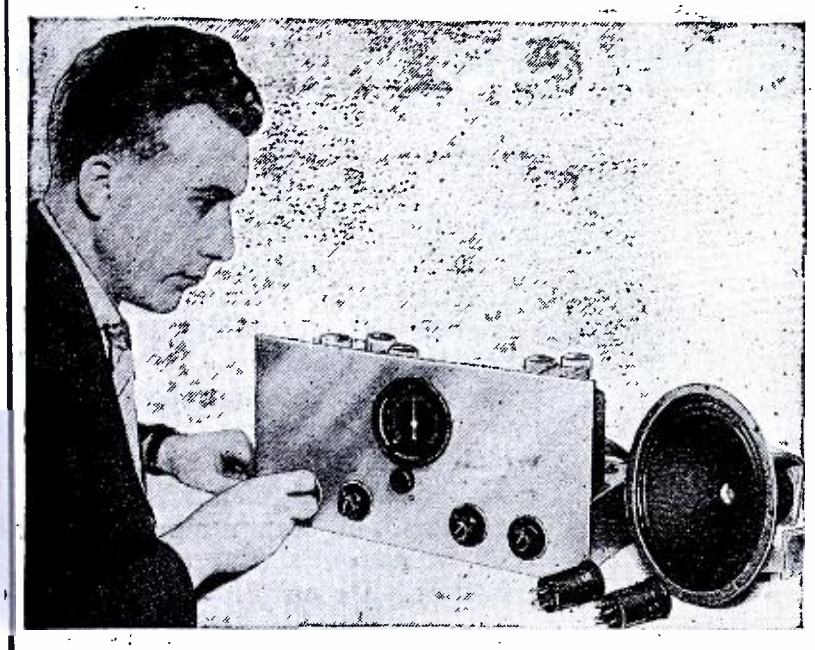


Diagram for the new "Hallicrafter" S-W Receiver.

find that every precaution has been taken to prevent stray R.F. currents from getting into the audio amplifier. R.F. chokes are used in the screen-grid and plate leads of the R.F. and detector stages and by-pass condensers are placed wherever there is the slightest need for them. The detector is a 6D6 screen-grid R.F. pentode, connected in a grid-leak detection circuit with the regeneration controlled by varying the screen-grid voltage through the use of a 25,000-ohm potentiometer. Inductive coupling is used between the R.F. stage and detector in order to provide maximum selectivity. In the power supply, we find that sufficient filtering has been incorporated to practically eliminate all traces of A.C. hum in the speaker. A double-section filter is used with the speaker field coil serving as one of the chokes. Sixteen microfarads of electrolytic condensers smooth out the slightest trace of ripple. An R.F. choke is connected in each leg of the high voltage winding, which, together with the electrostatic shield of the power transformer, prevents electrical disturbances from getting into the set via the 110-volt A.C. line.

The set is very compact, in that it measures only 7 inches high, 17 inches long and 7½ inches deep. The metal cabinet is finished in black crackled enamel, with the front panel finished in silver crackle. The output of the audio

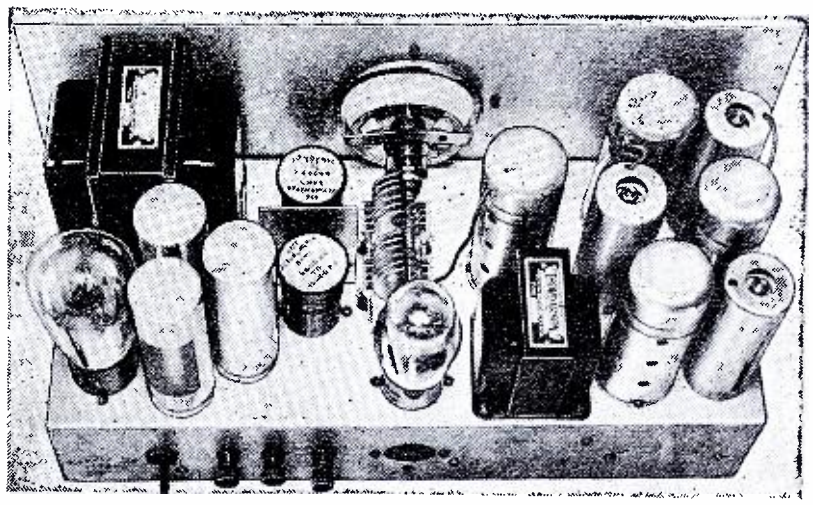
(*Continued on page* 310)



Note the business-like appearance of this latest short-wave receiver—the "All-Star Super-6". It works on 110 volts A.C., has "band-spread" and operates a dynamic loud-speaker.

The ALL-STAR SUPER-6

Here's the latest short-wave superheterodyne receiver, the parts for which are all commercially available; it has been very efficiently designed to operate on 6 tubes, including the rectifier. All standard parts have been selected for the construction of this receiver. It operates on 110 volts A.C. and it features "band-spread" tuning.



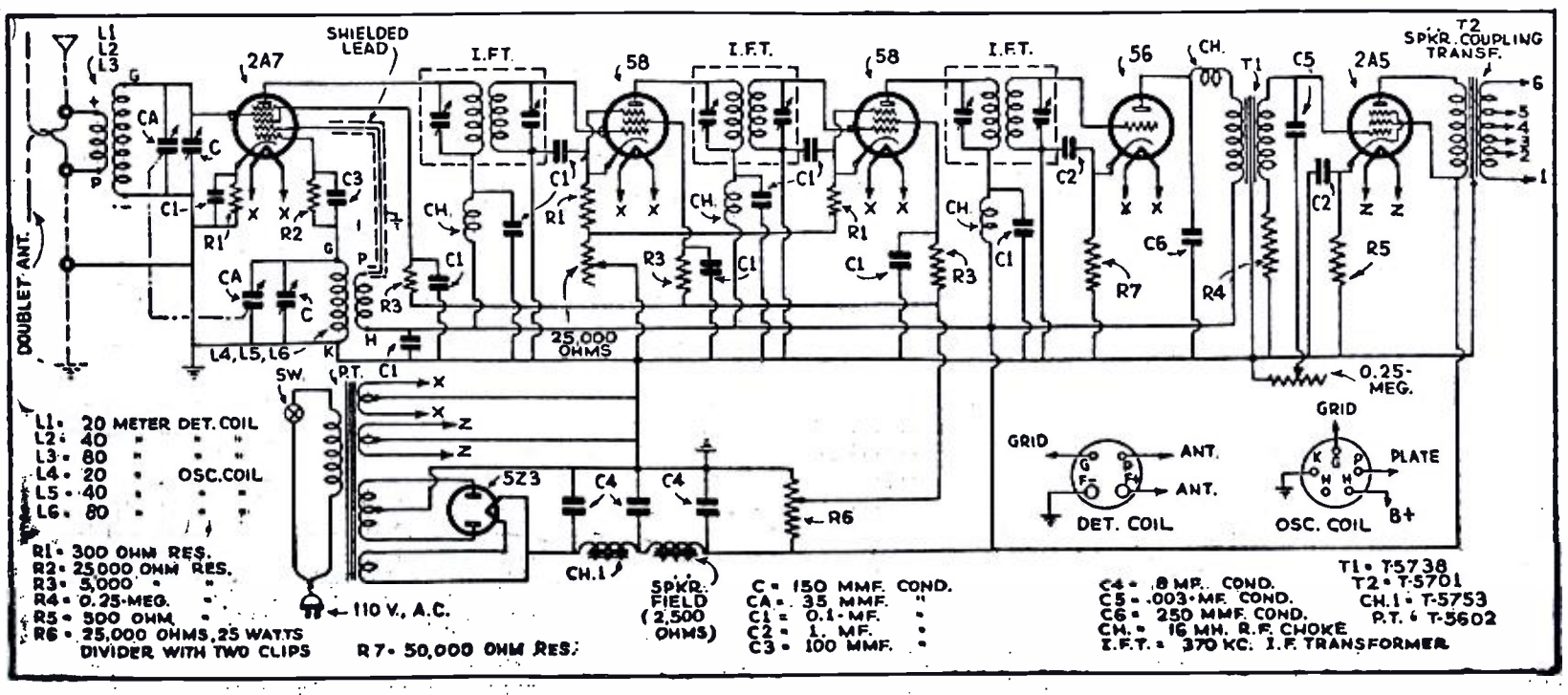
An interesting top view of this very desirable new "short" and "broadcast" wave superheterodyne receiver; it uses plug-in coils.

● SUPERHETERODYNE short-wave receivers have unquestionably proved their superiority in short-wave reception, that is superheterodynes that are *well-designed* and use high grade parts. The set shown in the photograph is a 6-tube superheterodyne receiver, including the rectifier tube, and is a result of much effort on the part of several leading radio engineers of the country. It combines simplicity and efficiency to the point where it represents about the optimum in receiver design. This is not a manufactured receiver, nor is it furnished in kit form. It is sponsored by several of the leading radio manufacturers of the country under a plan which enables the short-wave "fan" to purchase a complete drilled chassis and panel, together with complete instructions, such as wiring diagrams, schematic and pictorial, complete parts list, instructions for assembly and wiring, and instructions covering the tuning and adjusting of the set. The chassis is sponsored by one of the oldest electric manufacturing companies and is available at all legitimate radio supply houses. All of the parts necessary to construct this receiver are of standard design and can be purchased from any radio store. The parts list indicates the various makes and types of parts for which this chassis is especially drilled and machined. The various makes of parts which will fit on this chassis are Thordarson, Cornell-Dubilier, Hammarlund, Electrad, Ohmite, Belden, and Meissner and all other leading firms in their respective fields. This plan, organized by the various manufacturers mentioned above, is for the sole purpose of enabling the short-wave "fan" to construct a high-grade short-wave receiver of simple design, and for the purpose of eliminating the "headaches" that may be encountered because of the use of inferior parts.

Description of Circuit

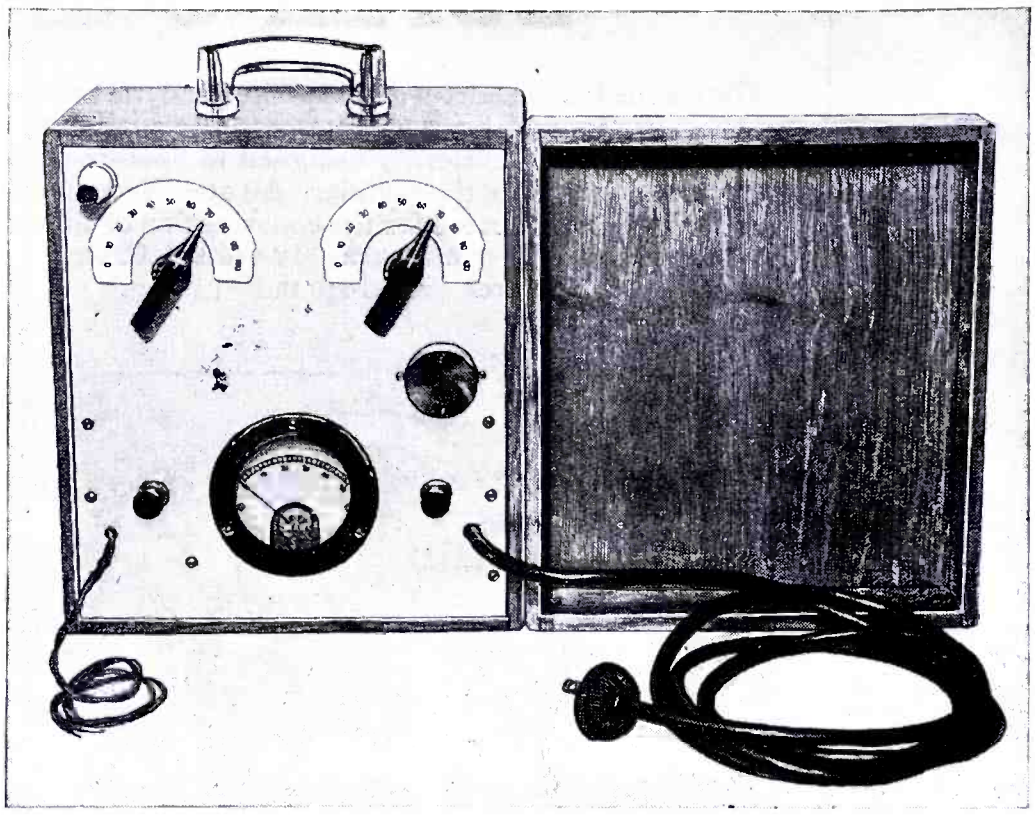
A 2A7 pentagrid converter is used as the first detector and high-frequency local oscillator. Two type 58 tubes are used in the two stages of "high-gain" intermediate frequency amplification and a 56 power triode for the second detector. A 2A5 pentode is used as the audio amplifier and provides sufficient amplification to fully actuate a large-sized dynamic

(*Continued on page* 311)



Wiring diagram for the "All-Star Super-6" superheterodyne "short" and "broadcast" wave receiver. High-quality, standardized parts, available anywhere, are specified throughout.

Crystal Portable Trans-



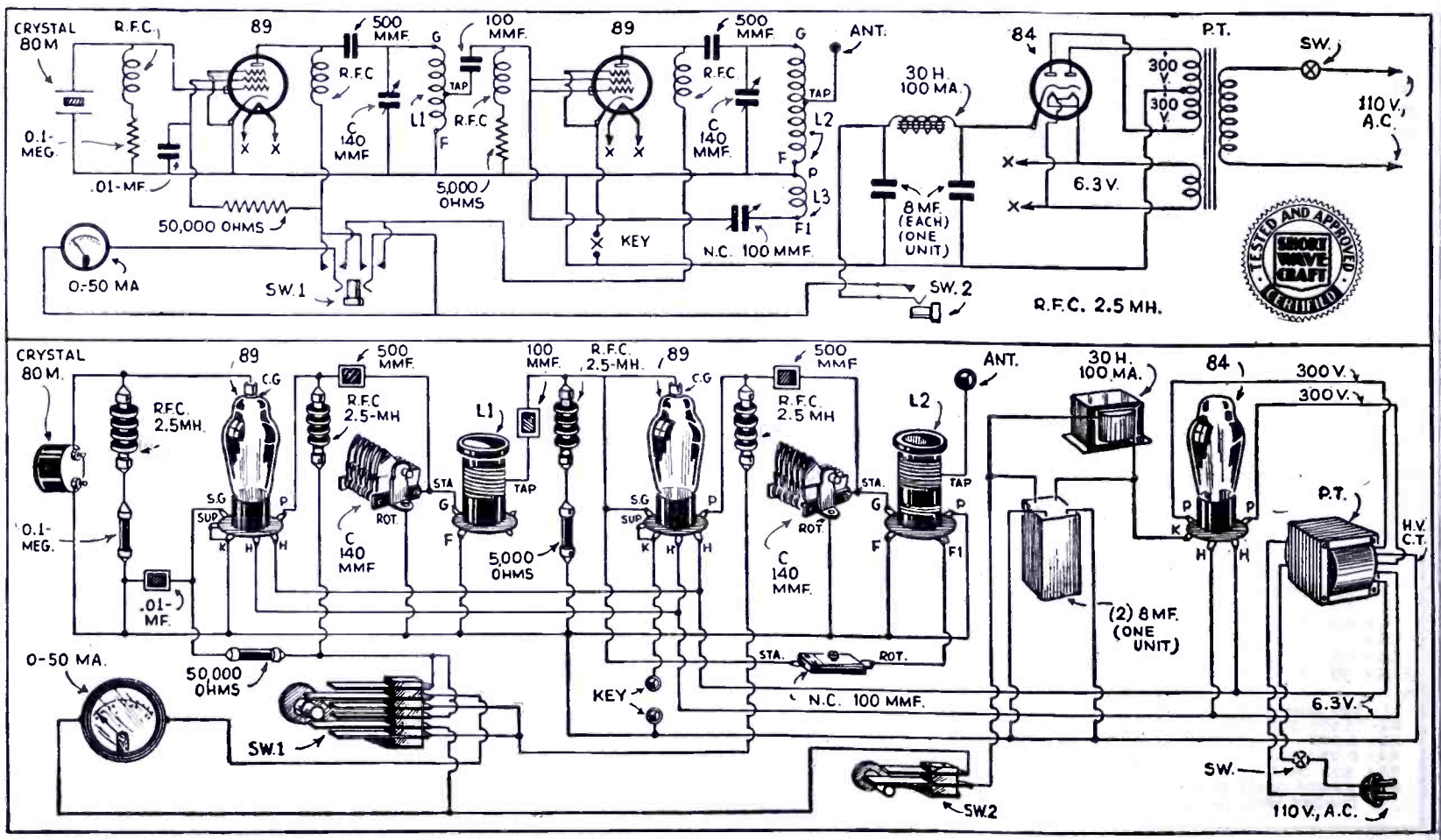
Note the fine "professional" appearance of this portable transmitter. The key connects to the twisted pair at the left of the set; the plug on the heavy cord at right is inserted into any 110 volt, 60 cycle A.C. outlet. Only a single-wire Hertz antenna, 132 feet long, is necessary.

This "portable" transmitter is up to the minute and maintains a very constant frequency, thanks to the use of a crystal. The transmitter is designed to operate on 110 volts, 60 cycle, A.C. and may be operated from a 6-volt storage battery by using one of the new "converters" which delivers 110 volts 60-cycle A.C. This set weighs but 10 pounds, yet it has held communication over 1000 miles on actual test by the author. Its output is 8 watts.

● NEARLY every Ham at some time longs for a *portable transmitter*. Particularly during the summer when camping trips and other vacationing activities take us away from the "old home town". And who will question the thrill of communicating with the "folks" especially when we can brag about the fine time we're having and all the "big fish" we nearly landed. Of course any ham that takes a portable on a vacation just for the sake of "operating a rig" should do little bragging, having had radio all year. Portables are nice to have around the shack at all times and should not be considered simply vacation equipment. Many uses for portables will suggest themselves and of them no mention need be made.

Should Be Well Built

Portable transmitters should be built as well as the regular "home" station, if not better. They are apt to be subjected to some hard usage now and then. Most portables we have seen have been made up of all the old "junk" that could be found, dating back to the year one. The best of circuits and parts should be used, because a rig suitable for portable use will most necessarily have very low output, which means that the signal emitted should be of the steadiest and clearest in order to cut through QRM and QRN with the least difficulty.

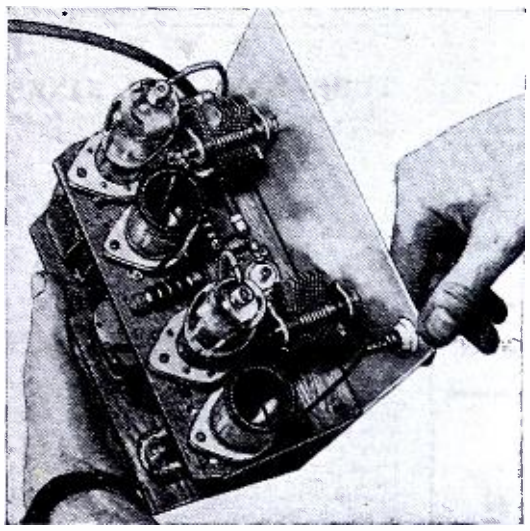


Both schematic and picture wiring diagrams are given above which make it a "cinch" to build a duplicate of Mr. Shuart's very attractive short-wave transmitter; it is designed for CW (code) transmission.

mitter

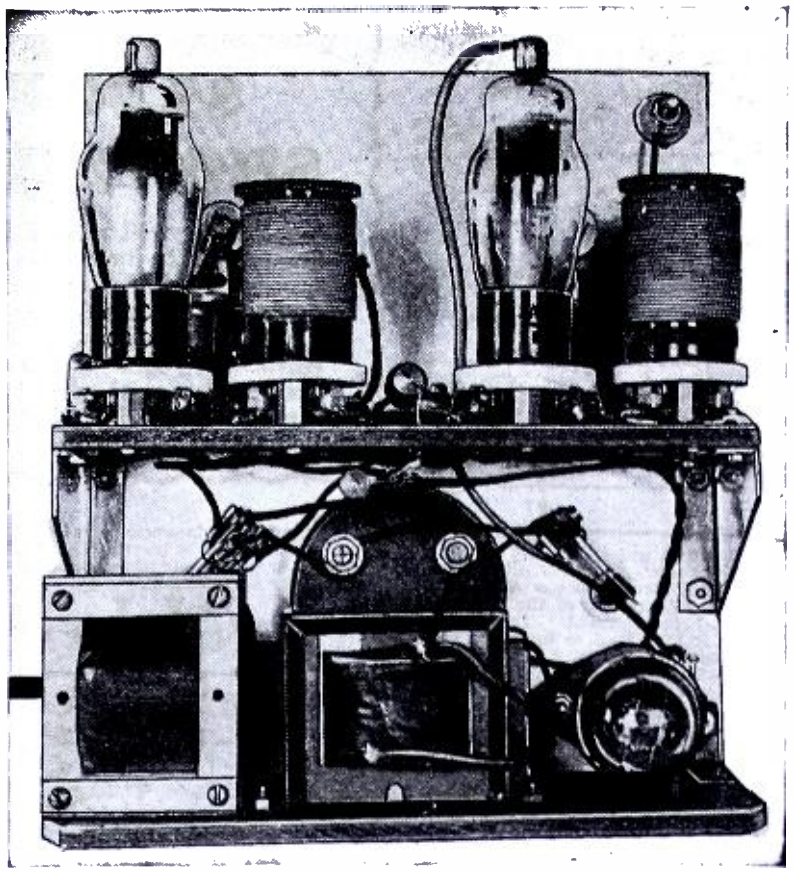
By Art Gregor

There are several kinds of portables, such as transceivers —A.C. and battery; battery-operated transmitters, and another type which is operated directly from the A.C. lighting mains. It is the latter that appeals to the writer most because they are far more economical to operate and usually provide more output per pound of weight. True, they have their limitations in that they cannot be used in places where there is no A.C. available, but, let's not forget that the average "ham" has a car and right here is the solution to the battery problem. Converters can now be readily obtained that will deliver 110 volts A.C. 60 cycles, directly from a 6-volt storage battery. So after all the A.C. operated portable gets the vote, says the designer, George W. Shuart, W2AMN.



Extremely neat appearance of the portable CW transmitter, which uses but 2 tubes and operates from any 110 volt, 60 cycle A.C. circuit. It can easily be adapted to "phone" transmission by the simple addition of a single 37 tube, as explained in the text.

Another view of the 2-tube portable CW transmitter, built and successfully tested by Mr. Shuart.



A portable must be small in size, light in weight, have fairly good output and deliver a steady, piercing signal. Right you are—it must be *crystal controlled!* The rig shown in the pictures has just about all that any *real* ham could desire, and I can guarantee that unlike many other sets I have built, this one will never be dismantled.

The weight is *ten and one-half pounds;* size (over-all),

(*Continued on page* 308)

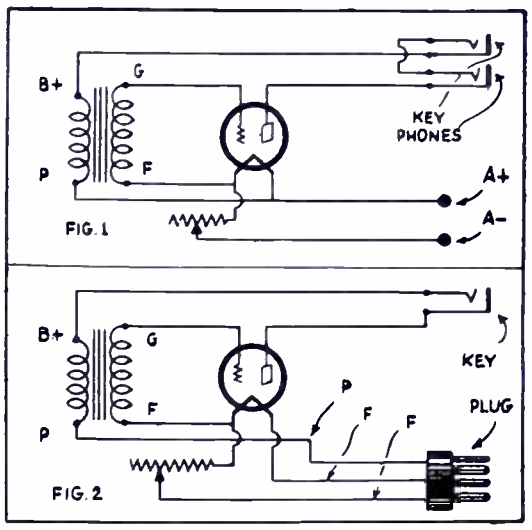
Short-Cuts In Learning The Code

By John T. Frye, W9EGV

● EVERY immigrant to that fascinating land of the Short Wave Amateur must pass through a gate guarded by a very fearsome-looking giant known as the International Code. Now, this particular giant has the very peculiar property (common to politicians, however) of appearing much larger and more awe-inspiring than he really is. None the less, he has frightened many a good ham candidate back into ship-modeling, paper-flower-making, or some other limbo that represents a thwarted ambition from the point of view of the haughty brass-pounder. Something must be done about this situation, and I have resolved to do it. I intend to strip this giant of his illusory strength and to show him up for the weak little barrier that he really is. You, armed with this knowledge, can then trample over his prostrate body into this glamorous land of modern magic.

Do not misunderstand me. I am not representing myself as a code expert, for I am far from being one. However, I am certain that I can copy fifteen words per minute on the air and twenty words per minute from any device which sends the letters automatically. This very modest code speed has been attained over a period of eighteen months, and during this time I have taught the "dit-dah's" to three other persons. In looking back over this period I can see many mistakes we made and some few shortcuts that might well be passed along. In compiling this article, I have recommended only those methods which all four of us found to be beneficial. Do not picture me as sitting on top of the mountain and shouting back advice through a megaphone; rather imagine me as but a few feet farther along the path than yourself, and I am saying, "Look out for that rough place, Bill, it tripped me up."

I shall assume that you have no person who is proficient at the code to instruct you. In the event that you do, you will not need this article, for the best training in the world is that given by an experienced and patient operator. Since you do not have this instructor to point out any mistakes that might occur in your sending, it is very important that you do not try to send until you are familiar with how the characters should sound *when sent* CORRECTLY! If you learn to send a character *incorrectly*, it will be three or four times as difficult for you to learn to send the letter in the proper manner, than it would have been if you had never established the wrong neural path. *Know how a letter should sound before you try to send it.*



Audio oscillator hook-ups used in learning the code.

First Thing You Must Do

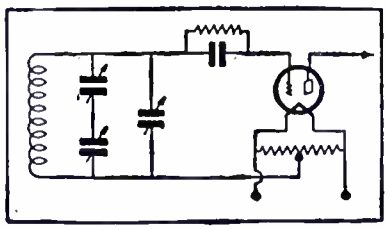
The *first* thing that you must do is to learn the various combinations of dots and dashes that make up the different letters. I suggest that you learn the letters as combinations of "dits" and "dahs," the dots being called dits and the dashes read as dahs. C, for example, becomes dah-dit-dah-dit. *Do not learn the letters in any prearranged order.* Many books say to learn the dot letters together, the dash letters together, and the combination letters together, but I have found that this practice makes it necessary to go through all of the letters of one group before selecting the right letter to go with a particular combination. For instance, upon hearing dit-dit-dit-dit, I mentally rejected *E*, *I*, and *S* before selecting *H* as the proper letter.

(*Continued on page* 306)

$5.00 PRIZE

A FLEXIBLE BAND SPREAD SYSTEM

This is the only system which I have found to be absolutely flexible. It can be adapted to any desired spread on any part of the short-wave spectrum. The 3,900 kc. phone band for example may be spread over the whole dial if desired. It consists in shunting a small midget condenser of 3 or 5 plates across the grid coil. The two condensers in series are used in series as in the standard band-spread arrangement, the band-spread condenser being a

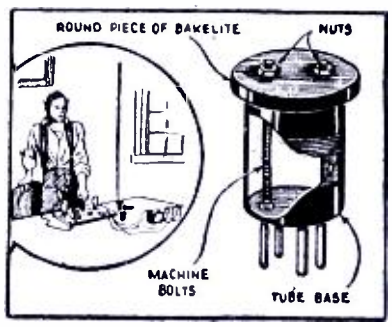


23 plate midget and the tuning condenser a 7 plate midget. The chief disadvantage of most band-spread systems is that the band slides off one end of the dial when band-spread is increased. The trimmer condenser is then used to bring the band back to the desired setting. This system has the additional advantage of making the detector circuit "High-C", which improves its stability. When the extra condenser is installed a turn or two should be taken off the grid winding to compensate for such additional capacity.—Fred Green, VE5CH.

▼ ▼ ▼

TUBE-BASE FINGER GRIPS

Cut a round piece of bakelite or hard rubber from an old panel, with a diameter of about 1¾ inches, so it will extend

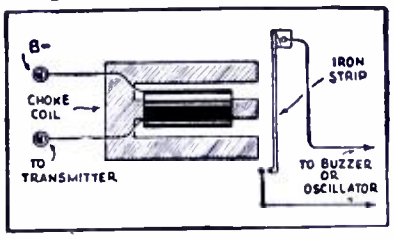


out from a tube base. Two holes are drilled in bottom of tube base and reamed out for the head of a flat-head machine-screw; then two holes are drilled in round piece of bakelite to fit the two holes in bottom of tube-base; two machine screws are inserted to hold top piece in place.—Milton Seltzer.

▼ ▼ ▼

RELAY FROM CHOKE

To listen to my "bug" sending, I convert a filter choke into a relay. This is put in the negative lead to the transmitter tube. When I press my key, the plate current causes the relay to operate I connect an audio oscillator to this relay and find sending much better.—John C. Nelson.



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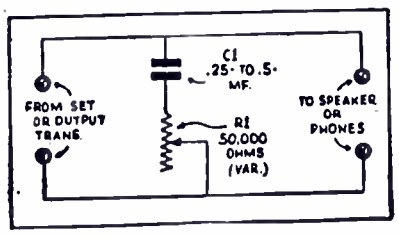
TONE CONTROL

I find that when QRM is heavy that a tone control is a great aid toward "solid" copying of a station, especially C.W. (code). It is a great relief, when an interfering station QRM's the fellow one is trying to copy, to turn the tone control and have all the other stations fade into the background, while the station being copied has decreased only slightly in volume. This also helps in bad cases of natural and "man-made" noises. The deepening of the tone has the effect of increasing the signal-to-noise ratio.



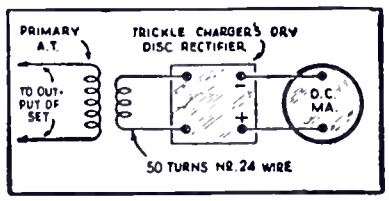
$5.00 FOR BEST SHORT WAVE KINK

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.

The tone control is connected across the leads to the speaker or phones. The tone is deepened by decreasing the resistance of R1.—Harvey C. Kenneson.

▼ ▼ ▼

OUTPUT-METER



A dry-disc rectifier from an old trickle-charger and an old audio transformer will make a very good output-meter rectifier to use in conjunction with a D.C. milliammeter with a scale of 12 or less.

Take the lamination out of the audio transformer and take off the secondary winding. This can be cut a few layers at a time with a sharp knife. Wind on 50 turns of No. 24 D.C. or cotton covered wire. Replace the lamination and wire as per diagram. On a four-tube set I get a deflection of nine mills (M.A.) using a 20 volt, .8 ampere dry-disc rectifier.—G. Van Velsen.

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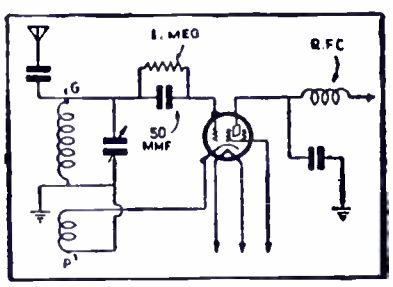

ELECTRON-COUPLING

Many people who possess manufactured coils would like to try electronic coupling. The process is very simple. No rewinding of coils is necessary. Only three changes are necessary. The bottom of the tickler coil (the wire that formerly went to the plate of the tube) is grounded. (2) The wire from the R.F.C. goes to the plate of the tube. (3) The top winding of the tickler goes to the cathode of the detector. The cathode is no longer grounded or connected to the tuning condenser. A 1 megohm grid-leak should be used for best results.—Francis Campbell.

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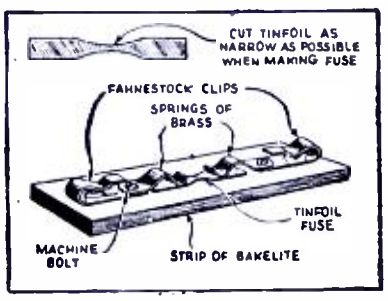
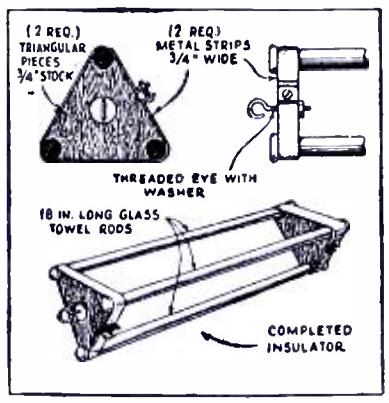


TINFOIL FUSE

A handy fuse for protecting tube filaments can be made from tinfoil. Make a holder for it from two Fahnestock clips and some spring brass bolted to a strip of bakelite. The diagrams illustrate how to make this. When making the fuse, cut the foil as narrow in one point as possible without cutting it in two. This fuse, when placed in the "B" negative lead will protect the filaments of two or more tubes when placed in parallel, but unless the foil is cut exceedingly narrow it is not trustworthy for one tube.—H. C. Smalby.

HOME-MADE AERIAL INSULATORS

I made insulators out of three glass towel-bars that were approximately 18" long. These I bought at the "dime" store; be sure to get those with a nub on both ends. Remember that it requires three rods to make one insulator. These rods are about ½" in diameter. Cut two triangles out of wood (¾" stock) with about 2½" on a side. Boil these good in paraffine, then cut round slots on each point of the wood ends a little larger than the rods, so that a little rubber shim can be laid in the slots. Now cut two strips of



metal ¾"x8". Bend up ½" on each end and drill a small hole through each of these lips to accommodate a screw. Lay the three bars in these slots; there is one block on each end. Bend a metal strip around the blocks over the rods, put a screw in the lips with a nut on the opposite side and tighten the strip so the rods are held securely. These make the niftiest looking aerial insulators, besides being very efficient, as they are plenty long. The ones I have are 18" long. I hope I've made it clear enough for you.—Julius J. Fliegel.

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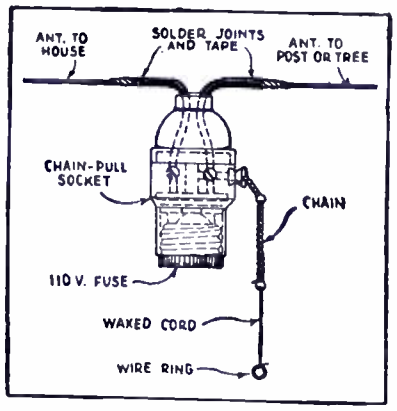
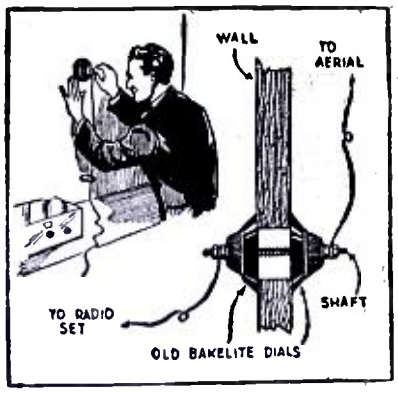
"2 IN 1" ANTENNA



The accompanying sketch shows a simple way in which one can make an antenna either long or short, by simply pulling a cord. This radio kink can be easily worked out with an aerial say a hundred feet in length, a shorter one or even a longer one. An ordinary pull-chain light socket in the center of the aerial is used with a 25 amp. fuse. A cord which is thoroughly waxed to give it extra strength and keep it from rotting is tied to the chain so that one can easily reach it. A copper wire ring is tied at the end of the cord to help one locate it at night. The wires which are cut off near the socket are strongly soldered and taped to the antenna. The antenna should be securely fastened to the house and the other end of it to a tree or post.—Adolph Zumaris.

LEAD-IN INSULATORS

For the fellow who is in a hurry and doesn't have the "dough" to get lead-in insulators for aerials—this is a very ingenious device. It consists of two old bakelite dials and a threaded shaft. To construct it drill holes through the back of the dials so that the shaft may be passed through them. Care must be taken not to break the dials in drilling.—Franklin Beaty.



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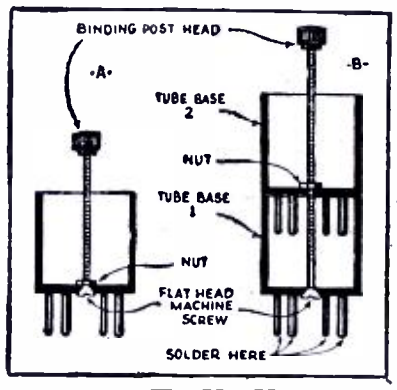
TUBE-BASE COIL KINKS

Here is a simple but strong handle for use with the tube-base type plug-in coils. A long flat-head type machine screw is used, which is a little longer than the tube-base. A hole is drilled in the center of the four prongs. Insert the machine screw through the outside bottom of the tube-base, and tighten with nut on inside bottom. A binding post head is screwed on the end of the machine screw, and is used to make a firm grip handle.

Extension Tube-Base Coil Form: It consists of two tube-bases and a machine screw a little longer than the tube-bases combined. The holes are drilled the same as at "A." The nut is tightened at the bottom of the top tube-base, which holds the bases securely. Where long secondary windings are called for, this form fits best. This form can also hold a primary, secondary and tickler coils; of course the five-prong tube bases would then have to be used. Before coupling the tube-bases, wind tube-base 1 with sec. or pri. and tick. and bring out the leads through the prongs and solder at the tips. Then add tube-base 2. Keep the prongs in parallel with tube-base 1 prongs, so the leads from tube-base 2 can easily slide down to tube-base 1 prongs, where they are to be soldered.—Charles Poskonka.



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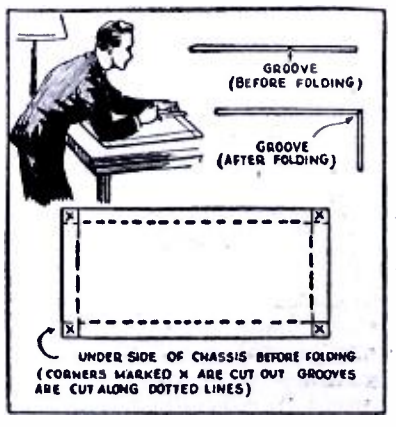
PANELS AND CHASSIS

Aluminum cookie sheets are stiffer than bread and cake tins and, therefore, make much better panels and chassis. When it is desired to fold the aluminum for a chassis, use a ruler and scratch the metal with an old knife on what is to be the inside of the angle. This groove should be one-quarter to one-third of the thickness of the aluminum. The chassis may then be folded and the fold will be straight and even, while it will be found sufficiently rigid for any requirement.—Richard Quirk.



SHORT WAVE STATIONS OF THE WORLD

New!! "Complete" Grand List Broadcast, Police and Television Stations

We present herewith a complete, revised and combined 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 3 P.M.-4 A.M., the 20-35 meter will be found very productive. To the west of the listener this same band is best from about Nine 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.
7 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.
7:30-10 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
Around 6 p. m.

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
8-11 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

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.
Relays KDKA

11865 kc. GSE
-B- 25.28 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.

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- 25.63 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

11181 kc. CT3AQ
-B- 26.83 meters
FUNCHAL, MADERIA
Tues., Thurs., 5:00-6:30 p. m.
Sunday, 10:30 a. m.-1 p. m.

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

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, 4:30-7:00
p. m.

9600 kc. YV5BMO
-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 or 7 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
3.30-7.30 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. LKJ1
-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
5-7:40 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.
Relays WJZ Irregularly on Friday, 5:30 p. m.-12 midnight

6383 kc. HC1DR
-B- 47.00 meters
QUITO, ECUADOR
8-10 p. m.

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

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
7-10 p. 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 KDKA
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 Irregularly on week days

6075 kc. XEBT
-B- 49.4 meters
MEXICO CITY, MEX.
P.O. Box 7944
7 p. m.-1 a. m.

6070 kc. ★YV5BMO
-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.-12 midnight Irregular

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

6040 kc. W4XB
-B- 49.67 meters
MIAMI, FLORIDA
Relays WIOD, Sat. evenings

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. YV4BSG
-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 296

POLICE RADIO ALARM STATIONS

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.
UYR	Montreal, Can.	1712 kc.
WCK	Belle Island, Mich.	2414 kc.
WEY	Boston, Mass.	1558 kc.

(*Continued on page* 294)

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

Readers Opinions on "No Code" Test Below 5 Meters

"No Code Test" Would Boom Business!

Editor, SHORT WAVE CRAFT:

I read all the articles and letters published in SHORT WAVE CRAFT on the subject of *No Code below 6 Meters;* therefore I decided to let you know how I looked on the subject.

This argument has been going on for some time and I think that something should be done about it. I think it would be a big thing if there was *no code below six meters*, because more men and boys would get a lot of pleasure out of it, besides just the ones that use it now.

If there was *no code below six meters*, there would be many more radio parts sold and the old "ham" could build up his old sets so that he would have a better station for the same price. If there was no code below six meters, more people would get to work, therefore radios would be sold in greater quantities and engineers would be put to work building new circuits, parts, and sets, because of the bigger demand from the enthusiasts that would enter radio. I'm behind the SHORT WAVE LEAGUE one hundred per cent, and think it is a great thing for the promotion of short-waves.

BEVERLY RHYNE,
785 North Pack St.,
Shawnee, Okla.

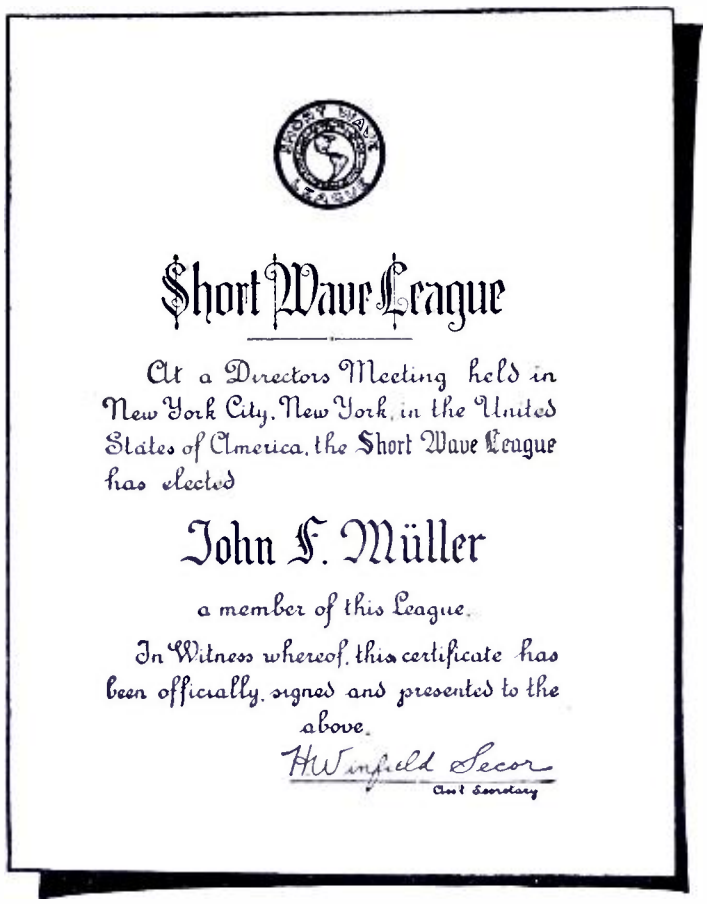
Favors No Code Below 6 Meters

Editor, SHORT WAVE CRAFT:

For the past three years or more I have been a constant reader and admirer of your magazine, SHORT WAVE CRAFT, and must truthfully and sincerely say it's a real book for the experimenter or radio "bug," such as I am and many others for I know that your SHORT WAVE CRAFT has been praised more than you can imagine here in Reading, Pa. I am looking forward to more and better articles in your magazine and will continue to be a constant purchaser and reader.

Lately this "code-less ticket" discussion has been appearing in your magazine and I would like to have a hand in the soup, to help the boys out and wish to say right now and here that I see no use for the "CODE TEST." Not that I think the code is too hard for a would-be ham to learn, but I really believe and know that you could be an operator of a transmitter without knowledge of the code. Why not give the fellows a break below 6 meters? Another thing, some of these "selfish hams" complain of the QRM that would arise without the code, which I claim is a lot of bunk, not telling of the QRM and poorly modulated signals some of them send over the air now, Hi-Hi. I experienced many and many a time in going down over the bands that some of those meant-to-be dots and dashes sounded like natives with a few dish pans or pots trying to create a racket. And as for some of the phones on 75 meters well, now and then some of them sound as if they have a mouthful of mush, and more than one have a sort of tinny sound or rumble. What the FRC should do is to make some of these "Hams" brush up on their own outfits before finding fault with the would-be ham, who as yet has no transmitter but perhaps could show some of these "swell-headed" and selfish hams up, Hi-Hi. Smoke that in your pipes and like it. Also about the YL's (young ladies) appreciating a Ham because he learns the code, I say if they can't appreciate him without the code, they are of no use. I would like to see this letter in print so as to cheer the boys along and as for you fellows who are in the "code-less" boat I wish you the best of luck and as the "good-book" says, "HELP ONE ANOTHER." So in closing I say away with the code below 6 meters and I would like to get in touch and hear from you fellows who think the same. I will promise you a reply.

WILBUR C. PFEIFFER,
1162 Mulberry St.,
Reading, Pa.



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 295—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.

A Good Anti-Code Test Argument

Editor, SHORT WAVE CRAFT:

I surely do enjoy your magazine as it seem to be for all. I have been pegging away for a year now learning code so I can pass the "exams" and get a station on the air. I think I can easily receive 10 words per minute. It was a battle but I finally conquered. I still cannot see though what benefit CW would do me if I built a phone station. I cannot see where that would help me operate a phone station or know any more about one. A person might hook up an oscillator, put a key in the circuit, hook the antenna up and start pounding away. But would that mean that this same fellow could build a phone "rig" with the conventional oscillator, buffers, and final, and 100 per cent modulate it? In all my CW practice I never learned anything about building transmitters by listening to the dots and dashes. Some of these old "Rip Van Winkles" may think that learning CW educates you in theory, construction, and operation of transmitters. Personally I don't feel any wiser in learning the code. To me it was just a necessary step in obtaining a license—a step to keep many off the air.

Why should the sincerity and ability of a radio engineer be doubted and why should he be compelled to learn the code to show he is interested in amateur radio? Someone is trying to run amateur radio with "1912" regulations. This is 1934 and things and conditions have changed materially.

(*Continued on page* 317)

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.

OBTAINING A LICENSE

Peter Hnott, Binghamton, N. Y.

(Q) I built the 12 watt crystal controlled transmitter which was described in the June issue and it works F.B. Please send me the address of my closest examining office, that is in my district. I want a license to operate my "rig."

(A) The twentieth U. S. Inspection District is located at 514 Federal Bldg., Buffalo, N. Y. It is here that you will be able to take the examination for an amateur operator's license.

THE BEST SET

(Q) Will you please advise me as to whether a Doerle 2-tube A.C. with an added stage of audio using a 47, or a regular 3-tube Doerle would be the best or simplest. I also wish to know whether it would be advisable to add two stages of amplification to a Doerle 2-tube A.C. set.

(A) While the 2-tube Electrified Doerle, with the addition of a 47 pentode, will give good loud speaker operation, a 3-tube receiver using the tuned R.F. stage is considerably more sensitive but, of course, has less audio gain. It is not advisable to add two stages of audio to the 2-tube A.C. set. This would provide three stages of audio and it is quite possible that you may have difficulty in maintaining stability in the audio section. We believe you would obtain better results if you were to add only one stage of audio to the 2-tube set.

COIL DATA

F. C. Gillar, Lyndhurst, N. J.

(Q) In referring to your issue of May, 1933, entitled, "A 3-tuber that hauls them in," pages 18 and 19, the coil data as shown does not indicate wire size, coil form diameter or spacing of primary and tickler. As I wish to build this circuit, I would appreciate the information requested above.

(A) On page 165 of the July, 1934, issue of SHORT WAVE CRAFT (Question Box), we printed complete coil data on plug-in coils covering a range from 15 to 200 meters for both 2 and 3 winding coils. If you refer to that issue, you will find the information necessary to wind the coils for the 3-tube set you are constructing.

3-TUBE A.C. RECEIVER

Barnes Barker, Orange, N. J.

(Q) Would you please be kind enough to publish a diagram of a 3-tube set using a 24A detector and a pair of 27 audios?

(A) The 3-tube receiver is given here and we sincerely trust that it will meet with your requirements. Use a 224 or 224A regenerative detector. A 35 can also be used. Regeneration is controlled by a 50,000 ohm potentiometer connected in the screen-grid lead. The first audio stage is resistance coupled and the second stage is transformer coupled. 27's are used in both stages. However 56's can be substituted with less current drain on the transformer; 56's only require 1 ampere.

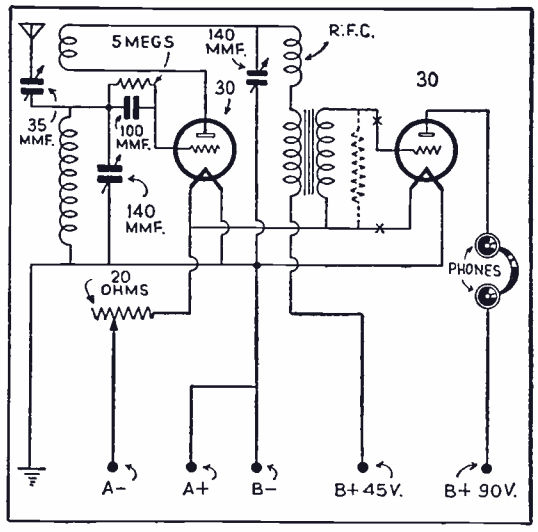


Diagram of receiver using two 230 tubes.

2-TUBE BATTERY DOERLE

Felix Stroinski, Jr., Wilkes-Barre, Pa.

(Q) Will you kindly publish a circuit of the Doerle D.C. 2-Tube Receiver?

(A) We are very pleased to reprint the diagram of the 2-tube, battery-operated, Doerle receiver. This receiver has proven very popular among our readers, and we feel sure that you will be very pleased with the results. The two points marked "X" in the grid circuit of the audio amplifier indicate the connections for a 250,000 ohm, ½ watt resistor. This resistor is dotted in, and is only for use in reducing *fringe howl*, that is a howl that presents itself when the detector is just on the verge of oscillation. This resistor, of course, is not needed if you are not troubled with fringe howl.

AUTODYNES vs. SUPERHETS

John G. Boileau, Port Moresby, Territory of Papau.

(Q) I would like your opinion as to why regenerative sets work so much better than superhets in the Tropics. To explain just what I mean, a 4-tube set will receive all Australian stations, including short-waves worked with regeneration, whereas a six-tube superhet on the same antenna will not get a signal.

(A) From what you state we believe there must be something wrong with your superheterodyne receiver. Either one or two of the tubes are defective or the I.F. stages are not properly aligned, because the average 6-tube superhet should give results equal, if not superior, to the 4-tube regenerative set. However, we have seen poorly designed superhets fall down miserably when compared with a good "sensitive" regenerative set, using at least one stage of tuned R.F. We suggest that you have your superhet looked over by someone familiar with the circuit.

SHIELDING

Bob Abbott, Canton, Ohio.

(Q) Would a bakelite panel with a copper sheet back of it eliminate body capacity as well as a full aluminum panel? How can you insulate the shaft and bushing of a potentiometer when used with metal panels?

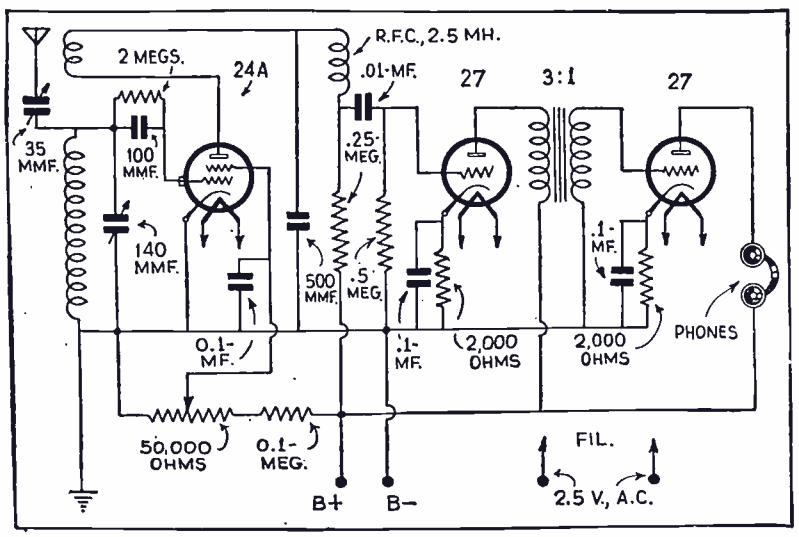
(A) A sheet of copper fastened on the back of a bakelite panel will serve very nicely as shielding. However, we cannot say that this will entirely eliminate body capacity effect. It should at least serve as well as an aluminum panel. The method of insulating potentiometer shafts from metal panels is to use insulating bushings, the holes in the panels should be drilled large enough to accommodate the bushing, and this will place the insulating bushing between the arm of the potentiometer and the metal panel.

200A DETECTOR

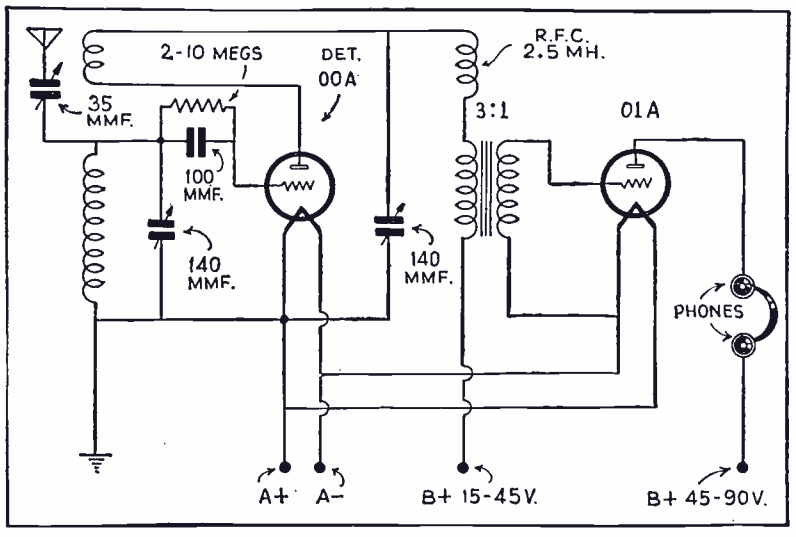
Yukio Fryu, Aiea, Oahu, T. H.

(Q) Will you kindly publish a diagram of a set using a 200 detector?

(A) This diagram is printed on this page. While the 200A was famous as a very sensitive detector in the "old days," the present-day tubes are far superior to it. The diagram shown requires a 200A detector and a 201A amplifier. We believe better results would be obtained by using a 201A as a detector in place of the 200A.



Circuit for 24A detector and two stages of audio.



Circuit showing connections for 201A type tubes.

Short Wave Stations of the World

(*Continued from page* 291)

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.
WFPN	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.
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.
WRDR	Grosse Pt. Village, Mich.	2414 kc.
WRDQ	Toledo, Ohio	2474 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.
W8XL—Cuyahoga, Heights, Ohio

Short Waves On Yachts

● SHORT-WAVE interest in Los Angeles among radio men is increasing. Call letters WDFV, on 2,738 kc., have been assigned to Freeman Lang, transcription producer, for his cruiser, the *Dierdre;* and WDFL, on 2,738 kc., to Ben McGlashan, owner of KGFJ, for his yacht, *El Perrito.*

They will use the transmitters for two-way communication when sailing. Through the cooperation of commercial land stations, they can also talk with any point in the country where telephone communication is available.

There are many radio executives in the southwest who own boats and it is expected that others, too, will install mobile equipment. These include the *Melodie,* owned by Don Lee, KHJ owner; *Dorothy Dx,* owned by Victor Dalton, KMTR'S owner; *Dorissima,* owned by Clarence Juneau, KTM production director, and others.

Recently the owner of WDFL installed a five-meter transceiver in a small sixteen foot sailing dinghy and a duplicate five meter transceiver on board the *El Perrito.* The sail boat went out in the ocean about three miles and held two-way conversation on these five-meter sets with the *El Perrito.* The *El Perrito* operator turned on the transmitter and receiver of WDFL and I did likewise on the *Dierdre* located about forty-five miles away. Two-way relay conversations were held between Mr. McGlashan and myself with very satisfactory results.—Freeman Lang.

• • • 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:

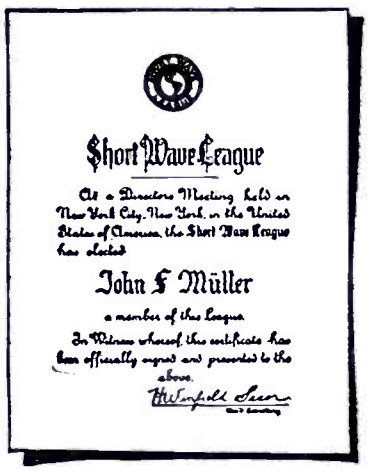
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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**

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**

RADIO MAP OF THE WORLD AND STATION FINDER

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

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

GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

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

SHORT WAVE LEAGUE LAPEL BUTTON

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

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

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

SHORT WAVE LEAGUE SEALS

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

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

SHORT WAVE MAP OF THE WORLD

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

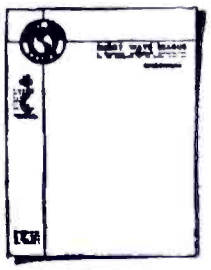
F—SHORT WAVE Map of the World ..... Prepaid **25c**

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

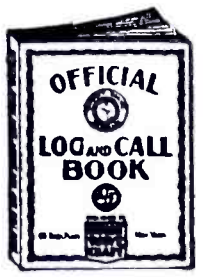
Send all orders for short wave essentials to SHORT WAVE LEAGUE, 98 Park Place, New York City.

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

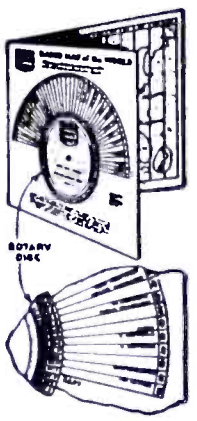
SHORT WAVE LEAGUE, 99-101 Hudson St., New York, N. Y.



A—50c per 100



B—25c per copy

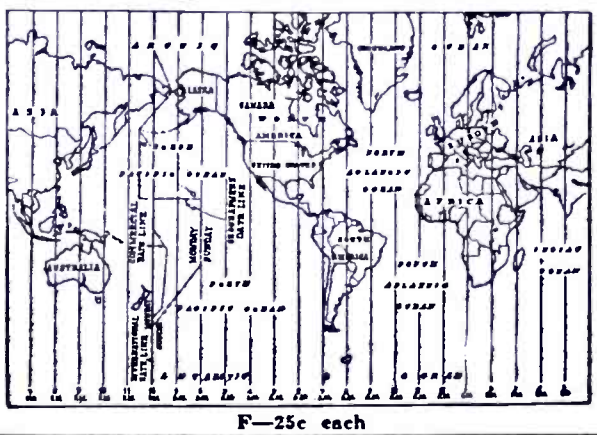


C—25c each

D—$1.25 each

E—35c each

G—15c for 25



F—25c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 9-34
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:

.....
.....
.....
.....
.....
.....
.....
.....

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 .....
9-34 City and State .....
Country .....

WHEN TO LISTEN IN

By M. Harvey Gernsback

Daventry

Daventry will operate as follows during August: Trans. 1, 12:15-2:15 A.M. on GSB and GSD. Transmission 2, 6-8:30 A.M. (6:30-8:30 on Sundays) on GSG and either GSF or GSH. Transmission 3, 8:45-10:45 on GSG and GSF, 10:45 A.M.-12:45 P.M. on GSF and GSE. Transmission 4, 1-5:30 P.M. (1-4:40 on Sundays) GSB will probably be used the whole time, GSF will be used at least till 3 P.M. and from 3-5:30 P.M. either GSD or GSF, with GSB. Transmission 5, 6-8 P.M. on GSD and GSC. GSF may be used in place of one of these, so listen for announcements.

Bombay, India

We have received word that VUB at Bombay, India will probably have commenced regular broadcasts around the first of July. It had been testing for a month previous. The proposed schedule is Wednesday and Saturday from 11 A.M.-1 P.M. VUB is rated at 4.5 kilowatts and operates on 31.36 meters. (9565 kc.)

Caracas, Venezuela, S. A.

YV3BC at Caracas, Venezuela on 9510 and 6150 kc. is now called "YV3RC."

New South Americans

Listeners should note that there are several new South American stations in the station list this month. They are all between 40 and 55 meters.

Byrd Expedition

We are taking the liberty of reprinting the waves and frequencies used by stations KFY and KFZ, the Byrd Antarctic expedition's station at *Little America*, and also those used by KNRA, the station on the schooner "Seth Parker," now on a "round-the-world" cruise. The following frequencies are jointly shared by KFY, KFZ and KNRA. 6650 kc. (45.11 met.), 6660 (45.05), 6670 (44.98), 8820 (34.01), 8840 (33.94), 9500 (31.57), 13185 (22.75), 13200 (22.73), 13230 (22.68), 13245 (22.65), 13260 (22.62), 17600 (17.05), 17620 (17.03), 21575 (13.91), 21600 (13.88), 21625 (13.87). KFZ also operates on 11830 kc. (25.36 met.).

Rocky Point, L. I., N. Y.

We receive many letters asking why we do not list the RCA stations at Rocky Point, N. Y. These commercial stations are used for contact purposes when the N.B.C. or Columbia Network relay programs from abroad.

The Rocky Point stations are normally used for telegraph service only, but use phone when testing with foreigners for these relays. They are assigned about 63 different wavelengths any one or more of which may be employed for testing on phone with foreigners. The waves used at any time depend entirely on atmospheric conditions. For this reason we do not list them as there is so much uncertainty as to which will be used.

Japan or China

There is much talk on an unknown oriental station operating on about 28.79 meters. This station is frequently heard around 4 or 5 A.M. sending Oriental music and speech. Some listeners believe it is a new Japanese, while others believe it is a Chinese station. *There is* a commercial phone station at Shanghai, China, with call letters XGW, which is authorized to operate on 28.79 meters. Whether this is the station being heard or whether it is a new Nipponese transmitter, only time will tell.

Berlin

DJE, sister station of the famous DJ-stations is occasionally used from 8-11 A.M. in place of DJB. It operates on 16.89 meters.

25 Meters Good at Night

With the return of summer the 25 and 31 meter bands have become the favorite hunting ground for Europeans during the night. These bands are very poor in the afternoon now, but excellent after 6 P.M. In the afternoon, up till 7 P.M. the 16 and 19 meter bands are worth investigating.

Sydney, Australia

The August and September schedules of VK2ME (9590 kc.) follow: Sundays only; August. 12 midnight-2 A.M., 4:30-8:30 A.M., 10:30 A.M.-12:30 P.M. September; 12:30-2:30, 4:30-8:30, 9:30-11:30 A.M.

Station List

Since last month we have received many votes on the question of the style of the station list. The vote was overwhelmingly in favor of retaining the "old" style, so instead of republishing the "new" style this month, as was promised, we are continuing with the familiar old style, which will be *standard* from now on.

Addresses

All stations at Monte Grande, Argentina, should be addressed, Transradio International, Compania Radiotelegrafica, San Martin, 329, Buenos Aires, Argentina, S. A.

All those at Hurlingham, Argentina; Compania Internacional de Radio, Defensa 143, Buenos Aires, S. A.

All stations at Rocky Point, N. Y., and Bolinas, Cal., should be addressed; RCA Communications, Gen'l Frequency Bureau, 66 Broad St., N. Y. City, N. Y.

Station CT1AA; 86, Ave. Duque de Avila, Lisboa, Portugal.

YV4BSG, Caracas Venezuela; Sociedad Anonima de Radio, Este 10, bis no. 7, Caracas.

Moscow

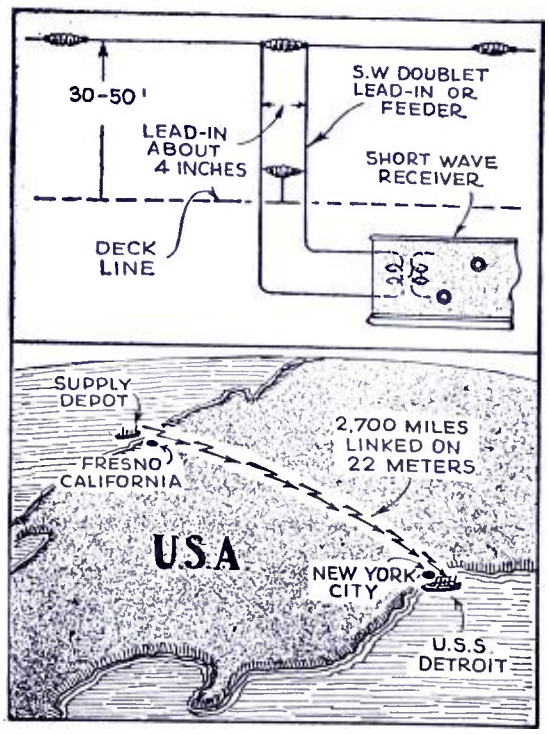
Late reports from Moscow seem to indicate that RW 59 (50 meters) is not on the air in the afternoon when RNE (25 meters) is on.

How Our Navy Uses Short Waves

(*Continued from page 263*)

Airplane Radio

The "Detroit" carries two airplanes, which are equipped with 100 watt transmitters. The planes, of course, can hold communication with any of the ships. Another interesting feature about the planes' equipment is the method by which it becomes possible for the plane to locate a ship via the radio-direction finder. This is not a moving loop aerial as some might think, but it is an antenna built into the wings and directly around the fuselage, forming a square-loop aerial. The plane only has to pick up a signal from the ship, fly in a circle until the signal is picked up at *maximum strength*, and then follow this course directly back to the ship. In this manner the plane can find the ship, even when it is out of sight, and no tricky operation of manually controlled loop-aerials is necessary on the operator's part. The "Detroit" is known to naval men as a "light cruiser," but don't get the idea that it is small by any means. It is a "husky" ship and carries six-inch guns, together with numerous other small guns, such as anti-aircraft machine guns, etc. On ships of this type nothing is left to chance and everything is done in duplicate. In other words telephone circuits are accompanied by pneumatic speaking tubes, so that if the electrical system were to become disabled, orders and commands could still be given through these speaking tubes. Telegraph systems also are installed as another precaution of failure of the two previously mentioned systems.



This diagram shows doublet feeder as used on U. S. S. "Detroit"; second sketch shows 22-meter link over 2,700 miles between warship in New York harbor and supply depot at Fresno, Calif.

Talkies and Other Features

Up-to-date talking movie equipment employed on the "Detroit" consists of a modern projection room and sound-amplifying device. The "boys" are entertained with the latest talking moving pictures, and this is their favorite recreation. So much for the radio and electrical equipment. While the readers of this magazine are undoubtedly more interested in radio, we feel that it would be fitting to give a brief resume of some of the mechanical features aboard one of these great fighting ships. The most interesting, of course, of these are the catapults which project the airplanes.

The catapult operates by compressed air, the plane traveling at the rate of 40 or 45 miles an hour when it reaches the end of this short run of about 50 ft. This is an ingenious device and never fails to work and is constantly in use during maneuvers. The planes aboard this ship are used every day and difficulty is seldom encountered in its operation. The plane when it wishes to return to the ship lands somewhere near the ship, the crew then throws overboard a large rope net for the plane to run upon. Beneath the large pontoon of the plane is a hook which catches into the mesh of the rope net and in this manner the plane can then be maneuvered into position beside the ship and raised aboard with the boom and reinstalled upon the catapult. The large guns are controlled, so we are informed, from the range-finding tower or room located well up on the mast.

A Dandy 4-Tuber For Beginner Or Old Timer

(*Continued from page* 266)

The attached list of parts gives the complete requirements and should be closely followed for values.

This set has been in use at my station where a two-year-old "Marconi" type aerial about 20 feet high is used both for receiving and sending. A steam pipe is used for a ground. Signals are much louder and steadier with less interference than on a very good regenerative set and two stages audio. "Fives" and "Nines" (refers to amateur stations in the fifth and ninth districts) on a magnetic type cone speaker are easily read through early evening QRM.

Parts List

1 Cadmium-plated Steel Chassis—Nominal size 8″ x 12″ x 3″.
2 National Coil Shields.
2 Shields for Type '58 Tubes.
2 Wafer Sockets marked '58.
2 6-Prong Wafer Sockets unmarked.
1 Wafer Socket marked '56.
1 Wafer Socket marked '80.
1 Transformer, Midget type, having high voltage center tapped winding, one 2.5 volt and one 5 volt winding.
2 Filter Chokes.
2 8 mfd. "Dry" Electrolytic Filter Condensers.
1 National R.F. Choke.
2 .0001 mf. Fixed Condensers.
1 Two-gang Midget Tuning Condenser .0002 mf. each section (B).
4 .01 mf. Fixed Condensers.
1 5 mf. 100 volt Electrolytic.
1 mf. Fixed Condenser.
1 250 ohm 2 watt Resistor.
1 50,000 ohm 2 watt Resistor.
1 12,500 ohm 5 watt Wire Wound Resistor.
1 5,000 ohm 5 watt Wire Wound Resistor.
1 100,000 ohm 1 watt Resistance.
1 2,000 ohm 1 watt Resistance.
1 1 megohm 1 watt Resistor.
1 5 Megohm 1 watt Resistor.
1 10,000 ohm Tapered Wire-Wound Potentiometer.
1 50,000 ohm Potentiometer.
1 Audio Transformer; connect windings in series.
1 .00025 mf. Fixed Condenser.
1 each of Type '80, Type '56 and 2 Type '58 Tubes. (R.C.A. Radiotron.)

For each band there will be needed two coils. To wind these coils ¼ lb. spool of No. 20 D.C.C. and No. 36 D.S.C. wire will build all coils most people use. These coils are wound on "*Bud*" six-prong forms and have a 80 mmfd. Hammarlund Trimmer (A) mounted in top.

A screw-driver, a pair of pliers, a pair of diagonals, a breast-drill, a 3/16″ drill, a No. 34 drill—a 6/32 tap and holder, a soldering iron and solder were the tools used.

Coil Data

Band	L1	L2	L3	L4	Tapped at
160 Meter	10	60	30	60	3rd Turn
80 Meter	6	28	20	28	1st Turn
40 Meter	5	14	10	14	¾ Turn
20 Meter	3	7	5	7	¾ Turn

Coils L1 and L2 on Same Plug-In Form; Coils L3 and L4 Likewise.
Coils L1 and L3 wound with No. 36 D.S.C. Wire.
Coils L2 and L4 wound with No. 22 D.C.C. Wire.
Variable Condenser "A" 70 mmf. Compensator in top of Coil Forms.
Variable Condenser "B" 150 to 250 mmf. Ganged Midget Broadcast Receiver Type.

More About Short-Wave Aerials in the Next Issue

Short-Wave Scout News

(*Continued from page 274*)

Report From Official Short-Wave Listening Post of John Sorensen, New York City, N. Y.

(Winner of 2nd Scout "Trophy")

● RECEIVED a veri from PHI on January 7. Report 25.57 M.—this took 5½ months to get. Received veri also from PHI on 16.88 meters and he is coming in R9. QSA5 this month; sends a very nice card with picture of transmitter.

Veri from YV4BSG, Caracas, Venezuela, S. A.—Address (ESTE 10 bis N 7), 50 meters; 8:20 to 10:30 p. m. daily. Static very bad this month; they are sending a fine program. Card—yellow with blue letters.

Veri from XEBT; 49.65 meters (approx.)—Apartado 79-44, Mexico, D. F. This is form letter and in corner is printed XEB in red. Wrote twice for information but they fail to give any. Sending very nice program, heard good, but static very bad this month.

Veri from W1XAZ, 31.35 meters; 6 a. m. to 12 midnight, E. S. T. Power 10 kilowatts. Heard very good all month.

Veri from CJRX, 11.780 kc.; formerly VE9JR.

Veri from VJRO 61.50 kc., formerly VE9CL, Winnipeg, Canada; James Richardson Sons, Limited, Winnipeg, are owners; 7 p. m. to 11 p. m., E. S. T. Power 2,000 watts.

Veri from XETE, 31.25 meters; P. O. Box 1396, Mexico, D. F. Daily 2 p. m. to 2 a. m., E. S. T. Card yellow with red letters. Sending fine program—heard daily.

Veri from KWU, Dixon, Calif., 15,355 kc., 15 kilowatts. Commercial phone U. S. to Hawaii, Philippine Islands, Dutch East Indies. Transpacific Communication Co., Ltd., 140 New Montgomery St., San Francisco. Hear this station often evenings, call KAY, Philippine Islands, and KKF, also Japan. Received two pamphlets with pictures of transmitter and charts; very interesting veris.

Heard PRAB, Rio de Janiero, Brazil, S. A.; 31.58 meters. June 26, 5:45 p. m. Talk in Spanish, English and French. R9, QSA 5.

May 29. Heard U. S. S. *California* sending broadcast to New York, 10 to 10:30 p. m., E. S. T., on 43 meters. Also U. S. S. *Saratoga* testing with New York from 10:30 to 11:00 p. m., same date and wavelength.

VK2ME-VK3ME heard well mornings, best at 6-7 a. m.

WQB-WLL, relaying Sweden from Berlin, Sunday, June 24, 9 to 9:30 a. m., E. S. T., on 20.3 meters (about).

RNE—25 meters; heard often evenings.

Radio Kootwijk—Broadcast for East India on 24.5 meters (about), 1 to 1:45 p. m., May 31.

Reception here is very good on 16 to 33 meters. The rest of the band is noisy.

▼ ▼ ▼

Report From Charles Guadagnino, Detroit, Mich.

(Winner of 3rd Scout "Trophy")

● HEREWITH is my report as Official Listening Post, for June. Due to very, very hot weather here, my report is not as large as I hoped it would be—too hot to do much tuning.

The German stations, DJD on 25.5 meters, is the best heard in this locality, always an R9 plus. Heard here as late as 10:30 p. m., E. S. T. They have very good programs.

CT1AA, Lisbon, Portugal, on 31.2 meters, is back on the air after a "lay-off" of some time. Heard on Tuesdays and Fridays from 4:30 p. m. to 7 p. m., E. S. T. *CT1AA is using three "cuckoo calls" in between programs to identify itself.* Best here from 5:30 p. m. to 6:30 p. m., E. S. T.

Of the French stations at Pontoise the 25.6 meter one is the best heard here. The 25.2 and 19.8 meter ones are not so "hot". Lots of fading.

From the Vatican, Rome, Italy, HVJ, on 19.8 meters, is heard here on Saturdays calling and broadcasting to different Italian cities. From 10:00 a. m. to 10:30 a. m., E. S. T.

KAZ, Manila, P. I, on 30 meters, is heard working California near 10:00 a. m. Irreg.

A new station in Bogota, Colombia, was heard here, HJB, on 30.3 meters, between 6 p. m. and 7:30 p. m., E. S. T, working PSK on 36.6 meters at Rio de Janeiro, Brazil. Very good volume.

That's all of the report for June.

CHARLES GUADAGNINO,
15226 Mack Ave.,
Detroit, Mich.

▼ ▼ ▼

Report From "O. L. P."—Edward M. Heiser, Brecksville, Ohio

(Sixth Winner of Scout "Trophy")

● DURING the past month, reception conditions have been rather poor in this locality. The usual so-called "locals" could be heard more or less regularly.

The nineteen meter band is producing better results at present than it has in the past and also the twenty-five meter band.

The fifty meter band is very noisy now, as far as "foreign" reception is concerned, although the U. S. short-wave stations have been coming in *louder than ever*.

On Sunday evening, June 10, I heard CGA8 at Drummondville, Quebec, Canada. They are on 4,905 kc. (61.16 meters). They were testing at this time (8:00 p. m.). with VE9AM.

VE9AM is an experimental station which at present is on board the S. S. *New Northland* and I believe it is or was somewhere on the Atlantic.

VE9AM was heard on approximately 58½ meters.

On Monday afternoon at 2:00 p. m., on June 11, CGI was heard talking to London and Montreal. CGI is located on the Isle Malijne, Quebec, Canada, and was heard on approximately 23½ meters.

EDWARD M. HEISER.

▼ ▼ ▼

Report From "O. L. P." of Harold Hansen, S. Omaha, Neb.

(Fifth Winner of Scout "Trophy")

● STATIC has been high here this month. However, I have "logged" several new stations.

XENT of Neuvo Laredo, Mexico, can be heard every evening on 44 and 69 meters from 7 to 12 p. m., C. S. T., with good volume. I have received a verification from this station.

CFU of Rossland, B. C., Canada, tests irregularly about 10 p. m., C. S. T., with CFO and CES. This station is owned and operated by the Amalgamated Mining Co. of Canada. It also rebroadcasts programs for its listeners in the far north. I have received a veri from this station which is on 52 meters with a power of 500 watts.

A powerful Japanese station that I have not identified as yet, may be heard each morning from 4 to 7 a. m., C. S. T. This station broadcasts songs and music and also talks in Japanese. It is on 27 meters.

HAROLD HANSEN,
Official Listening Post,
South Omaha, Nebr.,
Route 5, Box 169.

The "19" Advanced Twinplex

(*Continued from page* 271)

the smallest size of 45 volt "B" battery can be used, and should last as long as their shelf life, which is about a year. Remember, however, that if cheap or *bootleg* batteries are purchased, they will inevitably become noisy and cause trouble. "C" bias can be provided by two of the smallest size flashlight cells in series, or by a regular "C" battery. Incidentally, this set will work quite nicely on only 90 volts of "B" battery. The screen voltage on the 34 should be kept constant at 67½ volts. Provided that it is well filtered, and has no trace of hum, a "B" power substitute, or eliminator may be used in lieu of the batteries.

Operation

After the set has been wired, and we hope, carefully checked, put the tubes in their sockets and connect the filament supply. Provided the tubes light properly, plug in a low frequency set of coils and connect the "B" and "C" supplies. The trimmer is used to line up the r.f. and detector coils for each band. The set is then operated with the main tuning control and regeneration control, just as any other short-wave receiver.

This little job has brought in quite a "log" of D-X stations, and if the reader realizes that it has all the excellent qualities of the *Twinplex*, plus a stage of high-gain r.f. he will understand that it is really a worth-while set. Remember, good results are just as much up to the builder of the set as to the original instigator of the circuit. Here's all the dope, fellows. Go to it, and, let's hear what you catch in the way of D-X (distance).

Parts List

2 gang .00014 mf. variable; American Sales.
.0001 mf. variable; American Sales.
3—6-prong sockets; American Sales.
1—4-prong socket; American Sales;
1—5-prong socket; American Sales.
50,000 ohm potentiometer; American Sales.
3—.1 paper condensers; American Sales.
.0001 mf. mica condenser.
.0005 mf. mica condenser.
.01 mf. paper condenser.
3 meg ½ watt resistor.
100,000 ½ watt resistor.
250,000 ½ watt resistor.
19 tube RCA Radiotron (Arco).
36 tube RCA Radiotron (Arco).
Chassis—Blan the Radio Man (Korrol).
1 set 3 winding coils; Na-Ald.
1 set 2 winding coils; Na-Ald.

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.

How to Report Signal Strength

TABLE OF SIGNAL STRENGTHS

R1—Just audible.
R2—Audible, but unintelligible.
R3—Audible, partly intelligible.
R4—Just intelligible.
R5—Quiet, but intelligible.
R6—Moderately loud.
R7—Normal, good clear reception.
R8—Strong reception.
R9—Wipe-out signals.

FADING AND ATMOSPHERICS

F = slight fading; FF = fairly deep fading, but no program lost; FFF = complete fade-out, and program lost. (N = no fading). SS = very slow fading (minutes); S = slow (one minute or so). R = fairly rapid (several seconds). RR = very rapid (one second or less).
X = slight static; XX = rather bad; XXX = very strong atmospherics. (N = no atmospherics.)

3-Vt. "A" Power Battery

(*Continued from page* 283)

This "A" powerpack contains no caustic, alkaline, destructive, poisonous, messy electrolyte and requires neither the addition of liquid, nor any periodical attention.

A special tapped resistance unit insures most accurate voltage control.

Three Important S-W Bulletins Free!

● THE name of STROMBERG-CARLSON is a magic word in the realm of radio, and their sets have always represented the highest degree of engineering and supreme workmanship. The Stromberg-Carlson engineers recently prepared 3 extremely valuable bulletins, WHICH EVERY SHORT-WAVE LISTENER AND EXPERIMENTER SHOULD READ. Copies of these bulletins are available FREE OF CHARGE.

● BULLETIN No. 3—Discusses with text and illustrations the "how and why" of short-wave radio transmission, including an explanation of kilocycles versus meters, an explanation of "fading," "skip distance," the Heaviside layer, etc.

● BULLETIN No. 4—Getting the Most Out of Short Waves. This explains how to get the most out of short-wave tuning under different weather conditions and the effect of "sun spots" on short-wave reception; a quick test for sensitivity; WHEN to tune and WHERE with respect to day and night, including four graphic charts showing just where the "foreign" stations come in on your set dial—and at what time of the day.

● BULLETIN No. 6—Identifying Short-Wave Broadcasting Stations—The characteristic musical or other identifying signals or phrases you should listen for in connection with the "foreign" stations. Instructions are given on how to keep a short-wave "log," with specimen "log sheets".

Address your request for any one or all three bulletins to SERVICE DEPARTMENT, SHORT WAVE CRAFT, 99-101 Hudson Street, New York City.

Band-Spread Methods

(*Continued from page* 278)

here, make *full coverage* available at the "flip of a switch". Thus you quickly and effectively eliminate the necessity for separate coils for full coverage. Of course two switches will be necessary, so that both the RF and detector circuits can be switched. The writer tried it with a single switch, using a double-pole double-throw unit, and got a slight interlocking effect because of the proximity of the leads in the switch, and it was necessary to install separate switches for each circuit. Perhaps by careful shielding the effect could be eliminated, but with two separate switches, no trouble should be experienced.

Large and Small Condenser System

The method shown in Figure 3 is simple and well known and in the opinion of many, the best of all. It simply uses a *band-setting* condenser and another condenser is parallel to *spread the band.* By setting the one condenser C3 on any desired portion of the range, the other one can be used to tune with, thus giving continuous band spreading and full coverage. A tip here—use the condenser values as given and you will be very pleased with the system. Here is why: The total of the capacities is .00015 mf. With C3 set on zero, C4 covers the first third of the range of the coil. With C3 set at *half closed*, C4 covers the second third of the dial, and with C3 set fully closed, C4 covers the final third of the dial. Furthermore, if you know the desired station's wavelength, you can hit the necessary dial setting rather closely. For example, suppose you want the 40 meter amateur band. The coil used covers 29 to 58 meters. You want 40 meters. The range of the coil is 29 meters. 29 from 40 is 11. 11/29 of 150 mmf. is 57 mmf. We set C3 on 50, which is half scale. Then remember the C4 spreads its 50 mmf. over 100 degrees so we multiply the remaining 7 mmf. by 2, and we get 14. Actually, on the writer's set, the band began at 20, making 6 divisions error. However, if you use kilocycles instead of meters, you will hit it much closer, since the frequency is nearer a straight line. This will make it unnecessary to search the whole band for a station, at any rate. The only disadvantage to this method is that it is a little difficult to return C3 to the same setting each time when you want to return to a "logged" station. This can be overcome by the method shown at Figure 4. Here we make use again of the little trimmers. Position 1 uses C4 alone. Position 2 adds in parallel a 50 mmf.-trimmer. Position 3 adds a fixed or trimmer of 100 mmf. These trimmers or fixed condensers remain set and the switch therefor returns positively to the same settings each time on each coil.

Figure 5 is the simplest of all, but its use is quite limited. However, within its limitations is a very good method. The coils used must each reach the high frequency end of the band when the condenser is open. The condenser is then of just the right size to *spread the band* over all or most of the dial. This is useful in a receiver used solely for ham work. Of course it will spread the 160 meter band the most, and the 20 meter band the least, so that the condenser must be large enough to reach all of the lowest frequency bands to be used.

Our broadcast band covers 1,000 kc. By using band-spread we put it on the whole dial. Short-waves spread in the same way will tune as easily.

A Good 5-Tube Battery Super-het

In the Next Issue!

3.1 Meter Transmitter and Receiver

(*Continued from page* 267)

CH4 is an iron core A.F. choke coil, through which the common plate voltage Va is supplied to the two tubes. The transformer Tr supplies to the grid A.F. voltage modulation in accordance with which A.F. variations will arise in the plate current, flowing through CH4. This variable current will cause across CH4 an A.F. voltage which is superposed by plus Va and which will control the emission of the oscillator.

Circuit Made Flexible With Jacks

The two other modulation methods are much simpler. It is only necessary to apply the modulating voltage either to grid or to the plate. The modulation tube and the A.F. choke coil are not required. Fig. 4 shows a circuit which enables the investigation of the influence of the three modulation methods mentioned above: J1, J2, and J3 are plug-in jacks, which are either short-circuited by jumpers or through which the required apparatus can easily be connected with short leads to the circuit. As an illustration let's take the Heising method. Jack, J1 is short-circuited, the plug of J2 connects the R.F. choke, CH4, and the plug of J3 connects Tr to the grid of M. In order to pass to the plate voltage modulation method the A.F. choke CH4 is replaced in J2 by the secondary of the TR, while J1 remains short-circuited. An A.F. modulation generator is shown in Fig. 5. Here again the Hartley circuit is used with certain modifications necessary for A.F. generation. The inductance Ls is the secondary of an A.F. output transformer Tr. In order to match the impedance of the output tube, the windings in some types of transformers are tapped, a fact which makes them convenient for our purpose. The secondary of TR supplies the required modulation voltage. The frequency can be brought to a pleasing ear tone by adjusting Cs and C4. Care should be taken to have C4 always larger than Cs. The Morse key K is connected at a point, where it is free from direct current tension. Under these conditions the tone is clear and disturbances due to key clicks do not occur. CH5 is an iron-core choke of the type used in power supply units of broadcasting receivers. Fig. 6 shows the oscillator built in accordance with the circuit of Fig. 4. As very high frequency currents flow only over the outside surface of conductors, the inductance coil is made of large copper tubing 12 mm in diameter (approx. ½"). The inner diameter of the coil is 11 cms (4 5/8"). The coil is mounted on a vertical bakelite panel. In order to have the connections between the coil and the tube elements as short as possible the tube socket is mounted on the same panel between the ends of the coil. C2 (Fig. 4), is an air condenser and has a capacity of approx. 55 mmf. The R.F. choke coil CH2 which is in the path of the grid bias consists of 20 turns 1 cm. (.4 inch) in diameter. The resistance of R2 is 3000 ohms and the milliammeter Ma (Fig. 4), has a range from 0-20 milliamperes. The leads for the filament supply are mounted below the base plate. The condenser, C3, which is mounted immediately below the tube socket has a value of .001-.002 mf. The two R.F. choke coils, CH1, are intended to prevent the leakage of the H.F. currents into the power line. In order to keep their resistance as low as possible these chokes are made of heavy copper wire. Each choke is an air helix of 20 turns 25/32" (approximately ¾") in diameter. The slider of the 100 or 200 ohm potentiometer, R1, which is connected across the two chokes CH, is connected to minus Va and plus Vg. The by-pass condensers C3 each have a value of approx. .002 mf. The above arrangement makes it possible to use raw A.C. for the heating of the filament, because the hum is almost completely eliminated.

How R.F. Choke Is Wound

The R.F. choke, CH3 which is connected to a point, T, of the coil L consists of 80 turns wound on a bakelite tube 1.5 cm. in diameter (19/32"; about ⅝") with the idea in mind to keep the distributed capacity of this coil as low as possible. The total number of turns was subdivided in several groups connected in series and spaced a few milliameters. In Fig. 6, this coil is seen mounted vertically somewhat on the right side of the oscillatory coil L.

Our transmitter was mostly operated from the raw (unfiltered) 200 volt D.C. line and a four volt storage battery was used for the heating supply. The oscillator tube was of the Philips Miniwatt E410 type and an LK 4110 was used as a modulator for the Heising method. (201A, 112A, or 71A will work in this circuit.)

It is necessary to establish very carefully from the beginning during the first tests (without a modulating system) the right location of the tapping point, T. This point shall coincide with the nodal point which is formed on the inductance L. It is relatively easy to detect by watching the milliammeter in the grid circuit while touching the R.F. choke CH3 with one end of a wire, the other end of which is connected to some point on L. The point will be the right one when the reading of the milliammeter will not vary.

Measuring Wavelength

The next problem is to measure the wavelength of the transmitter. This is done by making use of the Lecher method of parallel wires. This method has been repeatedly treated in this publication and can be assumed as well known. When the dimensions of the elements of the oscillatory circuit are precisely the same which were indicated and when the same tube is used, the wavelength is 310 cms. (3.10 meters). Once the wavelength of the transmitter has been established the problem can be solved of how to couple it to the antenna. First, the antenna is tuned in to the third harmonic and directly coupled to the oscillatory circuit of the transmitter. The radiator is made of a couple of telescoping copper tubes in the outer ends of which are inserted small metal balls to avoid sparking. This radiator oscillates on the third harmonic when its length is approximately ¾ wavelength or about 220 cms. Fig. 7 shows the coupling between the transmitter and the antenna. The position on the inductance L of the point A to which the antenna is directly coupled and also the exact length of the radiator are carefully determined with the aid of the thermo-milliammeter MA; an antenna current of 220 milliamperes can be expected with a well adjusted transmitter. The complete circuit of the experimental transmitter is shown in Fig. 8.

When a tube of the type L413 (see previous note on American tube equivalents) is used in the modulating oscillator, the three tubes of the circuit can then have their filament supply from a common storage battery.

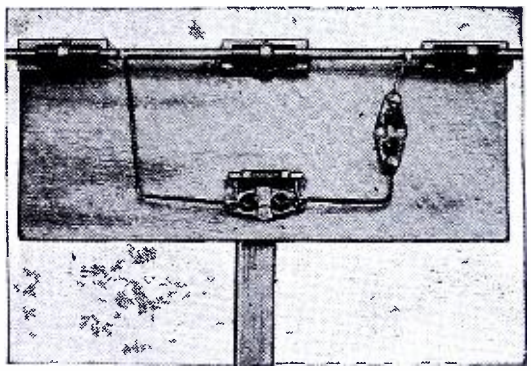


Fig. 10—Crystal receiver, diagram of which is given in Fig. 9.

Crystal Receiver For Testing

In order to be able to pick up signals from the transmitter during the first adjustments, a small crystal receiver shown in Fig. 10 can be used. Fig. 9 shows the circuit of the crystal receiver. The total length of the dipole is approximately equal to half the wavelength, in our case about 1.55 meters. The detector circuit consisting of the crystal and the head-phones with the corresponding by-pass condenser is connected to the dipole at a distance about 10 cms. (4 inches) from its middle. The dipole and the detector circuit are mounted on a small board which is carried on a wooden handle. Very interesting experiments can be performed with this primitive receiver when the transmitter is located inside of a building. The radio waves are reflected from the walls and from the combination of the outgoing and reflected waves a system of *standing waves* with nodal and antinodal points is formed within the room. At the nodal points, the loudness of the signal drops almost to zero. A few feet further a point of maximum signal intensity may be found. In connection with these, experimental demonstration of polarization of emitted waves can be performed and experiments can also be conducted on field losses due to various reflections.

In selecting a circuit for an ultra short-wave receiver all those which operate with H.F. amplification have to be rejected. Already the amplification of short waves becomes a difficult problem, on account of the fact that the efficiency drops with the decrease of the wavelength. H.F. amplification in the ultra short-wave range is practically impossible. However, there still exist a number of circuits which are appropriate for our purpose. These are the ordinary regenerative, the push-pull regenerator, various types of super-regenerators and superheterodynes. The difficulty lays rather in the choice of the most appropriate of them, because an exact solution of this problem by the method of comparative tests requires a considerable period of time and sufficient funds.

(*Receivers will be described next month.*)

High-Quality Audio Amplifier and Power-Supply

(*Continued from page* 279)

age amplification of 100 to 110, whereas a triode (a 56) has an amplification factor of 13! The output from the second detector of a six-tube superheterodyne was connected to this amplifier and stations that were ordinarily hardly perceptible were brought in to an ear-splitting volume. The 2A5 is in the second stage and it is capable of delivering 3 watts of undistorted audio output. Three watts of high quality audio is much more than what a normal sized room can bear. The 57 is capable of handling a respectably strong audio signal, and it is not "overloaded" as easily as some might think. In fact, the 2A5 will be overloaded before the 57. The volume control on the amplifier is a 500,000 ohm potentiometer (R5) acting as a variable grid resistance for the 2A5. Maximum volume to a gradual cut-off is possible. There is no noise in its operation and it does not affect the tuning of your receivers. There is also an arrangement for the use of headphones by simply throwing a switch. Careful scrutinization of the schematic will show that this sends the plate current of the 2A5 through L1, which is the secondary of an audio transformer. The audio component is sent through the earphones through the condenser C5. No direct current goes through the earphones. The audio transformer should be shielded because it is nearer the electric fields of the chokes and power transformer. A word as to why the earphones are not used directly after the first stage. It is because the volume control will cut down the strongest signal until it can hardly be heard in the earphones; and if a very weak signal is received, the volume control can be entirely opened and we have the advantage of the extra stage which will make the signal at least understandable and not barely perceptible as the case would be if the earphones followed the first stage.

Do not neglect the condenser C5! L2 is the primary of the output transformer. The load resistance of a 2A5 is 7,000 ohms. This is very important and is taken care of if the loudspeaker matches a single 2A5. The speaker is an 8 inch dynamic model having a 2,500 ohm field coil (L3).

Power Supply

Now to the power supply. At the first glance, it will be seen that an extra amount of filtering is employed. Some might object but for my part, if I hear a faint signal from Java or Borneo, I won't have AC creep in and spoil it. Therefore, three chokes are used, one of which is the speaker field. Four electrolytic condensers are used; three—C8, C9, C10 are 8 mf., 500 volt peak units, and C7 is a four mf., 600 volt peak unit. Of course, if one wishes to use all 600 volt condensers, he may. The high voltage winding is by-passed by C14 and C15. The values of these condensers are not critical, but .002 mf. is preferred. The important thing is to have them rated at a *high voltage*, about 800 volt or more. I had a condenser rated at 500 volts and it broke down, and a burned out rectifier tube was the result; it might have burned out the transformer. The primary is by-passed for a good measure by the condensers, C12 and C13. They should be about .1 mf. One may be used instead of two but then the AC plug should be tried both ways and set the way it works best; whereas, if two are employed as shown in the diagram, the plug may be used either way.

High Voltage Circuit

The high voltage winding of the power transformer should provide 400 volts on each plate of the rectifier, at about 100 milliamperes. The output will then be 250 volts *with the amplifier running*, which is high enough to run any receiver at its highest efficiency. If the 5-volt rectifier winding is center-tapped, the high voltage posi-

tive connection should be brought out at this point; but if it hasn't, take it from one side. In regard to the other filament windings, as heater tubes are used, the center tap should be *grounded*. If they are not center-tapped, a center-tap resistor (R8, R9) of about 20 to 30 ohms should be used with the center tap grounded; these resistors are wire-wound. The ground should be *good*, a cold water pipe preferred; this is another precaution against "hum."

The voltage divider should be a 25,000 ohm, 50 watt resistor, with adjustable taps. Any voltage between 250 and 0 may be obtained by adjusting the sliders.

The Special Table

I have designed and built a table to fit my requirements of short-wave listening. To the right of the speaker layout on the top (in the back) is the binding-post strip with the various voltage taps. The voltage divider is mounted *directly* behind this strip. When it is done this way, only two leads (the high voltage plus and minus) come to the top of the table, whereas, if the voltage divider were placed below, many wires would be necessary to bring the various voltages to the top. Either Fahnestock spring clips or binding-posts may be used on the bakelite strip. Taps should be provided for the filament leads also. In mine, I have a separate binding-post strip for this because I have 3 pairs of filament windings (2½ v., 1½ v. and 1½ v.) on my power transformer, besides the two windings for the rectifier filament and amplifier heaters. Then by connecting the different pairs in series, I can obtain besides 2½ and 1½ volts, 3v, 4v, or 5½ volts. The 5½ volt is high enough to run the six volt heater tubes.

The cable to the speaker consists of 3 leads—the input to the field, and the lead to the plate of the 2A5. The output of the field and the input to the primary of the output transformer (which is mounted on the speaker chassis) should be connected together at the speaker; thereby, saving one lead. All of the leads should be shielded and the shields should be grounded. If one desires to economize he may, *but the input lead to the amplifier should be shielded regardless;* the 57 tube should also be shielded.

The best wood to use for this bench is poplar. It is strong and relatively cheap. The finish is two coats of shellac. As it is a "work bench", scratches are apt to be made, and they are not so apparent on this kind of finish; but individual tastes should be followed. The hole for the speaker should be 5 inches in diameter if it is an 8 inch speaker (outside diameter).

Mortise and tenon joints should be glued together. However, Fig. 4 gives the general dimensions. They may be varied for individual requirements. The top is three 6¼ x 36x¾ inch boards doweled and glued together. The 2 racks are constructed in like manner only using two pieces. The speaker board is two pieces 6x⅝x12 inches glued together also; but first two half circles are cut out and when put together make the 5 inch hole. I have a sheet of iron (grounded) tacked underneath of the top of the table; this is another precaution against hum!

A word as to the assembling of the amplifier and the power unit. The two units should be shielded from each other by an iron sheet. The power transformer and the chokes should be in metal cases. My chokes are of the open type, and so I mounted them at right angles to each other and in separate shielded compartments. The parts should not be mounted at random, or with the idea of having them look "nice". They should be mounted with care and consideration; in fact, it is a good idea to shift the parts around a bit (while the amplifier is working the speaker) until the best results are obtained.

A few useful hints are: *Keep RF out of the amplifier.* Have the output of the receiver well by-passed and "choked" before sending it through the amplifier.

I have worked this amplifier and power supply in conjunction with the "Oscillodyne", the "Pentaflex", the "Megadyne" and several modifications of the "Doerle" circuits, besides many hook-up of my own design, including T.R.F., super-hets, and super-regenerators with excellent success.

Short-Cuts In Learning The Code

(*Continued from page* 287)

The persons to whom I taught the code seemed to have much less trouble in this respect as a result of their adopting the following method: secure any piece of printed material and look up the code combination for the first letter. Say this aloud several times and then pass on to the next letter. You will be surprised how quickly you will learn the code combinations for letters that are often repeated, and an hour's practice of this sort will make it possible for you to give the dits and dahs for any letter that you encounter. Then take up the numerals in the same manner and practice on both letters and numerals until you can give any of them instantly with no hesitation. When you can do this you will be ready to start listening to actual sending.

Best Mechanical Teacher

Of all the mechanical contrivances that are used to teach the code, it is my firm belief that the *short-wave receiver* is by far the best. Secure a pencil and paper and seat yourself before your pet pile of junk. Rotate the dial across one of the amateur bands until you hear a rhythmic dah-dit-dah-dit dah-dah-dit-dah. The operator will probably repeat this "CQ" several times, the actual number being inversely proportional to the length of time that he has held his license and to his general ability as an operator. Next he will send either "DE" or "V" and then sign his call several times. This will be followed by "K" or he will start calling "CQ" again. Now you are to copy his call during the time that he is sending it. Unless your receiver is better than mine, the chances are strongly in favor of this call being a "W" followed by a numeral. The number will indicate his approximate position, and thus you will be contracting the dread DX disease while you are learning to copy. Two birds with one stone, so to speak! It is unlikely that you will be able to get the entire call the first time he sends it, or the second time, or the third time; but hang right on like grim death until you are absolutely sure that you have it. As soon as you do have it written down, hunt up another "CQ" and repeat the process. As soon as you have attained a fair degree of proficiency at getting call letters, you can start copying straight stuff as it is called in the vernacular. Stick with a good strong station that is calling CQ until he sends "K," and then let the receiver set for a minute or two. If he has any luck, you will hear him come back to another station and sign his own call. I am willing to bet a good quarter that the next thing he will say is exactly this: (GM, GA, or GE) OM ES TNX FER CALL UR (NDC, DC, PDC, XTAL, or RAC) SIGS QSA——— R——— HR IN ——————— WX HR ——————— —...— —...— —...— WL OM PSE QRA ES QRK? .—.—. . If he doesn't follow the above text to the letter, have no more to do with him, for he is a heretic and is showing dangerous signs of possessing that unforgivable fault of amateur radio, originality.

Don't Copy "In Your Head"

Now we come to a point that I wish to emphasize. *Do every letter of your copying with a pencil and paper.* On no account start copying *in your head!* I speak from experience. Being of an energy-conserving disposition (my rude enemies say plain "lazy"), I early contracted the habit of copying in my head. As a result, I am now able to copy at about half the speed on paper that I can mentally. Inasmuch as your copying speed is measured by the speed that you can copy with a pencil, you can readily see the advantage of learning to write down the letters as you hear them. I find that after you have been accustomed to copying in your head, the small amount of attention that is necessary to write the letters is enough to destroy that intense concentraion that is necessary to copy at high speeds. I realize now that if I had only practiced writing down the letters as I heard them, I should be able to copy as fast on paper as I can mentally.

Keep plugging away at this practice every day until you can copy a good slow fist one hundred per cent. Always practice on a station that is sending at a speed which keeps you right up on your mental toes. Do not fall into the lazy habit of hunting up the slowest fist on the air for your practice. If QRM comes on the station to which you are listening, swear a couple of times to show that you are an old timer and freeze right on. Do your darndest to pull your station through the interferring station. This is the best practice that you can hope to get, for it trains the ear to respond to one particular note while it disregards any other signal of even a slightly different pitch. When you are able to copy an R6 signal through R6 QRM, you are ready to start the really difficult part of your code instruction. I mean that you can then start to paw the key.

By this time, if you are of normal intelligence, you should have noticed that *C* is not sent as double *N* in the best radio circles, and that *L* is not sent as if it were *A I*. You should also realize that the International Code is composed of dots, dashes,

and SPACES, and that the use or lack of use of these spaces spells the difference between an operator in the best sense of the word—and just another "lid". *The entire secret of good sending is a matter of accurate timing and spacing.*

How to Use Audio Oscillator

It is necessary that you have some device to enable you to hear your own sending, and I believe that the simple audio oscillator is the best all-around instrument for this purpose. It is simple, easy to make, and all of the parts may be used around the shack after you no longer need it. With it you can select any note that you wish, and you can use it without disturbing anyone else in the room. Figure 1 is a diagram of the oscillator. The tube should be selected to match the filament battery at hand. You may use a '30 and light the filament with a C battery if you wish, or a 201A and a six volt battery will make an excellent rig. By attaching it to a plug as shown, it may be plugged into the detector socket and the amplifier can then be used. Attempts to use this oscillator with AC tubes have not been successful in my particular case, but it may be that you will have better luck. At any rate, the '30 tube that you need for the oscillator can be used in the monitor when you build your station, so it is merely a matter of making the purchase a little early.

How to Arrange Key

I suggest that you fasten your key to a small thin board and use a phone jack to plug it into your oscillator. I have found that this method makes it possible for you to place the key in any desired position, and it teaches you to learn to use a light touch instead of trying to pull the key off the table every time there is a space. I want you to avoid a nervous type of sending in which the dots are sent as quickly as possible, but at the same time I do not want you to send with a slow muddy fist that employs three-second dashes. Learn to form the letters as a complete unit rather than a combination of dots and dashes. Make the dots as short as possible and make the dashes just three times that long. Do not leave any appreciable space between the parts of the same letter, but leave a well-timed space between letters. Try to send as if you were some machine that grinds out the letters at a uniform speed. Send every letter at the same speed, and do not forget to put a longer space between the words than you do between letters. Try to get a swing to your sending that will sound as if you were keying to the measured beat of a metronome. Your dashes should be as near the same length as it is possible to make them, and the dots should be so short that there can be no possibility of anyone mistaking them for dashes.

How to Hold the Key

I have left the manner of holding the key for the last, as it seems to be one point that is never to be settled arbitrarily. I do not believe that you could find any two Hams who hold their keys in exactly the same manner, or who use their arms and wrists in the same fashion when they key. In general, however, we may lay down certain basic principles that must be followed if the student is to develop a clean, easily read, high-speed fist without paying for it with the acquiring of a glass arm. The key is usually held between the thumb and the first two fingers of the right hand. The thumb is placed on the left side of the knob, while the fingers are partly on top and partly on the right side of the key. The other two fingers do not touch the knob, nor are they allowed to rest on the table. The grasp of the key is what is usually termed "gentle, but firm". If you insist on holding it as if it were the proverbial straw of the drowning man, your sending will be characterized by a nervous, ill-spaced kind of keying that is the first symptom of a future glass arm. On the other hand, only a dub tries to "slap" the key. The fingers should never leave the knob while the operator is sending.

The key should be so placed that the forearm rests on the top in an easy, natural position. The wrist just clears the table,

and the dots and dashes are formed by a smooth, well-controlled motion of the hand. Only the wrist should be flexed; a type of sending in which the entire arm is used leads quickly to fatigue. Do not worry about how many words per minute you are sending. Think about whether or not you are making your letters clearly and smoothly; if you are observing the spaces between letters and between words; and if you are doing this with a minimum of effort. Learn to form the letters as quickly as is consistant with keeping them clear and well spaced, and vary your speed by proportioning the length of the spaces between letters. By actual experience I have found that it is much easier to copy code sent in this manner than it is to copy code in which the length of the dots and dashes is varied to suit the different speeds. Finally, *keep at that practice for a long, long time after you have decided that you are pretty doggone good, even if you do say it yourself.* It will not hurt you, and it may just be possible that you will not be quite as adept at sending and receiving as you may think.

In conclusion, I want you to sit down for a minute and realize that there are just twenty-six letters and ten numerals to learn. Thirty-six characters! If you are going to let a little thing like that get your goat, you have no place in the amateur ranks, for the first dose of Saturday night QRM would probably show up that quitting streak of yours in a great big way. On the other hand, if you are of normal intelligence and are willing to pay a little of your time for a great deal of enjoyment, you should be able to pass the ten words per minute test after you have spent an hour a day on the code over a period of two weeks. If you flunk the test, I will read every word of the meanest letter that you can write me, and agree with every word you write. Are you on? OK, let's go!

Crystal Portable Transmitter

(*Continued from page* 287)

nine inches wide, ten inches high, and six inches deep. Output; a good eight watts. Circuit; crystal-controlled M O P A; Signal; XPDC, the best that can be obtained. A *real portable?*—you guess!

Tubes an Important Factor

Choosing the type of tubes for a portable deserves quite some thought. Tubes of the receiving type of course have to be used in a portable of very small dimensions, because there is little room for a power supply that would produce high voltage. Therefore transmitting tubes cannot be used to any advantage. After studying the tube manual for hours, and after every other tube had been investigated—the 89 was chosen as the oscillator and R.F. amplifier tubes. This tube is the little brother of the 59 and will do the job just as well as the 59, only with less power out-put. The 89 can be used as a class "A," class "B" or pentode amplifier. The suppressor grid is brought out to a pin on the base; making a six-pin base with the control grid coming out to a cap on the top of the envelope.

Incidentally, before we forget it, *if one can find space in the carrying case for it, a 37 could be used as an audio amplifier and employed to modulate the suppressor grid of the amplifier.* This would mean that we could have a very "nifty" low-powered phone rig. The 89 has a 6.3 volt heater and is of the heater-cathode type. The rectifier tube is also of the automobile type and requires 6.3 volts for the heater. Because all the tubes have indirectly heated cathodes the heaters can all be run from the same winding on the power transformer. Looking at the data sheet for the 89 we find that it will stand 90 milliamperes peak plate current at 250 volts, for class "B" service, so there is no danger of damaging the tube by drawing heavy plate currents. In this transmitter the 89's have 300 volts on the plates and the highest plate current

"HAM" ADS

Advertisements in this section are inserted at 5c per word to strictly amateurs, or 10c a word (7 words to the line) to manufacturers or dealers for each insertion. Each word in a name and address to be counted. Cash should accompany "Ham" advertisements. Advertising for October issue should reach us not later than August 5.

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for the amplifier is 50 milliamperes. Maximum output is attained at this input and there is no benefit in running it any higher. The oscillator draws normally under load 30 mills (M.A.), the plate voltage also being 300.

The 84 rectifier is slightly overloaded but has withstood the overload very nicely. It is rated at 225 volts and 50 mills, (M.A.) The insulation between the heater and cathode fortunately is specified at 300 volts.

Transmitter Circuit Conventional

The circuit of this transmitter is conventional in every respect. No trick circuits should be used in portable transmitters! Shunt plate-feed is used for both oscillator and amplifier in order that the two 140-mmf. tuning condensers could be mounted directly on the metal panel with no danger of short-circuit. The plate voltage is fed through receiving type 2.5 mh. r.f. chokes. Grid-leak bias is used in the oscillator circuit for simplicity. This is a 100,000 ohm, 2 watt resistor. The screen-grid voltage for the oscillator is obtained through the use of a 50,000 ohm series resistor connected directly to the high voltage. Excitation is taken from the oscillator plate tank coil at approximately one-third the total number of turns from the ground end of the coil. If it is taken from a point nearer the plate or *hot* end of the coil the tube will not oscillate readily and results will be very unsatisfactory. A .0001-mf. mica condenser is used as a blocking condenser and also serves as the means of feeding RF to the grid circuit of the amplifier tube. The grid of the amplifier is also shunt fed. A 2.5 mh. RF choke is used here also and in order to limit the plate current of the amplifier tube a 5,000 ohm 2 watt resistor is used as a grid leak. This is possible because the two grids (control and screen) are connected together, the tube then operating in class B fashion.

The amplifier plate circuit is identical to that of the oscillator except for the neutralizing coil which is wound at the ground end of the plate coil. The amplifier operates on the same frequency as the oscillator, and as the 89 is not a screen-grid tube, it has to be neutralized in order to prevent self-oscillation. The 100 mmf. postage stamp compression type condenser (nc) serves as the neutralizing adjustment.

The plate current for both oscillator and amplifier tubes is measured by a single 0-50 milliammeter. This is accomplished by a double-pole double-throw push switch; a knife switch can also be used.

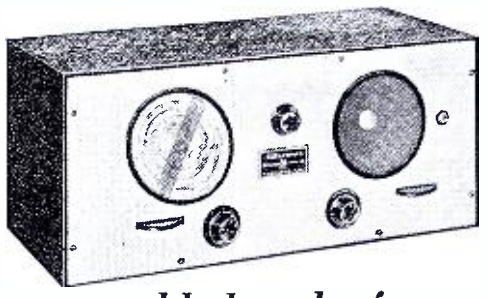
The power supply is located on the bottom shelf and there is just enough space to mount the 300-0-300 transformer, the 30 henry filter choke and the double 8 mf. 500 volt electrolytic filter condenser. In order that all these parts including the meter would fit in such a small place the 84 rectifier tube is mounted against the front panel and lies in a horizontal position. This position is OK for the 84 because of the type of cathode it has.

Looking at the front panel we find the oscillator tuning control to the right and the amplifier to the left. The crystal is mounted on the outside of the panel just below the oscillator control. This is done in order that the crystal will not be subjected to the heat inside the box while the set is in operation. The flexible leads coming through the panel on the left side are the "keying" leads and are connected in the cathode circuit of the amplifier. The two black buttons are for switching the meter and turning the oscillator on and off.

Tuning and Operating Hints

Tuning and operating the portable is very simple. Adjust the oscillator for minimum plate current, a dip will be noticed in the plate current and this will indicate that the crystal is oscillating. Then with the key circuit of the amplifier open, swing the amplifier plate condenser back and forth until a change in oscillator plate current is noticed. Then adjust the neutralizing condenser until swinging the amplifier condenser has no effect upon the oscillator plate current. The amplifier will be sufficiently neutralized at this point. Then close the key and tune the amplifier tank to a point

CONTINUOUS BAND-SPREAD



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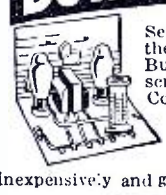

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where the amplifier plate current is minimum. This will be between 5 and 10 milliamperes. We are now ready to connect the antenna.

For portable transmitters we need the most simple and efficient type of antenna, one that can be put up at a minute's notice and with the least trouble. The writer selected the end-fed Hertz. That is, one single wire which is fed directly at the end and which is clipped directly onto the plate tank coil. This antenna should be approximately 132 feet long. And it is tapped to the plate coil one-third the distance from the plate end of the coil. This arrangement will drive the plate current of the amplifier up to about 45 or 50 mills. (M.A.) With this arrangement no trouble was experienced in working stations over 1,000 miles distant.

The coils used are of the plug-in type as the forms were of the proper size and they can be changed easily if one wishes to operate in another band. The oscillator coil consists of 30 turns of No. 18 solid copper magnet wire, with single cotton covering. The amplifier coil has 33 turns of the same wire and the windings are given a coating of coil dope to make them firm and weatherproof. The neutralizing coil is wound at the bottom of the amplifier coil and has 10 turns of No. 26 D.S.C. wire. Standard Na-Ald 1¼ inch four-prong coil forms are used.

Here's a swell portable transmitter which should meet the most exacting requirements and will delight the builder with it's fine performance. Moreover, it can be built for a cost of only a few dollars.

Parts List for Portable Transmitter

1—Card index file box, see text.
1—8¼x9¼ inch aluminum panel, Blan (Korrol).
2—140 mmf. variable midget condensers; Hammarlund.
1—100 mmf. compression type variable condenser; Na-Ald.
1—.01 mf. mica condenser.
2—100 mmf. mica condensers.
2—500 mmf. mica condensers.
1—double 8 mf. electrolytic filter condenser (500 volt).
1—5,000 ohm 2 watt resistor.
1—100,000 ohm 2 watt resistor.
4—2.5 mh. receiving type R.F. chokes; National (Hammarlund).
2—4-prong isolantite sockets; National (Hammarlund).
2—6-prong isolantite sockets; National (Hammarlund).
1—4-prong wafer socket; Na-Ald.
2—4-prong Na-Ald coil forms.
1—0-50 milliammeter.
1—D.P.D.T. push switch; Blan.
1—S.P.S.T. push switch; Blan.
1—300-0-300 v., 6.3 v. 100 mill. (M.A.) power transformer.
1—30 Henry 100 mill. filter choke.
2—89 tubes RCA Radiotron.
1—84 tube RCA Radiotron.
2—aluminum brackets (shelf-supports); Blan.
1—80 meter crystal; Blilely.

A 5-Tube Loud-Speaker Set

(*Continued from page* 284)

amplifier is so connected that by the use of a conveniently located jack, earphone reception can be easily obtained. A special audio volume control is provided in order that the volume of any station can be reduced to comfortable earphone intensity. The set is designed to work with a regular short-wave antenna or a special doublet. Three connections are brought out in order that either type of antenna may be used.

Many entirely new features are incorporated, such as anti-backlash worm and gear reduction tuning drive that gives a 20 to 1 tuning ratio, modified band spread to provide easy separation of all short-wave stations, and dual volume control that affords micrometer adjustment of amplification necessary for each short-wave tuning. The resistor in S.G. lead is 25,000 ohms, ½ watt; detector plate resistor 25,000 ohms, 1 watt; tuning condenser .00014 mf.

The All-Star Super-6

(*Continued from page* 285)

speaker. The power supply consists of a high voltage power transformer with a 5Z3 "heavy-duty" rectifier. A three-section filter is employed and renders the set absolutely "humless." The 2500-ohm speaker field serves as one of the filter chokes and three 8-mf. electrolytic condensers complete the filter circuit. This set is called the "*All-Star Super-6.*" It covers a range from 10 to 100 meters with three pairs of plug-in coils. Coils to cover the 100 to 200 meter band are also available, together with coils for the regular *broadcast band* (200-550 meters). The intermediate frequency is 370 kc. allowing greater gain and to reduce to a minimum harmonic and image frequencies. An absolute 10 kilo cycle selectivity can be obtained with this set.

Set Has "Band-Spread"

It is very interesting to note that this receiver design has ample *band-spread* on any wavelength from 10 to 200 meters. The two variable condensers, CA, are ganged and have a capacity of 35 mmf. each. The two condensers, C, are 150 mmf. units and allow the operator to select any portion of the range covered by any particular set of coils. These are known commonly as "tank" condensers. They should be set somewhere near the center of the frequency range that one desires to listen-in on, and then tuning is done entirely with the single dial in the center of the panel, which controls the 2-gang condenser.

Such trimming as may be necessary can be done with the first detector tank condenser in order to keep the stages in perfect alignment. Radio frequency chokes and decoupling resistors are used wherever there is the slightest indication that stray R.F. currents might cause unfavorable reaction or unstability and by-pass condensers are used wherever necessary. The photographs show the front panel layout and the rear view shows the placement of the parts. The main tuning dial which is of the airplane type, is located in the central portion of the panel, with the volume control on the extreme left along the lower edge. The next knob to the right of the volume control is the oscillator tank condenser, next is the detector tank condenser and on the right-hand side we have the variable tone control. The tone control incidentally aids considerably in overcoming the "background" noise and provides a much better signal-to-noise-level ratio when properly adjusted. By referring to the diagram we will find that connections are provided for either a "doublet" antenna or the conventional antenna-ground combination. The doublet, of course, is ideal and is recommended wherever it is possible to erect one.

Parts List for All-Star Super-6

L1—Meissner 20 meter detector coil.
L2—Meissner 40 meter detector coil.
L3—Meissner 80 meter detector coil.
L4—Meissner 20 meter oscillator coil.
L5—Meissner 40 meter oscillator coil.
L6—Meissner 80 meter oscillator coil.
C—150 mmf. Hammarlund star condenser.
CA—35 mmf. Hammarlund dual condenser.
C1—0.1 mf. Cornell Dubilier condenser.
C2—1.0 mf. Cornell Dubilier condenser.
C3—.0001 mf. Cornell Dubilier condenser.
C4—8 mf. Cornell Dubilier condenser.
C5—.003 mf. Cornell Dubilier condenser.
C6—.00025 mf. Cornell Dubilier condenser.
CH—Meissner 16 mh. R.F. choke.
1 Ft.—Meissner 340 kc. I.F. transformer.
R1—300 ohm Ohmite resistor.
R2—25,000 ohm Ohmite resistor.
R3—5,000 ohm Ohmite resistor.
R4—250,000 ohm Ohmite resistor.
R5—500 ohm Ohmite Red Devil resistor.
R6—25,000 ohm Ohmite 25 watt voltage divider with two clips.
R7—50,000 ohm Ohmite resistor.
T-5602—Power transformer. Thordarson.
T-5738—Audio transformer. Thordarson.
T-5701—Pentode output transformer. Thordarson.
T-5753—Filter choke. Thordarson.
1—Drilled chassis and panel. Thordarson.

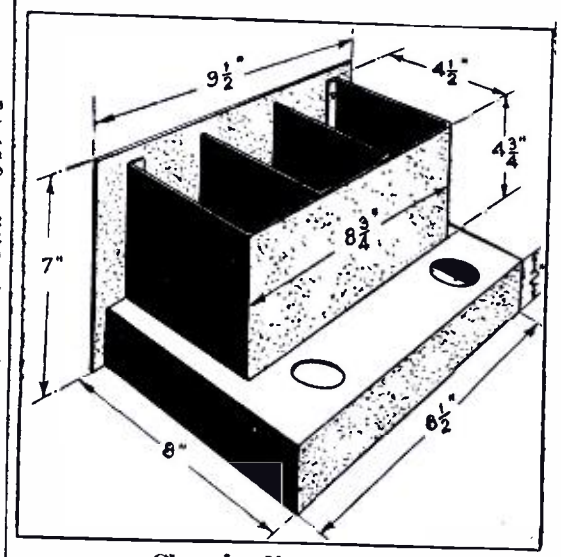
New! The T.R.F. Mono-Coil

(*Continued from page* 269)

remain. This necessitates a 6.3 volt winding on the transformer for the filaments of the tubes. Of course a 57, 58 and 2A5 could also be used with 2.5 volts for the filaments.

Chassis Provides Shielding

The formation of the chassis of this receiver provides excellent shielding and it

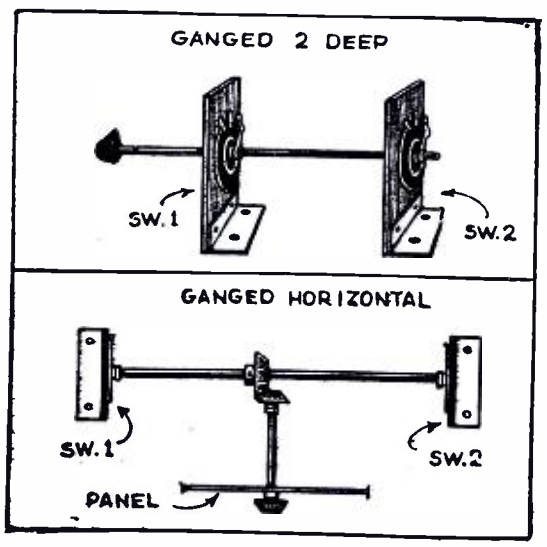


Chassis dimensions.

is highly recommended that the design be closely adhered to for best results. Dimensions for the chassis are given in one of the drawings.

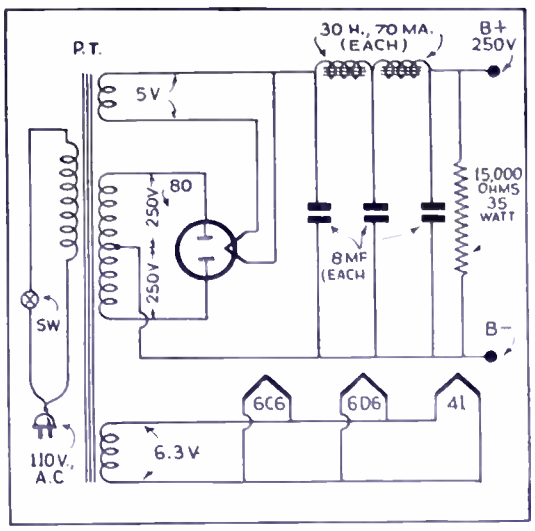
An r.f. volume control was needed and should be used by all means in order that the detector tube will not be "overloaded" on a very strong signal. Regeneration is controlled by varying the detector screen-grid voltage and works very smoothly.

The layout of the various parts of the set is as follows: Looking at the front we find the tuned r.f. stage on the left and the detector on the right. Behind the r.f. stage is the 25Z5 rectifier and behind the detector is the audio amplifier tube. The two-gang variable condenser is located between the two compartments housing the detector and r.f. stages. The padding or trimming condenser used in the r.f. stage is located under the chassis and the knob controlling it is on the lower left of the panel. The r.f. gain control is located on the left side of the base in a more-or-less out of the way place, but there is no room on the panel and besides it is not in constant use. The large National tuning dial is in the center of the panel and the regeneration control is on the lower right-hand side. The two switches that control the wave range of the r.f. and



Two ways in which to arrange the switches for single knob control.

detector stages are provided with round discs numbered 1, 2 and 3 for the three positions. All the knobs are of the flat type used on testing instruments and lend a handsome appearance to the set. If the diagrams are followed carefully and all soldering and constructional work done with care, no trouble will be had in picking up all the "foreign" broadcast programs (speech and music), with *plenty of volume* and with *tuning ease* that will satisfy the most critical "fan."



Power Supply "Hook-up" for use where higher voltage is desired on A.C. operation.

A doublet, such as the Lynch and described many times in past issues, was used and is highly recommended for maximum results with this or any other short-wave receiver. Good luck and I'll see you next month with a converter using the *Mono-Coils*.

Mono-Coil Parts List

2—Bakelite tube sockets, 1"x3" for "Mono-Coil". Alan.
2—3-prong, single pole, wafer type switches for "Mono-Coil". Alan.
1—2-gang 35 mmf. tuning condenser. Hammarlund.
1—50 mmf. variable condenser. Hammarlund.
1—.0001 mf. fixed condenser.
1—.0005 mf. fixed condenser.
1—.01 mica condenser.
5—.1 mf. by-pass condensers.
1—25 mf. electrolytic condenser. 25 volt.
2—2.5 m.h., R.F. chokes. National, Hammarlund.
1—Electrolytic filter condenser, 2 sections 8-16 mf., 200 volts.
1—2 meg. grid leak, ½ watt. Lynch.
1—100,000 ohm resistor, 1 watt. Lynch.
1—300 ohm resistor. ½ watt. Lynch.
1—50,000 ohm resistor, ½ watt. Lynch.
1—½ meg. resistor, ½ watt. Lynch.
1—500 ohm resistor, 2 watt. Lynch.
1—50,000 ohm potentiometer.
1—20,000 ohm potentiometer.
2—30 henry, 50 ma. filter chokes.
2—6 prong Isolantite sockets.
2—6 prong wafer sockets.
1—Antenna ground terminal strip.
1—phone terminal strip
1—Line cord with 160 ohm resistor
1—National type B dial.
5—Midget pointer knobs. Blan.
2—Band switch dials. Blan.
1—Chassis (see drawing). Blan (I.C.A.).
1—6D6 tube RCA Radiotron.
1—6C6 tube RCA Radiotron.
1—43 tube RCA Radiotron.
1—25Z5 tube RCA Radiotron.

When using transformer use an 80 rectifier instead of 25Z5 and a 41 in place of the 43 as the audio amplifier.

"Band-Spread" Portable

(*Continued from page* 281)

opened by the switch. The jack in the lower central part of the front panel is for the earphones. The coils can be changed through a slide in the top of the cabinet. A three-inch National Velvet vernier dial is used to provide accurate tuning. Two binding posts on the left side of the cabinet are provided for the aerial and ground connections. This neat and attractive little portable receiver tips the scale at 9½ pounds

"ALL THAT GLITTERS IS NOT GOLD"

We have been pointing out in recent advertisements that all bakelite or synthetic moldings were not necessarily of the same dielectric or insulating properties. We also stated that we have a special process of molding developed particularly for serving the radio industry. It has not only given us a flexibility of production necessary to serve both manufacturers and users of radio products, but it also fortunately has given us the best insulating properties of the various products that we have molded.

In our design of products we have also always endeavored to design the shape and cross section of the piece, so as to give the best results. For illustration, when we came to design our coil form, we could have made it in bulky heavy material like some of the earlier forms in the market. This, however, would have added to the cost and been inferior in results to the comparatively thin uniform walls employed in our design.

Synthetic resin compounds, in theory, are completely reacted when molded. In practice, reaction is never entirely complete. We do a number of things which the ordinary commercial molder cannot do economically. As a rule, the products which he makes are made in multiple cavity molds. Therefore, although he may use very high pressure on his presses, the actual pressure of each individual cavity seldom exceeds two thousand pounds and in many instances is not over one thousand pounds. In our process we use single cavities in magazine presses in which the molds are one on top of another.

On a part like our coil forms we obtain an approximate pressure of nine thousand pounds per square inch. In some particular pieces we use a pressure as high as nineteen thousand pounds. Because of using this higher pressure, we can use a material which is more completely reacted and that does not have to be as free flowing as that employed by molders who use the lower pressures. As a consequence, parts made of this "stiffer" material have a more complete chemical reaction with an equivalent pressure. The excess pressure, however, increases the density, allows the heat to permeate more thoroughly, increases the surface insulating qualities, and at the same time cures more effectively than with lower pressures. This can be readily understood in that if you will consider pressing something against pieces that are hot with only a moderate pressure, only a certain amount of heat is inducted, but if this material that you see pressing is in powdered form and the pressure is increased, it not only heats more quickly, but the particles pack immediately with the result that conduction and the speed of transmitting the heat is faster, more complete and thorough.

Many molders use one hundred and twenty-five pounds of steam. We use in our process one hundred and seventy-five pounds, and as the molds emerge from the magazine we superheat them with an open gas flame.

We have worked closely with the makers of synthetic material, having made special that which is best suited for our requirements. There are also one or two other things that we do which we do not care to make public, that, in our estimation, still further tend to improve the ultimate product.

We go to all this trouble of telling you our intimate story, because Na-Ald or Alden coil forms have become thoroughly known to builders of short wave sets and the trade by their size, dimensions, physical appearance, ring and the colored groove in their top. Recently a molder copied the product so completely that those in the trade and our salesmen couldn't tell from the appearance of these forms whether they were of his manufacture or ours. Consequently, although this form was easily mistaken for ours, it was not molded under the pressure or by the process which we have described, which, as far as we know, is not employed by any other molder in the United States.

We brought suit against this molder and very carefully and completely prepared our case. The result of this litigation was the issuing by the consent of the parties involved of a permanent injunction restraining them from making this form with its distinctive features, dimensions, rim and ring.

However, a fair quantity of these forms were produced and sold before we brought action, and we have reason to believe that there are instances where forms have been illustrated in sales literature that would lead one to believe that these forms were of our manufacture.

In our **wound forms** we have used special care in their design. We have not simply taken a form and wound the windings with one general spacing. You will find that plated wire is used on these higher frequencies, and you will find the spacings developed so as to have the best ratio of coil length to diameter. On our band spread coils you will find ceramic condensers. We do not want it to be misunderstood that no one can or does make a coil form or coil the equivalent of ours. We, however, have priced it reasonably, so that they are not prohibitive as to price, and if you want the extra care which we feel that we are putting into this product, we suggest that you buy your requirements where the forms or coils are sold specifically as Na-Ald products, and we suggest that you make sure that they are shipped to you in the original packages.

Our products have wide distribution, and we prefer you to buy them through your regular supplier. However, because we have the obligation to you, the ultimate consumer, we will ship orders direct to you, if you are unable to get them locally, or if your local dealer does not agree to get you the genuine product promptly.

As we have previously told you in Na-Ald Inside Facts, we produce these forms with the windings completely supported; thus, the wires remain permanently in place, and their inductance is not changed by handling.

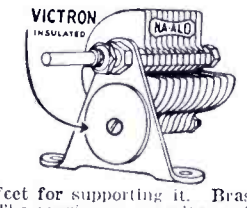
Once again, we are in radio with the idea of staying, not with the idea of simply copying, but rather to originate and develop only products which have some special features or qualities to commend them. We, therefore, feel that it is timely to introduce the **Victron** molded coil forms. That you may get the very finest value and have no occasion to even consider what might be called inferior substitutes, we have decided to make the higher frequency coil of each set that we make of "AA" Na-Ald Victron.

We could, of course, have taken a porcelain—glazed or unglazed—given it a name, and some purchasers would have perhaps believed they were getting something superior to Bakelite—we could have also used a special material compounded for the Navy that would have had a glazed non-hydroscopic surface—in the laboratory it would have tested better than the best unglazed ceramic that we know of—We, however, decided to go the whole way and develop the molding of our products the special Na-Ald VICTRON that so closely approaches fused quartz.

This material, as you probably know, is considered to have the lowest loss factor at high frequencies of any of the materials used for this purpose. We are not only winding coils on this form, but are also using Victron cement as it would be futile to use the low loss supporting material and then an inferior high loss lacquer to hold the wire.

Although this new construction could add the equivalent of an increase of a dollar list price to our present coils, we are for introductory purposes continuing the list prices as when all four forms were of our special synthetic material. The result is that you get this extra good insulation in all of the coils, and at the place where these higher frequencies call for better insulation you will have the finest that we believe can be produced.

Once again also realize that to get the fullest advantage through the forms, it is also desirable that the other elements in radio frequency circuits have the same high grade insulating qualities. Consequently, we are offering the following items all Victron insulated:



In this new condenser not only is VICTRON used for insulation, but the number of insulated points is reduced to only one. Among the advantages is a single hole panel mounting, although this condenser can be stand-off mounted and if desired at a distance from the panel because it has feet for supporting it. Brass plates are used throughout. The maximum capacitance is 140 mmfd.—the proper size standard for use with all Na-Ald coils.

No. C-140 Na-Ald VICTRON Insulated S.-W. Condenser. List Price..... $1.50

Here is the new Na-Ald VICTRON insulated R.F. Choke Coil, designed especially for use at the ultra high frequencies where losses are so all-important. **Five tapered universal wound pies** on a VICTRON form which can be rigidly mounted and connected, thus preventing wobbly signals from vibration. Small pie at "hot" plate end of choke for reduced capacitance. Why not use this choke in all low-power transmitters and receiver applications and enjoy its greater efficiency. D.C. resistance 40 ohms. Inductance 2½ m.h.

No. 702R—Na-Ald VICTRON R.F. Choke. List Price..... $ .70

Here are the New Na-Ald VICTRON "AA" MOLDED SOCKETS

494V

Especially designed for use at the ultra-high frequencies. Make use of its advantages wherever a tube or plug-in coil is mounted. Socket rests flat on board so is unnecessary to screw down for temporary set-ups. However, it is easy mounting. Just drill two small holes with hand-drill. Each terminal has convenient jack-top binding post for plug-in connections or binding wire under knurled nut. Handy solder terminals at each contact. Each contact has new standard R.M.A. numbering. Below panel wiring may be brought through chassis by drilling small holes at terminals. The finest breadboard-mount socket obtainable.

494V 4 contact Na-Ald Victron "AA" S.-W. Socket. List Price.....$1.00
495V 5 contact Na-Ald Victron "AA" S.-W. Socket. List Price.....$1.00
496V 6 contact Na-Ald Victron "AA" S.-W. Socket. List Price.....$1.00
497V 7 contact Na-Ald Victron "AA" S.-W. Socket. List Price.....$1.00
497VA 7 small Na-Ald Victron "AA" S.-W. Socket. List Price.....$1.00

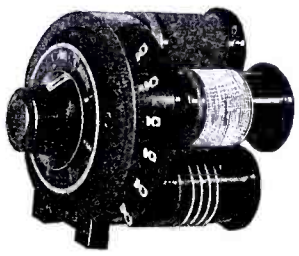
*COMPARISON OF DIELECTRICS

Insulator	Power Factor	
Transparent Fused Quartz	.02%	at 100 KC
Victron AA	.02%	at 877 KC
Ultra Steatite	.09%	at 2000 KC
Steatite	.18%	at 825 KC
Isolantite	.185%	frequency not given
Mycalex	.2%	at 100 KC
Electrical Glass	.4%	at 100 KC
Porcelain	.7%	at 100 KC
Bakelite	3.6%	frequency not given
Grade XX		

* Taken from Victron literature distributed at 1934 Annual I. R. E. Convention in Philadelphia.

ALDEN PRODUCTS CO.
Dept. SW 9 715 Center St.
BROCKTON, MASS.

NA-ALD



New 700 COIL SELECTOR takes any four 4, 5 and 6 prong coils for selection by turning knob. Mounts on chassis and panel. Modernizes old sets—eliminates handling and storing coils. Simple—compact—rugged — highly efficient — reliable self cleaning pressure contacts.
List price without coils $3.50

No. 700V NA-ALD VICTRON "AA" Insulated Coil Selector.....List price $7.50
No. 700CPL Complete Coupling Hardware for ganging No. 700 Coil Selectors in tandem. List price 25c

Regular standard 2-circuit 4-prong coils. Low-wave coil on VICTRON. Primary and secondary on each coil 13-200 meters with usual 140 or 150 mmfd. short wave condenser. UX base 4 coils to a set.

No. 704SWS S-W Coil Set..List Price $2.00 set

Broadcast coils same as above but tune 100-550 meters with above size condenser. UX bases 2 coils per set.

No. 704BCS B-C Coil Set...List Price $1.50 set

Regular standard 2-circuit 5-prong coils. Low Wave Coil on Victron. Primary and secondary on each coil same as 704SWS but 5-prong base interchangeable with band spread coils. UY forms 4 coils to a set.

No. 705SWS S-W Coil Set..List Price $2.50 set

Broadcast coils same as above but tune 100-550 meters UY bases 2 coils per set.

No. 705BCS B-C Coil Set..List Price $1.75 set

Regular standard 3-circuit 6-prong coils. Low Wave Coil on Victron. Primary and secondary and tickler on each coil. 13-200 meters. Uses 140 or 150 mmfd. tuning condenser. Std. 6-pin forms. 4 coils to set.

No. 706SWS S-W Coil Set..List Price $3.50 set

Broadcast coils same as above but tune 100-550 meters. 6 pins. 2 coils per set.

No. 706BCS B-C Coil Set..List Price $2.00 set

Band Spread Coils with low loss ceramic padding condenser mounted on each coil. Spreads all bands for convenient tuning with usual 140-150 mmfd. condenser.

No. 705SWB 20-40-80-160 for amateur bands.

No. 705SWBC 19-25-31-49 for S-W B-C bands. List Price, $4.00 per set or $1.00 per coil

Long Wave Coils with highly efficient band windings. Used in any short wave receiver using usual S.W. tuning condenser. Transatlantic code, ship traffic. European broadcast, etc., from 450-2000 meters.

No. 704LWS Set 4 Coils.....List Price $4.00 set

New 7 and 8-prong Coil Forms. For latest band spreading, electron coupling, detector-oscillator super-het circuits.

No. 704 4 prong coil form...List Price 25c each
705 5 prong coil form...List Price 25c each
706 6 prong coil form...List Price 30c each
707 7 prong coil form...List Price 30c each
708 8 prong coil form...List Price 30c each
438S 8 hole socket.....List Price 35c each

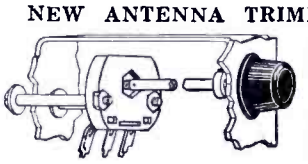
NA-ALD VICTRON "AA" COIL FORMS

704V 4-pin	list 88c	707V 7-pin	list 95c
705V 5-pin	list 90c	707VA 7-sm.	list 95c
706V 6-pin	list 95c	708V 8-pin	list 95c

New Band Spreading UY Coil Forms. Complete with high quality ceramic padding condenser mounted on coil form top.

No. 705BSC-80 Form with 80 mmfd. cond. 50c
No. 705BSC-180 Form with 180 mmfd. cond. 50c

NEW ANTENNA TRIMMER ASSEMBLY



ANT. TRIMMER
INSULATED SHAFT EXTENTION
CTA-80

Complete assembly for placing the ant. adjustment where it belongs—on the front panel. Extra long insulated extension shaft fits adjustment screw of trimmer condenser which mounts on back of chassis near antenna binding post. Collar and knob supplied for front panel. Condenser stand-off mounted for best results. The handiest thing in short wave.

CTA-80 7-80 mmfd. Trimmer Kit. List 75c complete

Na-Ald items are widely stocked—try your regular supplier—if he hasn't them and does not care to get the genuine Na-Ald products order direct from us.

Send for latest catalog.

Discount 35%-40% if order totals $10.00 list price.

NA-ALD ALDEN MANUFACTURING CO. NA-ALD

Short Waves and Long Raves

(*Continued from page 276*)

QUICK WATSON—THE NEEDLE!!

such "advs" are wrong for your magazine, they should be omitted and only those admitted which pertain to radio and affiliated subjects.

After so much of fault-finding, I still think, Mr. Editor, that your purpose and work are good and that your magazine still will find its way to my shelves in the future.

HERBERT W. GORDON,
27 Outlook Ave.,
W. Hartford, Conn.

(*Who left that door open, Herbert? Well anyway, we do appreciate constructive criticism and so far as the advertisements in the magazine go, we do not feel that any great injustice has been done to the readers because hotel, insurance, and other similar "ads" have appeared. The editors feel that if the advertiser is satisfied to display his wares before the* SHORT WAVE CRAFT *readers, that he is the one to be satisfied. People do go to hotels now and then, and they do buy insurance from time to time and so, in a general way of speaking, to our mind, most any sort of an "ad" can appear in these columns and still be of value to the reader—as well as the advertiser.*

After all, a great part of the revenue of any magazine is derived from its advertising columns and not from the small price received from the individual reader for a copy of the magazine, and if the publishers were to reject all the "non-radio" advertising in a radio magazine, they would be losing a considerable amount of revenue, which they cannot afford to do these days.

We are glad to note that you found extremely valuable Mr. Tipsel's article entitled, "Power Transformer Data." Regarding the great similarity existing between the Doerle and other short-wave receivers, we might explain this by making a comparison with an automobile. Most of the difference between one motorcar and another lies in the refinement or slight modifications in the design of the engine, as the drive or propeller shaft and the differential gear at the rear are quite identical except for size, where stronger teeth on the gears has to be used on the more powerful cars, and vice versa. Yet every owner of a certain make of car will loudly extol its merits, never thinking perhaps for a moment that if the pretty paint and other trimmings were stripped from the car, that fundamentally it was exactly similar to his neighbor's car.

It is the same with the short-wave sets—there is but little really new that comes along in the design of short-wave receivers, and the best we can hope for at times, is simple yet worthwhile improvements in circuits and apparatus. If a magazine such as yours exists principally as a chronicler of the latest improvements in circuits and in apparatus, it can hardly be expected that the magazine can go ahead of the inventors.—Editor)

O.K.—YL'S"—HERE'S YOUR CHANCE!

(*Continued from page 277*)

amateur operators, and will send a card and exchange photos with anyone who wishes to correspond. (I will communicate with YL's;* what say YL's, drop us a line.)

GEORGE TREIBER,
138 E. 32nd St.,
Brooklyn, N. Y.

*Young Lady "Ham" operators owning transmitting and receiving sets.

(*We hope the YL's (young women amateur station operators) QSO you hot and heavy. Certainly quite a listening station you have and we are sure that you are going to have a royal good time via the short-wave "ham" channels, as soon as you open up with an amateur transmitter.—Editor*)

HOORAY FOR THE "PENTAFLEX!"

(*Continued from page 277*)

hams, airplanes, and broadcast bands. I am using a 5-volt "A" eliminator and a Majestic 180 V. "B" eliminator; no ground and a "punk" aerial—pretty good I think. My "A" leads are run straight to the "A" source and not one side grounded, as per diagram. This threw me for a "foul" at first, but everything's "hotsy-totsy" now. I would like to hear from some one that tried this outfit and their success with it.

ARTHUR G. SHOFFER,
301 Maplewood Ave.,
Struthers, Ohio.

(*We have had quite a large number of letters praising the "Pentaflex" receiver. Arthur, but lack of space has prevented us from publishing many letters discussing some of the sets we have described in* SHORT WAVE CRAFT. *We are glad that you like the "Pentaflex" receiver, which really has many unusual features about it. It is at once simple, rugged, and of low "first cost"—which today is a most pertinent feature.—Editor*)

Short Wave League

(*Continued from page 292*)

Back in the old "spark" days, they had to use CW for they didn't know enough to modulate the carriers with voice. I've often wondered why they didn't make you ride and master a "bucking broncho" to show that you could drive a car! The automobile industry wants to develop and expand. They make it just as easy as possible for you to own and drive a car. They don't want you to stay off the road, for the more you drive, the larger their business. Now in radio they use the opposite argument, by trying to *keep you off the air!*

The manufacturers don't care if their business expands or not; they don't want too many to become interested in short waves. At least, that is the way it looks, since they try to keep the new-comers "off the air" by putting obstructions in their way, such as CW. This isn't the manufacturer's fault but they could help remedy it.

I'll say 73 es hpe to cuagn so wat saw om arsk.

DUKE BETTELON,
R. F. D. No. 1,
Dayton, Ohio.

Short Wave Scouts

(*Continued from page 275*)

*KNRA—8.84—Tests with W3XL—"Seth Parker" Schooner.
*KNRA—8.82—Tests with W3XL—"Seth Parker" Schooner.
*KNRA—13.20—Tests with W3XL—"Seth Parker" Schooner.
KWU—15.35—Tests in evenings—Dixon, Calif.
LSL—9.99—Calls CEC 7 P. M.—Buenos Aires, Arg.
LSM—19.12—Calling Bandoeng 2 P. M.—Buenos Aires, Arg.
LSN—21.02—Calls CEC 7 P. M.—Buenos Aires, Arg.
LSQ—19.5—Phones CEC evenings—Buenos Aires, Arg.
LSX—10.35—8-9 P. M. Relays LR4—Buneos Aires, Arg.
LSY—18.11—Tests with New York—Buenos Aires, Arg.
OCJ—15.82—Lima, Peru.
PHI—17.77—7:30-9:30 A. M. M. W. F.—Huizen, Holland.
PHI—11.7—8:00-10 A. M.—Huizen, Holland. (Not used since April 24, '34.)
"PRADO"—6.618—8:00-10 P. M. Thursday—Riobamba, Ecuador.
PRA3 (PSK)—8.18—7:00-7:30 P. M.—Rio de Janeiro, Brazil.

*"RADIO COLONIALE"—11.7—See letter—Paris, France.
*"RADIO COLONIALE"—11.89—See letter—Paris, France.
*"RADIO COLONIALE"—15.23—See letter—Paris, France.
*RNE—12.00—8:00-9:00 A. M. Sunday—Moscow, U. S. S. R.
*VE9GW—6.95—See card—Bowmansville, Ont.
*VE9HX—6.11—See card—Halifax, N. S.
VK2ME—9.58—5:00-6:30 A. M. Sunday—Sydney, Australia.
VK3ME—9.50—5:00-6:30 A. M. Wednesday—Melbourne, Australia.
WNC—15.05—5:00-6:00 P. M.—Hialeah, Fla.
WOO—4.2—Evenings—Ocean City, N. J.
*W1XAL—6.04—Irregular in early evening—Boston, Mass.
*W1XAZ—9.57—6:00 A. M.-Midnight—Springfield. Mass.
*W2XAD—15.33—2:00-3:00 P. M.—Schenectady, N. Y.
*W2XAF—9.53—7:00-10:00 P. M.—Schenectady, N. Y.
*W2XE—6.12—See letter—New York, N. Y.
*W3XAL—6.10—4:00-12:00 P. M., M. W. F.—New York, N. Y.
*W3XAL—17.78—9:00 A. M.-3:00 P. M.—New York, N. Y.
*W3XAU—6.06—See card—Philadelphia, Pa.
*W3XAU—9.59—See card—Philadelphia, Pa.
W3XL—6.42—Testing with KNRA—Bound Brook, N. J.
*W3XL—17.31—See card—Bound Brook, N. J.
*W8XAL—6.06—See letter—Cincinnati, Ohio.
*W8XK—6.14—See card—Pittsburgh, Pa.
*W8XK—11.87—See card—Pittsburgh, Pa.
*W8XK—15.21—See card—Pittsburgh, Pa.
*W8XK—21.54—See card—Pittsburgh, Pa.
*W9XAA—6.06—Evenings—Chicago, Ill.
*W9XF—6.10—Irregular—Chicago, Ill.
XEBT—6.01—Irregular, relays XEB—Mexico City, Mex.
XETE—9.6—Evenings—Mexico City, Mex.
YV1BC—6.11—Evenings—Caracas, Ven.
YV4BSG—6.00—Evenings—Caracas, Ven.
*YV3BC—6.15—Evenings—Caracas, Ven.
ZFA—5.04—Phones N. Y.—Hamilton, Ber.
ZFB—10.06—Phones N. Y.—Hamilton, Ber.

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 last 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, September 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.

● Index to Advertisers ●

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

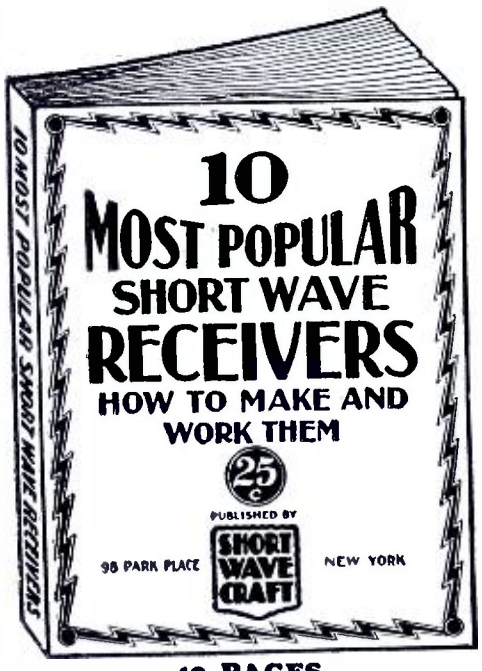
The 4 ESSENTIAL SHORT WAVE BOOKS

'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.

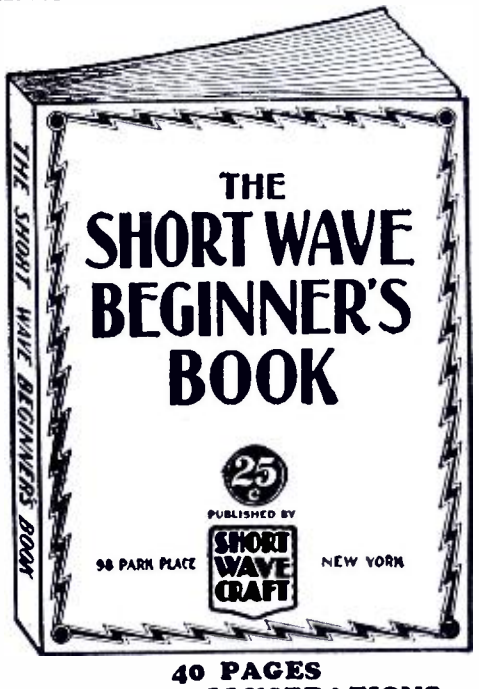
25c

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 tremendou- amount of very important informa tion 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

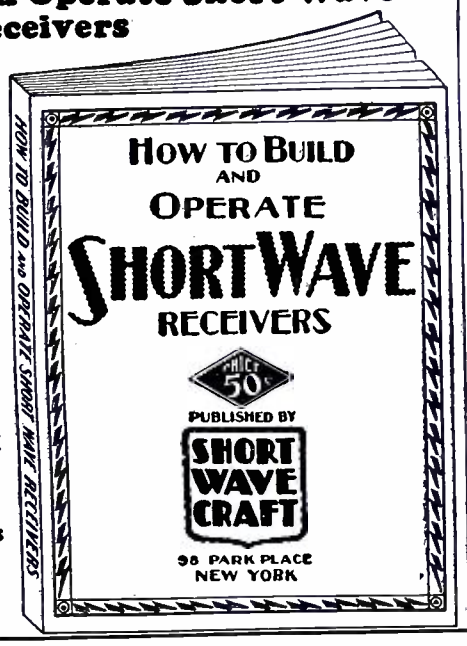
How to Build and Operate Short Wave Receivers

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.

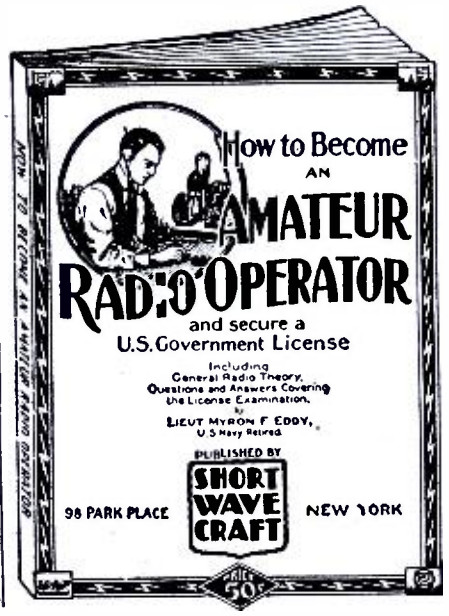
We know that if you are at all interested in short waves you will not wish to do without this book. It is a most important and timely radio publication.



Over 150 Illustrations
72 Pages 7x10 Inches

50c

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
72 Pages 7x10 Inches

50c

All the books shown on this page are published exclusively by

SHORT WAVE CRAFT

99-101 Hudson Street, New York, N. Y.

CLIP—MAIL

SW-9-34

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

Gentlemen: I enclose herewith my remittance for the amount of $.....for which you are to send me, postpaid, the books checked below.

( ) Ten Most Popular Short Wave Receivers. How to Make and Work Them..25c each
( ) The Short Wave beginner's Book.....25c each
( ) How to Build and Operate Short Wave Receivers.....50c each
( ) How to Become an Amateur Radio Operator.....50c each

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

(Send remittance in form of check or money order. If letter contains cash or unused U. S. Postage Stamps, register it.)

These Books are Authentic For All Short Wave Work and LOW in Price

COUPON TODAY!

DOERLE WORLD-WIDE RECEIVERS

Official Doerle Receivers

Never in the history of short waves has there been produced short-wave receivers which have taken the entire country by storm as much as the now **famous Doerle receivers.** Mr. Doerle described his first receiver, **the 2-tube 12,500-mile receiver,** in the December-January, 1932, issue of Short Wave Craft. And you must have seen the many letters published in that magazine, lauding this receiver to the skies, and for a good reason! It is a low-priced receiver, yet pulls in short-wave stations from all over the world—**REGULARLY—in practically any location**—not only in this country but anywhere. Thousands of experimenters have built their own and have obtained miraculous results.

Subsequently the 3-tube Signal Gripper was brought out with equal success; and to top it all, we have electrified both of these receivers so that now they are available either in 2-volt battery models or electrified A.C. models.

We list below two of the most popular Doerle receivers, namely, **the 2-tube 12,500-Mile Battery Model and the 3-tube Electrified Signal Gripper.**

Despite the remarkable performance of these two receivers, our technical staff felt that they could obtain even better results with slight modification of the circuit. This is especially true of the 3-tube Signal Gripper listed below. Here, full advantage is taken of the latest type triple-grid tubes, such as the 57 and 58, which are ideally suited for short-wave work. The increase in sensitivity and selectivity of these receivers, due to these modifications, is tremendous; yet, despite all, we have not raised the prices of these instruments to you.

ONLY FIRST CLASS PARTS USED

It may be possible to buy the parts of the completed sets at a lower price elsewhere. We admit this at once. But if you will look over our parts list you will find that only first class material is used. We have done away with all losses. There is no "hand capacity." IN THESE TWO SETS ONLY THE BEST CONDENSERS—AND THAT MEANS HAMMARLUND—ARE USED. We could have produced the sets for considerably less if we used inferior parts (some Doerle imitators do this), but we refrained from doing so because then we could not guarantee results, as we now do. The sets are low in price, yet the quality is excellent considering the low price. Thus, for instance, we use Kurz Kasch vernier dials, because we find them excellent for the purpose. Our chasses are made of heavy-gauge metal, beautifully finished in black crystalline. These panels do away with "hand capacity." The four plug-in coils are of genuine molded bakelite for low losses. In short, despite the exceedingly low price, we have given you quality. You will be pleased not only with their business-like appearance but with their exceptional performance as well.

Only by making these sets in quantities can we afford to sell them at the extremely low prices quoted.

Note the testimonials printed on this page. They alone can give you the true story of the excellent performance of these fine receivers.

The 2-tube 12,500-Mile Set is for 2-volt operation. Although it is designed for earphone reception, many local stations will come in with such volume that a loud speaker may be used. This receiver requires two type 30 tubes, two 45-volt "B" batteries, and two No. 6 dry cells for operation. **The 3-tube A.C. Signal Gripper** requires one 56, one 57 and one 58 tubes for operation; instead of batteries, it requires a power pack. Any good, well-filtered pack delivering 2½ volts for the filaments, 250 volts for the plates and 22½ volts for screens will work very nicely. This receiver is a great deal more powerful than the 2-tuber and will bring in a good many more stations on the loud speaker.

WHAT DOERLE FANS SAY

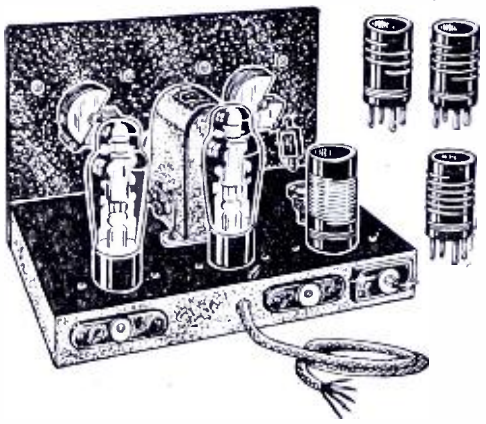
I received the 3-tube Doerle receiver and the set sure is a wonder. In just two weeks time I have received the following stations: KEE, HS1ABB, W4XB, PHI, W1XAZ, WMA, W8XK, W2XE, W9XF, DJB, GSE, YV1BC, KNRA, XETE, VE9JR, W8XAL, GSB, PSK, W3XL, W3XAU, EAQ, G6RX, W2XAD, HJ1ABB, VE9GW, GOA, FYA, WNC, HJB, YV3BC, LSX, KKQ, HC2RI. I think this is very good as the street car line is two blocks west and the L.C. electric railroad is about 150 ft. east of here. You may, if you wish, use this letter in whole or part in advertising your Doerles. **Mr. Glenn L. Thompson, 3612 Lake Park Ave., Chicago, Ill.**

THIS IS GOING SOME!

Today is my third day for working the Doerle set and to date I have received over fifty stations. Some of the more distant ones I shall list. From my home in Maplewood, N. J., I received the following: WVR, Atlanta, Ga.; WGK, Ohio; W9BHM, Ft. Wayne, Ind.; W9AYS, Elgin, Ill.; W8ERK, Girard, Ohio, and best of all XDA, Mexico; PZA, Surinam, South America; TIR, Cartago, Costa Rica; G2WM, Leicester, England. I have also received stations WDC and PJQ which I have not found listed in the call book.

That's not a bad record for three days on a two-tube job, is it? I will answer any questions concerning the Doerle set. **Mr. Jack Prior, 9 Mosswood Terrace, Maplewood, N. J.**

2-TUBE 12,500 MILE BATTERY SET



$8.69

This receiver is exactly as illustrated. Size of panel is 9" x 6¼", base 9" x 6⅛". **List of material used:** 2—Hammarlund .00014 mf. condensers; 1—20 ohm rheostat; 1—high quality audio transformer; 2—Kurz Kasch vernier dials; 3—bakelite low-loss sockets; 1—micamold antenna condenser; 1—.0001 mf. mica condenser; 1—5 megohm grid leak; 2—phone-pin jacks; 1—Ant-Gnd. assembly; 1—set of 4 bakelite plug-in coils; 1—set of hardware, hook-up wire, etc., and complete constructional details and diagrams. Shipping weight, 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.. **$8.69**

No. 2140—2-Tube 12,500 Mile Short-Wave Doerle Battery Receiver, Completely Wired and Tested, Less Tubes. YOUR PRICE..... **9.89**

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..... **4.35**

A NEW DOERLE!

The Amateur Band Spread DOERLE Receiver

For details, see page 188 in July issue of this magazine or send 5c postage for our Short-Wave Treatise and Catalog.

3-TUBE A.C. SIGNAL GRIPPER

$13.74

This receiver is exactly as illustrated. The panel measures 10½" x 7¼"; base, 10½" x 8". **List of material used:** 3—Hammarlund .00014 mf. tuning condensers; 2—Kurz Kasch vernier dials; 2—bakelite knobs; 1—volume control potentiometer; 2—tube shields; 1—Ant-Gnd. strip" 1—tip-jack strip; 3—6-prong wafer sockets; 1—special R.F. choke; miscellaneous high quality resistors and fixed condensers; 1—5-prong wafer socket; 1—4-prong wafer socket; 2—screen grid clips; 1 set of hardware, hook-up wire, etc., complete instructions and diagrams for constructing the set. Shipping weight, 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..... **$13.74**

No. 2177—Electrified 3-Tube Doerle Signal Gripper. Completely Wired and Tested; Less Tubes. YOUR PRICE **15.19**

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 **9.79**

GUARANTEE

We guarantee and warrant that all material furnished in the two 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.

ORDER FROM THIS PAGE — Send money order or certified check. C.O.D. only if 20% remittance accompanies all orders. Order NOW—TODAY.

FREE — 108-page Radio and Short Wave Treatise; 1,000 illustrations. Enclose 5c U.S. stamps or coin for postage. Book sent by return mail. Print name and address on your request.

RADIO TRADING CO., 101A HUDSON ST., NEW YORK CITY

WORLD GLOBES

FOR SHORT WAVE ENTHUSIASTS

AT UNPRECEDENTED LOW PRICES

THESE remarkable globes, executed in fourteen colors, are absolutely indispensable for short wave fans. Notable among the numerous features of these world globes, is that a damp cloth quickly removes all dust and water does not harm the surface.

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

There is a graduated "Meridian" scale of black enameled metal with the 9" and 12" globes. An additional feature is the movable hour scale found at the north pole—this facilitates determining the hour in any part of the world.

Only on a globe of this size is it possible to get an accurate picture of countries and their relative positions to each other. You will actually be amazed when you compare distances—from New York to Moscow" from Cape Town to Tokio; from Los Angeles to Rio de Janeiro, etc. A flat map is deceptive for measuring, but take a small string and stretch it across the globe, from city to city, and you have the correct distances.

Here are globes that add dignity to home, office, studio or laboratory—a globe that everyone would be proud to possess.

Each world globe contains a listing of over 7,500 cities in nations the world over—spellings conform to international geographic standards—all globes are of 1934 production. GET ONE OF THESE FINE WORLD GLOBES TODAY!

World Globe No. 99

9" Globe, equipped with sturdy, black metal base and full meridian. Same ball as our No. 139 but reduced ¼ in size and scale. Included with globe is newly printed **World Globe Handbook FREE.** Shipping weight 6 lbs.

PRICE

$2.05

F.O.B. Chicago.

Gentlemen:

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

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

P. C. ELLIS, Supt.
Laboratory—19th and Campbell Streets, Kansas City, Mo.

World Globe No. 147

12" Globe. New model—equipped with wooden floor stand finished in walnut. Height overall 35". Globe constructed with half meridian. New **World Globe Handbook included FREE.** A marvelous buy. Never has a floor model Globe been sold at such a low price. Shipping weight 9 lbs.

PRICE

$4.15

F.O.B. Chicago.

World Globe No. 47

7" Globe, equipped with sturdy metal base and half meridian. Index to countries fo the world by latitude and longitude shown on base. Shipping weight 2 lbs. **PRICE**

$0.90

World Globe No. 139

12" Globe, equipped with sturdy, black metal base and half meridian. Contains over 7,500 names and cities. Spellings conform to authoritative world standards. **Hundreds sold to many short wave fans during the last year. Copy of World Globe Handbook included FREE.** Shipping weight 8 lbs. **PRICE**

$3.25

F.O.B. Chicago.

ORDER YOUR GLOBE TODAY!

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

ALL GLOBES SHIPPED IMMEDIATELY

SHORT WAVE CRAFT
99 Hudson Street, New York, N. Y. SWC-034

Gentlemen: Enclosed you will find my remittance of $..... for which please ship me the following World Globe.

( ) World Glibe No. 99 @ $2.05
( ) World Globe No. 147 @ $4.15
( ) World Globe No. 47 @ $0.90
( ) World Globe No. 139 @ $3.25

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

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

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

THOUSANDS ARE *Enthusing* OVER THE *New 1935* MIDWEST·16

Midwest Amazes Friends!
Last night I listened to LSX talk to KFZ and also New York. Then I received KFZ direct. Then I tuned back to LSX and KFZ and heard them plainly. My friends were amazed. Dr. F. C. Naegeli, Devils Lake, N. D

Marvelous Foreign Reception!
My friends can hardly believe I paid so little for my Midwest 16. My best foreign stations are LSX, Buenos Aires . . . EAQ, Madrid . . . DJA, Germany . . . CSB, England . . . PRAC, Brazil. G. E. Wagner, 2102 Wyoming Street, St. Louis, Mo.

Unequalled Foreign Reception!
My Midwest brings in thrilling programs from England, Germany, Australia, Venezuela, Columbia, Argentina and principal world stations. My friends marvel at its tone, sensitivity, power and selectivity. La Rue Thompson, Box 554, Johnstown, Pa.

Byrd Expedition Direct!
My Midwest 16 is best radio I have ever seen. It pulls stations I could never get before. Foreign reception clear as locals. Secured Spain, South America, England, Cuba, etc. Also get Byrd Expedition direct. J. H. Hudson, Loudon, Tenn.

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)

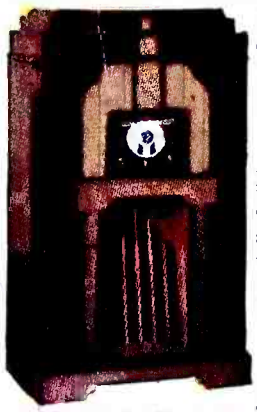
30 DAYS FREE TRIAL

Guaranteed WORLD-WIDE RECEPTION!

BEFORE you buy any radio, write for FREE copy of the new 1935 Midwest "Fifteenth Anniversary" catalog. See for yourself the many reasons why over 110,000 satisfied customers have bought their radios direct from Midwest Laboratories . . . and saved from ⅓ to ½. Learn why Midwest radios out-perform sets costing up to $200 and more. You, too, can make a positive saving of from 30% to 50% by buying this more economical way. Why be content with ordinary so-called "All-Wave", "Dual Wave", "Skip Wave" or "Tri-Wave" receivers when Midwest gives you more wave lengths in today's most perfectly developed 16-tube Super de luxe ALL-WAVE radio that are proven by four years of success . . . that carry an iron-clad guarantee of foreign reception! These bigger, better, more powerful, clearer-toned, super selective radios have FIVE distinct wave bands; ultra short, short, medium, broadcast, and long. Their greater all-wave tuning of 9 to 2400 meters (33 megacycles to 125 KC) enables you to tune in stations 12,000 miles away with clear loud speaker reception. Write TODAY for new FREE catalog!

TERMS AS LOW AS $5.00 DOWN

Now, you can enjoy super American, Canadian, police, amateur, commercial, airplane and ship broadcasts . . . and derive new delight and new excitement from unequalled world-wide performance. Now, you can enjoy the DX-ing hobby and secure verifications from more of the world's most distant stations. Thrill to the chimes of Big Ben from GSB, London, England . . . tune in on the "Marseillaise" from FYA, Pointoise, France . . . hear sparkling music from EAQ, Madrid, Spain . . . delight in lively tangos from YV1BC, Caracas, Venezuela . . . listen to the call of the Kookaburra bird, from VK2ME, Sydney, Australia, etc. Send today for money-saving facts.



NEW STYLE CONSOLES
The new, big, Midwest 36-page 1935 catalog pictures a complete line of beautiful, artistic de luxe consoles and chassis . . . in four colors . . . a model for every purse. Hand made by master craftsmen, they harmonize beautifully with any furniture arrangement. Write for new FREE catalog today!

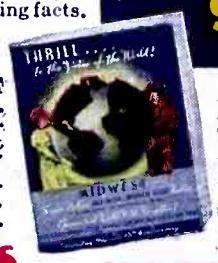
WORLD'S GREATEST RADIO VALUE

$57.50 with New *Deluxe Auditorium-Type* SPEAKER

. . . LESS TUBES . . .

50 ADVANCED 1935 FEATURES

Here are a few of Midwest's superior features: Controllable Expansion of Volume-Selectivity-Sensitivity (Micro-Tenuator) . . . Fidel-A-Trol . . . Triple Calibration Plus . . . Pure Silver Wire . . . Ceramic Coil Forms . . . Separate Audio Generator . . . Simplified Tuning Guide Lights . . . Compact Synchronized Band Switch . . . Amplified Automatic Volume Control . . . 7 KC Selectivity . . . Power Driver Stage . . . 16 Latest Type Tubes . . . etc. Read about these and 38 other features in the new FREE Midwest catalog. Never before so much radio for so little money. Write for FREE catalog.



We will send you copies of letters like those shown at top of page. They'll convince you that Midwest radios are sensational values! Try the Midwest for thirty days before you decide. Midwest gives you triple protection with: A one-year guarantee, foreign reception guarantee, money-back guarantee.

DEAL DIRECT WITH LABORATORIES

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