

# THE RADIO EXPERIMENTER'S MAGAZINE

HUGO GERNSBACK  
Editor

# SHORT WAVE ★ CRAFT

November 35

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**Panel 2:** HELLO, TOM, HOW'S EVERYTHING? OH, NOT SO GOOD BILL, BUT I'M STILL HAVING FUN PLAYING WITH RADIO. HAD D.J.C. LAST NIGHT ON A LITTLE SET I BUILT. IS RADIO STILL YOUR HOBBY TOO?

**Panel 3:** NO, TOM, I'VE BEEN TOO BUSY MAKING GOOD MONEY OUT OF RADIO TO SPEND TIME "PLAYING" WITH IT.

**Panel 4:** GOSH, BILL, YOU'RE SURE LUCKY. I NOTICED YOUR SWEET CLOTHES AND SNAPPY CAR. I THOUGHT YOU HAD INHERITED A MILLION. TELL ME ABOUT IT.

**Panel 5:** I AM LUCKY, TOM, BUT YOU HAD THE SAME CHANCE. REMEMBER ABOUT A YEAR AGO I SHOWED YOU A BOOK FROM NATIONAL RADIO INSTITUTE THAT TOLD ABOUT THE OPPORTUNITIES AND BIG FUTURE IN RADIO, AND HOW OTHERS HAD SUCCEEDED THROUGH THEIR HOME TRAINING? REMEMBER, I TRIED TO GET YOU TO ENROLL FOR THEIR COURSE WHEN I DID.

**Panel 6:** WELL, IT WAS THE SMARTEST MOVE I EVER MADE. I'M DOING SWELL. MARY AND I ARE TO BE MARRIED NEXT MONTH. TOM, WHY DON'T YOU SNAP OUT OF IT? DON'T STAY IN THAT DREARY LOW PAY JOB ALL YOUR LIFE. RADIO IS MORE THAN A PLAYTHING. IT'S A BIG BUSINESS. IT'S YOUR OPPORTUNITY. TAKE MY TIP. IT ISN'T TOO LATE. RADIO IS STILL YOUNG AND GROWING.

**Panel 7:** IF BILL SUCCEEDED, I CAN TOO!

**Panel 8:** THEN I CAN MAKE REAL MONEY SERVICING RADIO SETS

**Panel 9:** OR GET A JOB IN A BROADCASTING STATION

**Panel 10:** OR MAKE GOOD MONEY IN ANY ONE OF THE MANY OTHER NEW AND GROWING BRANCHES OF RADIO. THERE'S NO END OF GOOD JOBS FOR A TRAINED RADIO MAN! YES, SIR, I'M GOING TO SEND FOR THAT FREE BOOK AND GET THE DOPE RIGHT NOW!

**Panel 11:** YOU CERTAINLY KNOW RADIO. MINE NEVER SOUNDED BETTER

**Panel 12:** N.R.I. TRAINING CERTAINLY PAYS. I JUST STARTED A FEW MONTHS AGO AND I'M MAKING GOOD MONEY ALREADY. THIS SPARE TIME WORK IS SWELL FUN, AND SOON I'LL BE ALL SET FOR A GOOD FULL TIME JOB

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Editor



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- Audio Amplifier and Power Supply for S-W Receivers.



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# Short Waves and War

An Editorial By HUGO GERNSBACK

● DURING the World War, the vacuum tube had just begun to make its appearance and it was not until the end of the war that really good vacuum tubes had been perfected. Short waves at that time were not much in vogue and had only been used experimentally. Not very much was known of their behavior in space and whatever signalling was done during the war was done at the higher wavelengths, rather than on short waves.

The next war will see profound changes in all branches of warfare and one of the most interesting ones will no doubt be that involving instrumentality of short waves.

*Short Wave Craft* has repeatedly chronicled the latest inventions used in conjunction with short waves. Recently the so-called *mystery ray* has been given quite a good deal of publicity in the press. It seems this particular ray, which is nothing but micro short waves, was simultaneously developed by the United States Army, also in Germany, and by several other powers as well. These *micro waves* appear to pierce fog and even clouds, and work along optical lines. It will be impossible hereafter for an airplane to hide in the fog and even behind clouds, because the mystery wave directed against it is reflected down to earth where it is used for recording or alarm purposes.

A city, during the next war, will easily be protected against unheralded enemy aircraft by having a barrage of such micro waves surrounding the entire city, the action being automatic in such a manner, that automatic recording instruments will immediately sound the alarm when an airplane appears overhead within the confines of the city. It will be impossible, in the future, for an enemy airplane to get through such a short-wave barrage.

This, however, is only one of the more spectacular war uses of short waves. For propaganda purposes all of the short-wave stations of the various nations will be worked at full blast! One nation will shout to the other, in trying to tell the enemy population certain war facts which the home government may wish to suppress at all costs. We will then have the interesting experience where one government, in order to defeat this purpose, will try to "jam" the enemy station from sending out such propaganda by broadcasting on approximately the same wave. This would then nullify the enemy's efforts because listeners could no longer make out what the foreign messages were.

For communication purposes, between Army units, exceedingly short short-waves will be used; each bat-

alion will have its own short-wave set, which will be so small that one man can easily carry it. In this manner it will be possible to keep in touch with headquarters all the time. Of course, it will be argued at this point that the enemy will hear all these messages. This is true, and it should not be forgotten that we also hear the ones from the other side as well. This need not disturb us, because the messages can be in special codes, so that if the enemy gets the information they will not be much the wiser. These codes are changed quite frequently so that the enemy cannot understand them.

However, when it is necessary to keep the messages secret, we will make use of special directional or radio beams, which can be directed exactly the same as a searchlight, with the assurance that the enemy cannot eavesdrop on the message. It is to be expected that such directed beams on ultra short waves will come into general use during the next war and, as a matter of fact, practically all armies have experimented with the system and several have adopted ultra short waves for such communication.

The same reasoning holds true for airplanes. Here also, special equipment, whereby an airplane can send out a sharply focused beam wave, which cannot be intercepted by the enemy if the usual precautions are taken, will be used.

It will even be possible for outposts, where it is impossible to use telephone wires, to employ short waves for communication purposes to the rear. Short-wave sets have already been designed which can be carried on the back of any soldier. These are usually small battery operated affairs that weigh a fraction of a pound. The operator finds it easy to direct the micro wave back to his own lines, so that the enemy cannot intercept the message. This is also done by special beam-reflector work.

These ultra short waves will also be used where small mines, planted in the soil, can be hidden at strategic points, bridge approaches, etc., ammunition dumps, and wherever necessary. By a special combination impulse, the mine can be exploded at any time, although a special formation of signals are necessary before this can be accomplished. No wires are used, and the destruction can be effected especially during the retreat of troops in order to hamper the movements of the enemy.

There are, of course, hundreds of other uses of short waves for warfare purposes, many of which are secret and about which little or no publicity has, as yet, been given.

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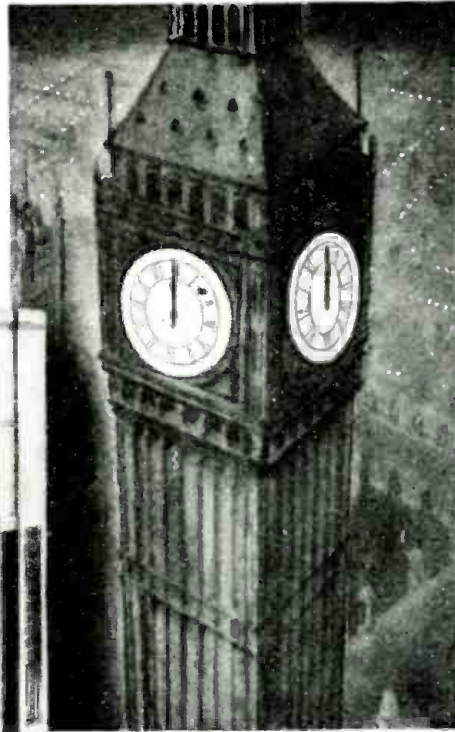
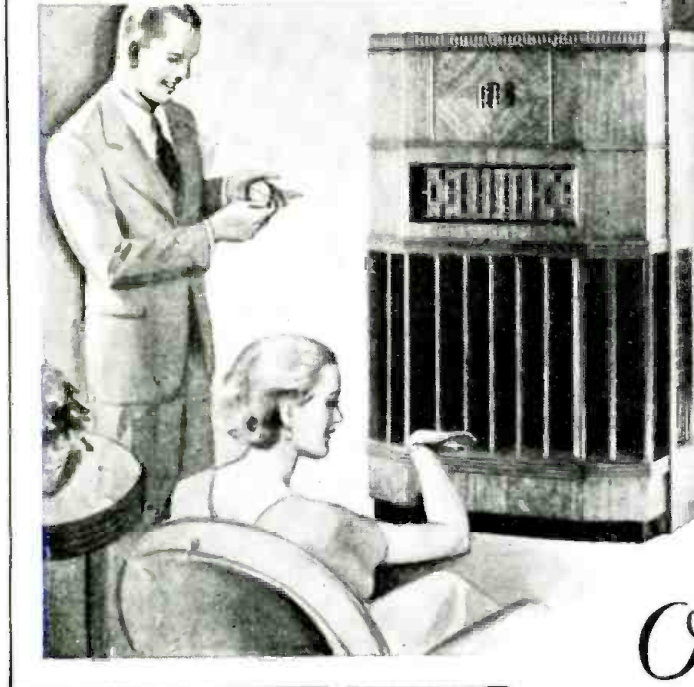
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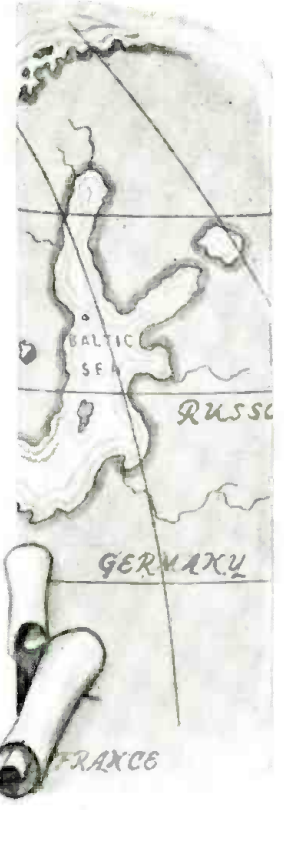




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**SOUND DIFFUSION**—the only radio today with scientifically designed sound diffusers for perfect distribution of all tones.

**FULL RANGE HI-FIDELITY**—twice the tonal range of any other high fidelity receiver. 25 to 16,000 cycles.

**THE RECEIVER THE CELEBRITIES OWN**

The unparalleled performance of the SCOTT is backed by a five year guarantee of perfect service on all parts except tubes. Custom-built and sold direct from the laboratories on a thirty day home trial (U. S. A. only). Send TODAY for complete information on the new SCOTT Full Range Hi-Fidelity AllWave—the receiver owned by Toscanini, Jeritza, Rudy Vallee, Guy Lombardo, Walter Winchell, and many other celebrities.



**SEND THIS COUPON TODAY—DETAILS FREE**

**E. H. SCOTT RADIO LABORATORIES, INC.**  
4470 Ravenswood Ave., Dept. 28T5, Chicago, Ill.

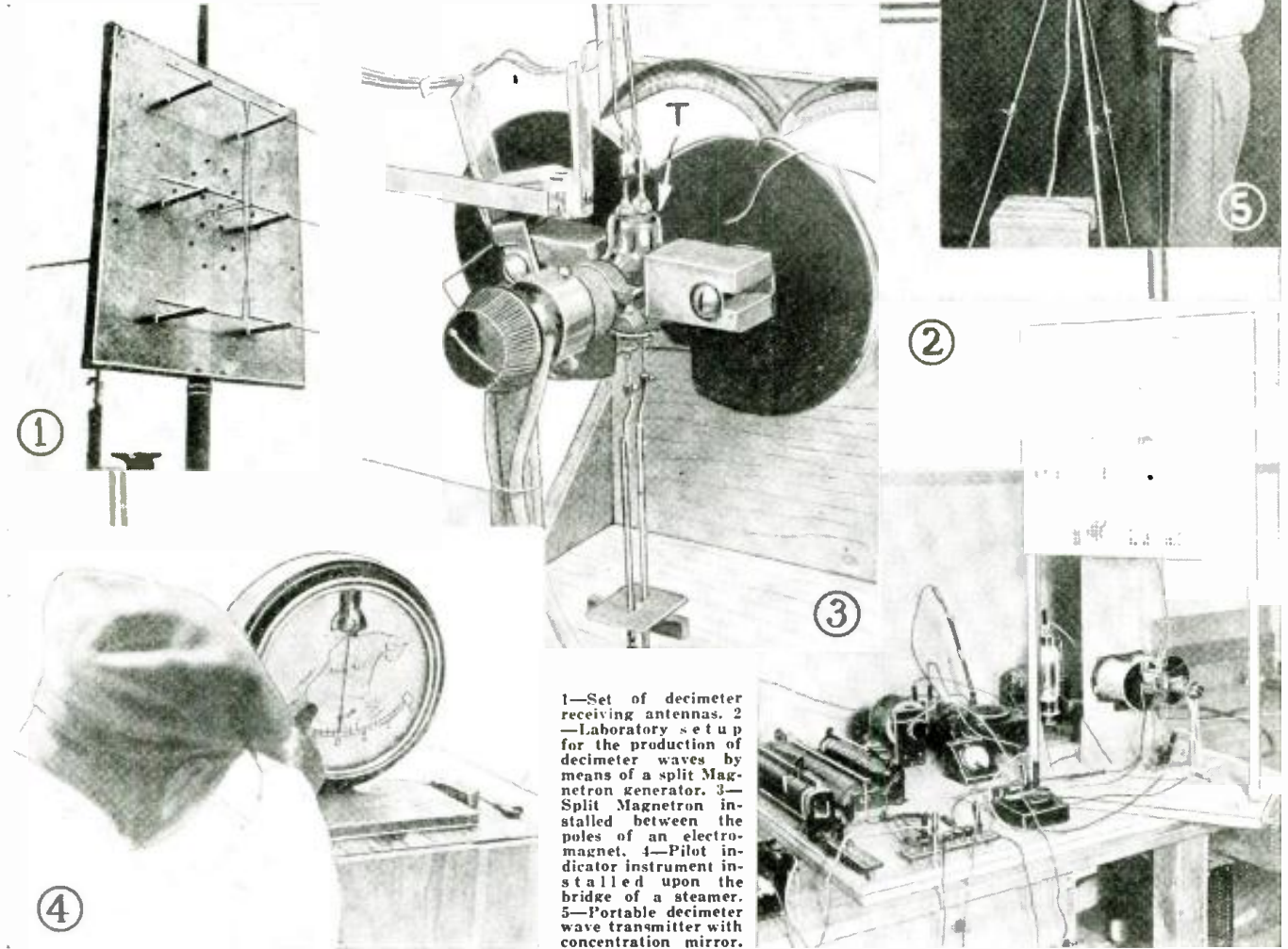
Send me complete details of the new SCOTT Full Range Hi-Fidelity AllWave. "94 PROOFS" of its superior tone and DX performance, and particulars of your 30 day trial offer.

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Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

Please mention SHORT WAVE CRAFT when writing advertisers

# Decimeter Waves— The Future of Radio

By Eckard Klein



1—Set of decimeter receiving antennas. 2—Laboratory setup for the production of decimeter waves by means of a split Magnetron generator. 3—Split Magnetron installed between the poles of an electromagnet. 4—Pilot indicator instrument installed upon the bridge of a steamer. 5—Portable decimeter wave transmitter with concentration mirror.

● THE great number of radio transmitters now in operation and the daily increasing demand for additional traffic channels, puzzles the radio commissioners of all nations, and has brought the present radio channel system to a point of practical saturation. Only by application of auxiliary tricks, for example the mutual use of one and the same wavelength by two transmitters, which operate in more or less large geographical areas, has it been possible to keep the world radio system in fairly smooth operation. These methods have or are actually hindering further progress in radio communication, however.

The only hope of solving this problem lies in the belief that future research work in the wave range below 5 meters may unearth some heretofore unknown facts, which would enable us to utilize the great number of radio channels in this region for practical application.

Despite the well-known fact that a great many of radio channels are unused

\*Decimeter waves are here considered as those falling between roughly .1 and 1 meter.

in the decimeter\* (one-tenth meter) range, no intensive research work had been carried on in Germany until about one and a half years ago. At that time

---

The present article deals with some of the possibilities of waves only a fraction of a meter in length, the new "split magnetron" tube is described, also the manner of guiding a boat by means of decimeter waves.

---

the Radio Corporation of Germany (The *Telefunken Co.*) started secretly some very interesting experiments with decimeter waves of a length between 40 and 90 centimeters, which have furnished a great number of new facts

about the character and the qualities of these very short waves. These very interesting experiments have indicated some new possibilities of decimeter wave utilization, which might in a short time to come be of incalculable value in the progress of radio communication.

Since these very short waves can be *bundled or concentrated* like a light beam, and since, further, these waves are only receivable as far as the direct optical sight goes, it is possible to use them for a directed beam by which many transmitters and receivers may operate in parallel on the same wavelength without any mutual disturbance.

The stumbling block in the utilization of these very short waves was until recently the enormous number of oscillations per time unit, amounting to many millions and even billions of cycles per second. It is easy to understand that currents of such a high frequency put insulation materials under a specially high electrical strain. Entirely new methods of handling these new high frequency electrical problems had to be designed; (Continued on page 433)





## Baby Walrus' DIET Prescribed by Short Waves

A baby walrus is hard to raise in any event, especially when he won't eat. Short waves, and a "Ham" station bridged the gap between a ship off Greenland and an expert in N. Y. City, who prescribed the proper diet.

*If retained, increase until patient takes four to five pounds. Then add to diet all he can eat of soft-shell clams.*

Later in the day another short-wave flash from Capt. Bob Bartlett to Mr. Preston read:—

*"Already perking up; likes fare. Eating clams, shells included."*

Dr. Blair relayed back through Mr. Preston's short-wave station, an urgent instruction to remove all shells from the clams in the future.

Julius Ross, the operator on the Morrissey, deserves all the credit for the Morrissey schedules, writes Mr. Preston, for often he has held on with one hand, while sending Px (press) to me with the other.

The transmitter is a Collins 300A, having a pair of 203A's in the final stage with an input of about 600 watts. The panel to the lower right of (Continued on page 426)

Photo at right shows the "Ham" S-W station that did the trick.

● A TINY baby walrus was recently captured and at once became quite a care for the officers and crew of the good ship Morrissey, lying in Davis Straight off Greenland. Capt. Bob Bartlett is the skipper of the Morrissey, and one of our good Ham friends, J. E. Preston, who operates the tip-top amateur radio station shown in the photo, at his home in North Arlington, N. J., maintained a daily schedule with the schooner Morrissey. He was very much surprised recently to get a short-wave flash from Captain Bob, aboard the Morrissey, asking him to relay this message to Dr. William R. Blair, Director of the Bronx Zoo, New York City:

*"Have baby walrus aboard—want bring you. Little devil won't drink milk. Can't get him to eat save by force. Can you prescribe?"*

Dr. Blair received a telephone call from our "Ham" friend, Mr. Preston, repeating the short-wave message from Capt. Bartlett, and having remembered the troubles encountered at the Zoo when an unsuccessful attempt had been made to rear a number of young walruses, the Doctor prescribed the following menu for Mr. Baby Walrus.

*"Feed shredded codfish six times daily in small quantities.*



## 56 Mile Commercial Link on 1.3 Meters!

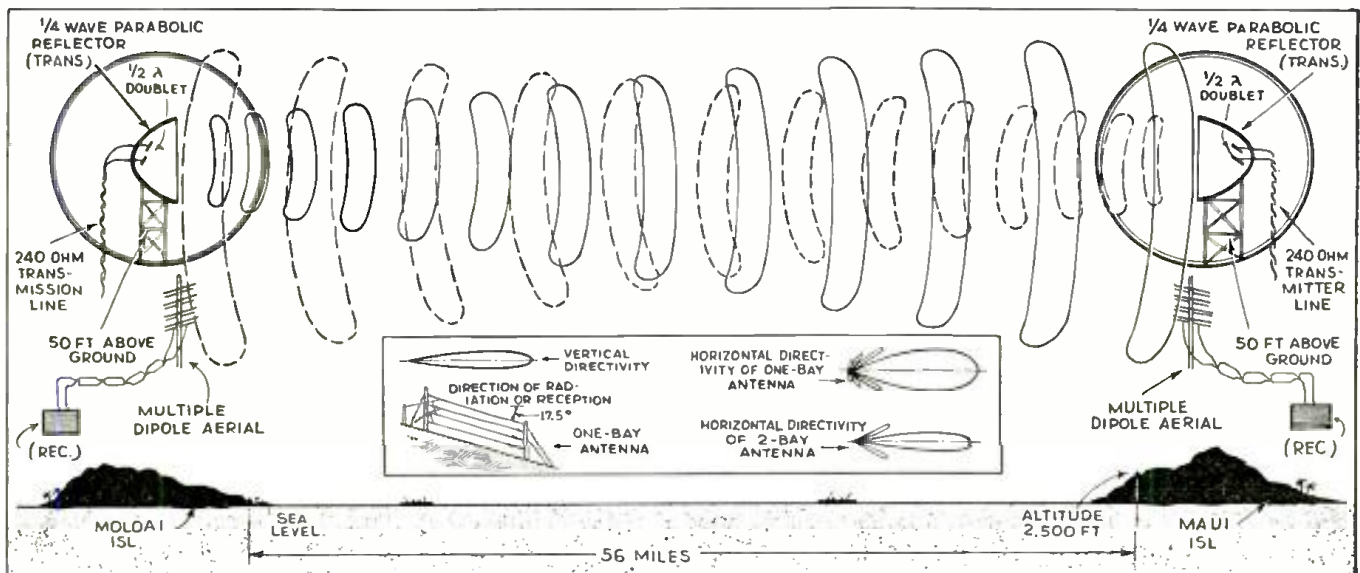
● SOME very interesting ultra short-wave communications have been carried on in the Hawaiian Islands and the accompanying illustration shows a 56-mile link between the islands of Maui and Molokai, on the surprisingly short wavelength of 1.3 meters. More, exactly, the frequency range used on this experimental telephone circuit operated by the Mutual Telephone Com-

pany of Hawaii, is 220 to 230 megacycles or 1.36 to 1.3 meters. This circuit is now operating on a commercial basis.

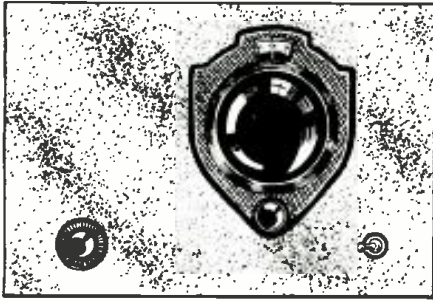
On the island of Maui, the antenna and the transmitter are located at the same site as the inter-island ultra short-wave station, at an altitude of 2500 feet. On the island of Molokai the 1.3 meter station is located at the

same site as the telephone company's radio telegraph station at Kaunakakai, at sea level.

A very interesting discovery was made in experimenting with the ultra high-frequency waves in the range between 150 and 400 megacycles, one of the valuable discoveries having been that at these frequencies the signals are practically (Continued on page 425)



The diagram shows graphically how 1.3 meter waves are used daily to link two islands in the Hawaiian group, the distance covered being 56 miles.



Front view of the "Universal 2."

# "UNIVERSAL 2"

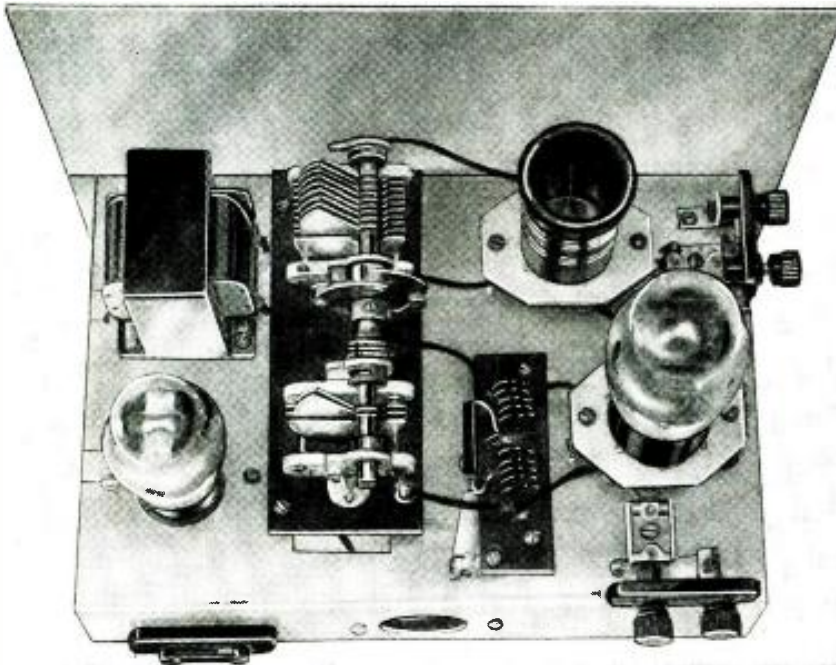
inum 7 by 10 inches and the base is a piece 9 by 10 inches. Both are of 1/16-inch stock and the base is bent to form a space of two inches "below deck." This gives just enough space to clear the regular regeneration control condenser. In bending the aluminum be sure and score it deeply and evenly

along the line where it is to be bent. Also if one makes the deepest line on the side the two inch pieces are bent away from the main section, the bend will be much sharper. It is more convenient, too, if all the holes are drilled before bending.

## Front Panel Layout

Looking at the front panel we see the tuning dial and the regeneration control at the left and the audio switch at the right. From the top one can see the 6A6 detector tube at the left, with the regular normal wave coil in front and the 5-meter inductances to the side. The ganged tuning condensers are to the right of the coils and the audio transformer and the 41 pentode are to the right of the condensers. Looking at the bottom one can see the audio switch to the left on the front panel and the regeneration control condenser to the right. Behind the switch is the cathode resistor and bypass condenser of the audio tube, and behind these the socket for the 41. Soldered to the regeneration condenser is the regular wave choke and behind this the 5-meter interruption frequency coils. The battery leads are taken out the back by the tube-base plug and tube socket and the phone tip plug into a pair of tip-jacks also on the back.

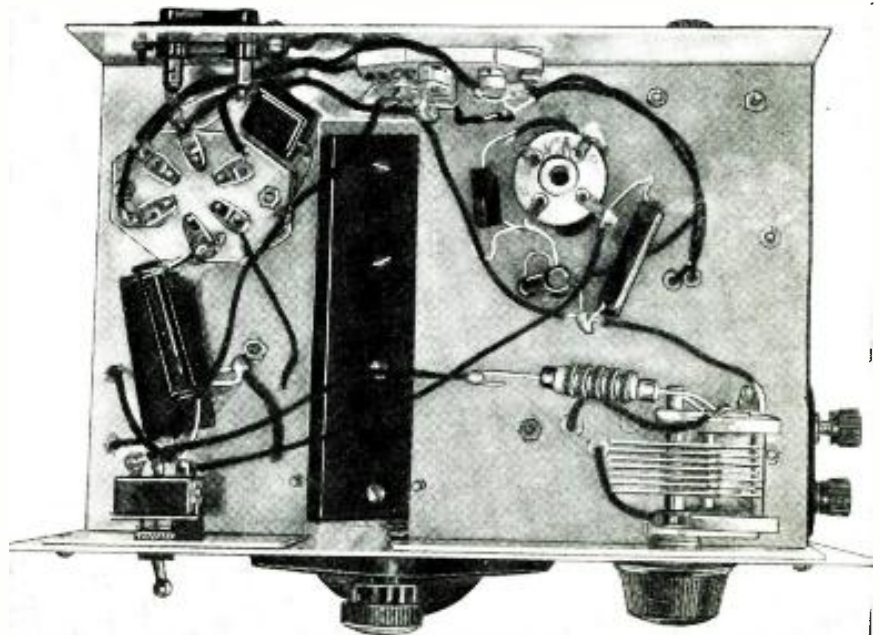
It will be noted that the detectors' apparatus is all mounted above the chassis on spacers. The tubes, coils, condensers, and antenna trimmers were mounted in this fashion to get short leads, particularly on the 5-meter detector, as the length of leads really mean something with such small coils. Keeping the inductance and capacity in the tank circuit is quite necessary to obtain good sensitivity down on five meters.



Rear view, showing how the parts are mounted.

● HERE is a set that is the result of a hankering for a small receiver that would cover all the usual short-wave bands. (5 meter and short-wave broadcast bands). Many times we would like to listen to 5-meter signals and yet do not feel quite equal to making special equipment for 5 meters alone. Hundreds of amateur stations are transmitting by phone on 5 meters and experimental commercial and television messages can be heard. This effective "two-tuber," however, uses a 6A6 tube as a detector. This is one of those double triode Class B tubes and one triode is used as a regular regenerative detector with plug-in coils, while the other used a self-quenching 5 meter super-regenerative detector. The output of either detector is switched on to the audio, depending on whether 5 meter or regular short-wave broadcast band reception is desired. This arrangement provides two sets in one for about the price of one and is inexpensive. This set, too, is simple enough for almost any beginner to build. The detector not in use does not draw any plate current. The audio end is taken care of by a transformer-coupled 41 pentode stage, which even though is not matched to the phones, provides greater gain than the ordinary triode.

The front panel is a piece of alum-



Bottom view, showing the wiring and general placement of parts.



# Covers 5-Meter and Broadcast Bands



Having the antenna trimmers convenient as they are from the top, permits one to adjust them without going around to the back of the set or underneath. The antenna trimmers are the new isolantite insulated capacities developed by Hammarlund. The tuning condensers are also Hammarlunds, the regular wave tuning being taken care of by one of 140 mmf. capacity and the 5-meter tuning by one of 35 mmf. capacity. They are connected by an insulated flexible coupling and mounted on a piece of bakelite 5 by 2 inches as shown. This piece of bakelite is supported five-eighths of an inch above the sub-base by spacers. It is necessary that both the rotor and the stator of the 5-meter tuning condenser be insulated from the ground, as they both carry R.F. The tube and the regular (19-50 meter) wave coil socket are mounted 3/8-inch above the sub-base and the 5-meter coils are mounted one inch above the base. These coils consist of 5 turns each of No. 14 enameled wire wound to 3/8-inch diameter. The shank of a 3/8-inch drill was used. Each coil is pulled out so its length is one-half inch and the two coils are separated half an inch. They are fastened to the 3 by 1 inch bakelite strip, which also holds the 5 meter R.F. choke. The R.F. choke consists of a winding 1 inch long of No. 30 wire, close-wound on a piece of quarter-inch bakelite rod. The 5-meter coils are bolted to the bakelite strip but connections to the coils are made to the coils themselves, rather than to the bolts through soldering lugs. The leads of the coils are bared before mounting and the connections soldered right to them. The 100 mmf. blocking condenser is one of those ultra midgets and is also soldered directly to the coil leads. For symmetry, the rotor connections to the tuning condensers are taken off the bushings instead of the soldering lugs at the back.

By Ernest Kahlert

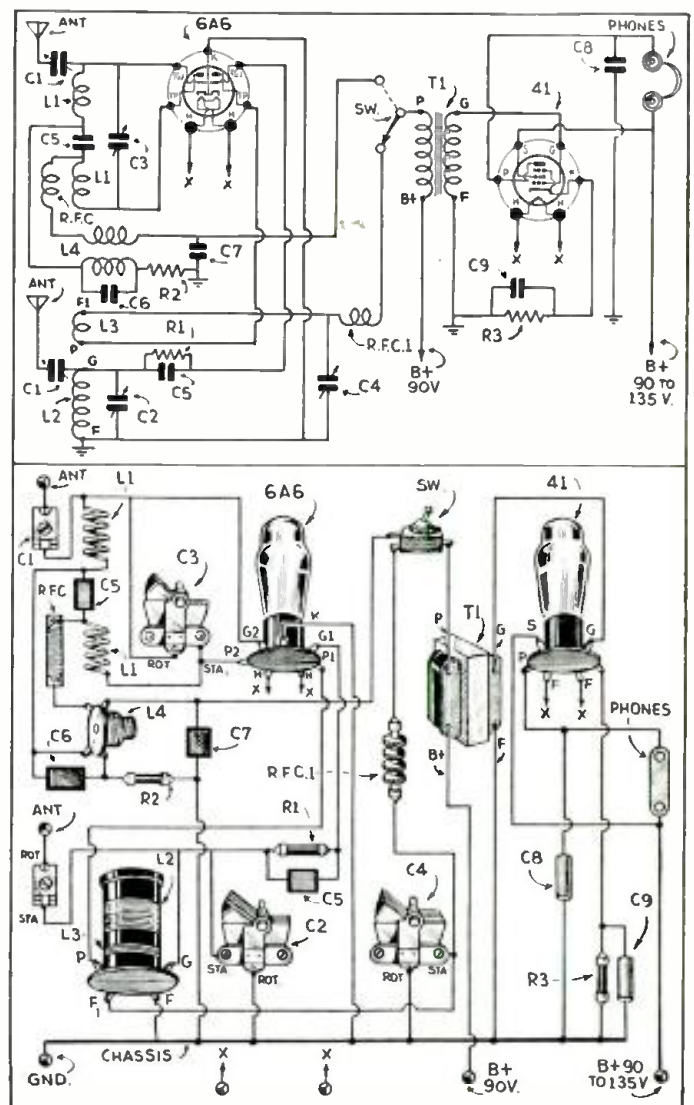
Here is a set that you have all been waiting for. It tunes in the three major short-wave "broadcast" bands (19 to 50 meters) and through the use of a dual purpose tube and clever circuit design, it will also afford reception on the 5-meter amateur band. A 6A6 is used as the "Twin Detector" and a 41 is used as the audio amplifier. By simply snapping a switch, the set will operate on either the short-wave broadcast bands, through the use of plug-in coils, or on the 5-meter amateur band. The 5-meter band is fixed and requires no adjustments except for the tuning.

have to be touched to get the set accurately in the band. In this case the set was right on the band but in other cases, due to a different tube or other components, the set might be a trifle "off wave." It will then be necessary to push together or pull apart the turns of the coils a bit to get "on the frequency," as there is no trimmer for the tank circuit, although the antenna trimmer does influence the tuning range to a slight extent. A little difficulty might also be experienced with the interruption oscillations. Perhaps if there is trouble one could improve things with a 50,000-ohm variable resistor in the detector lead, but in this case it was not found at all (Continued on page 435)

### Connection of I.F. Coils

A word is in order about the connections to the interruption coils as most coils come unmarked as to proper connections. If the two sections are wound in the same direction—and they usually are—the start of the small winding will go to the plate, and the end of the large winding will go to the grid. The grid coil of the interruption frequency coils is tuned by the .002 mf. condenser soldered to the leads of the grid coil. One should make sure as usual when building a set that all the parts are O.K. and especially the small fixed mica condensers, as quite often one will get leaky ones or "duds"—even "shorted" ones!

After the set has been carefully wired and the wiring has been rechecked, one can hook up the "B" eliminator and filament transformer or a storage battery and B batteries. The detectors in this case operate best at 90 volts although this may vary in individual cases and the audio "B" voltage can be anywhere from 90 to 135 volts. Greater voltages than this are liable to damage the phones as the pentode draws quite a high plate current and if 180 to 250 volts are applied the phones are liable to burn out. If a dynamic speaker is used with its output transformer of course there is no danger from excessive plate current. It is best, however, to keep the plate voltage down to 90 when using phones, the same as the detector plate voltage. At 90 volts there is plenty of "sock." A word about the audio switch. One is liable to get the connections wrong and the set will seem "dead" and it is good policy to find out the correct connections to this switch with phones and battery before wiring it in. The regular band coils are wound on 5-prong forms (4 prong if you prefer) with No. 30 D.C.C. wire. See dimensions at end of article. Note the large ticklers; this is because of the triode detector and small regeneration condenser for low-C and slightly greater gain. This set worked "right off the bat," although a little experimenting had to be done with the grid-leak of the super-regenerative detector. The antenna for the 5-meter end can be most any piece of wire, but it is preferable to have a vertical wire some multiple of 8 feet, either 8 feet, 16, 24, etc. The antenna trimmer adjustment is not critical and most likely the coils will not



Schematic and physical diagrams of the Universal 2-tube receiver.

# \$200.00 Radio Set Prize

## For Best Cover Title

### 25 OTHER PRIZES

● AFTER the artist had painted the cover of this month's issue, there were so many different titles that came to the editor's mind that he thought it would be a very good opportunity to let our readers exercise their ingenuity and have a chance to express their opinion as to what they think would be a good title for this month's cover design.

In order to make the contest still more interesting, the well-known *Midwest* set manufacturers have generously offered one of the latest models 18-tube CC all-wave receivers valued at \$212.50, complete in a handsome cabinet (as shown in the accompanying photo) which will be awarded by the editors to the first prize winner or the person sending in the title which the editors deem to be the most appropriate for this particular picture.

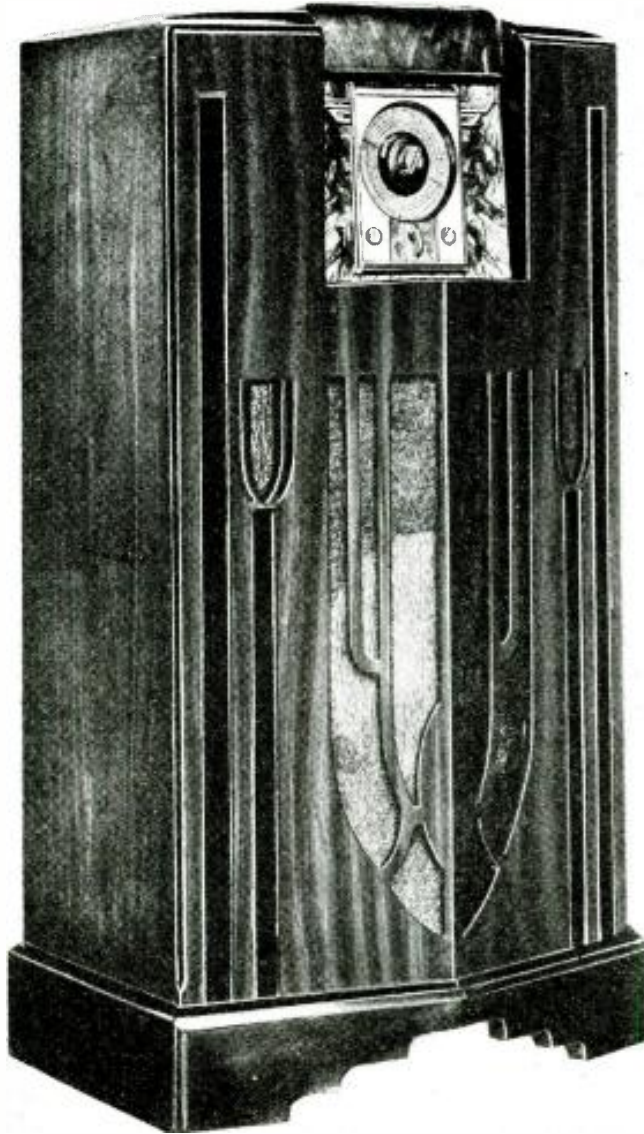
A study of the cover illustration will, of course, at once suggest a number of titles, such as:—"De Luxe Birthday Gift"; "Boy! What A Birthday Gift!"; "Hubby's Love Is Now Secure"; "A Birthday Gift He Will Remember"; "Just The Radio I've Wanted!"

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

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

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

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



Here is the magnificent 18-tube radio set, complete in console cabinet of beautifully matched woods which is offered as the first prize in the new cover title contest here announced. It is valued at \$212.50 by the makers.

the judges, who are the editors of *Short Wave Craft*, please print the title—it may be written in ink or else type-written.

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

The *Midwest* model CC 18 is the very latest design 18-tube receiver having the remarkable tuning range of 4½ to 2400 meters or 67 meg. to 125 KC.—6 tuning ranges! This set has a very handsome dial calibrated with the stations' call letters on it, and also the various short-wave and broadcast bands clearly indicated or marked on the dial so that any band or station can be very quickly found. This set uses metal tubes—18 of them—and the quality and volume obtained from this magnificent receiver can not be described in words—it must be seen and

heard to be fully appreciated. Another new feature of this 18-tube *Midwest* receiver is the new design Acousti-spread V-shaped front which improves tremendously the quality and distribution of the sound waves emanating from the set and serve to filter out all booming, blasting, etc. The wall of the panel is truly a work of art.

#### Rules Pertaining to This Contest:

1.—A suitable title is wanted for the front cover of this month's issue.

2.—The title should be self-explanatory and should have in it some reference to radio, short-waves, or both. It should be humorous, if possible.

3.—You may submit as many titles as you wish. There is no limit.

4.—Titles must be submitted on slips of paper size of a postal card, 3¼x5½ inches, or you can send your title on a one-cent postal card if you prefer to do so. Only one title must go on one sheet of paper. Use only one side of the paper. If the paper or postal card is larger than that size the entry will be thrown out automatically.

5.—Write in "ink" or "type-write" the title; no penciled matter considered.

6.—Name and address must be given on each title, no matter how many you send in.

7.—This contest is open to everyone whether you are a newsstand reader or subscriber.

8.—From the contest are excluded employes of *SHORT WAVE CRAFT* or *Midwest Radio Corp.* and their families.

9.—The contest closes on November 25th, at which time all entries must have been received.

10.—The editors of *SHORT WAVE CRAFT* will be the judges of this contest, and their findings will be final.

11.—No correspondence can be engaged in on this contest, nor letters answered, nor the entries returned.

12.—In the event of "ties," prizes of identical value will be awarded to each tying contestant.

Address all entries to TITLE CONTEST EDITOR, *SHORT WAVE CRAFT*, 99 Hudson Street, New York City.

The prize set will be sent from the radio manufacturer to the winner at the end of the contest and the results giving the winners' names will be published in our February 1936 issue.

The editors feel certain that this will undoubtedly be the most popular short-wave contest ever held and to facilitate the work of the judges, we would appreciate it if all of you good readers who intend to enter this contest with suggested titles for the front cover illustration, will send your entries in at the earliest possible moment.



# TWENTIETH "TROPHY CUP"

Presented to  
SHORT WAVE SCOUT

ADOLPH B. RICE  
RICHMOND, VA.

For his contribution toward the  
advancement of the art of Radio



Magazine

# SHORT WAVE SCOUTS

## Honorable Mention Awards

(None this Month)

## Trophy Contest Entry Rules

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

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

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

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

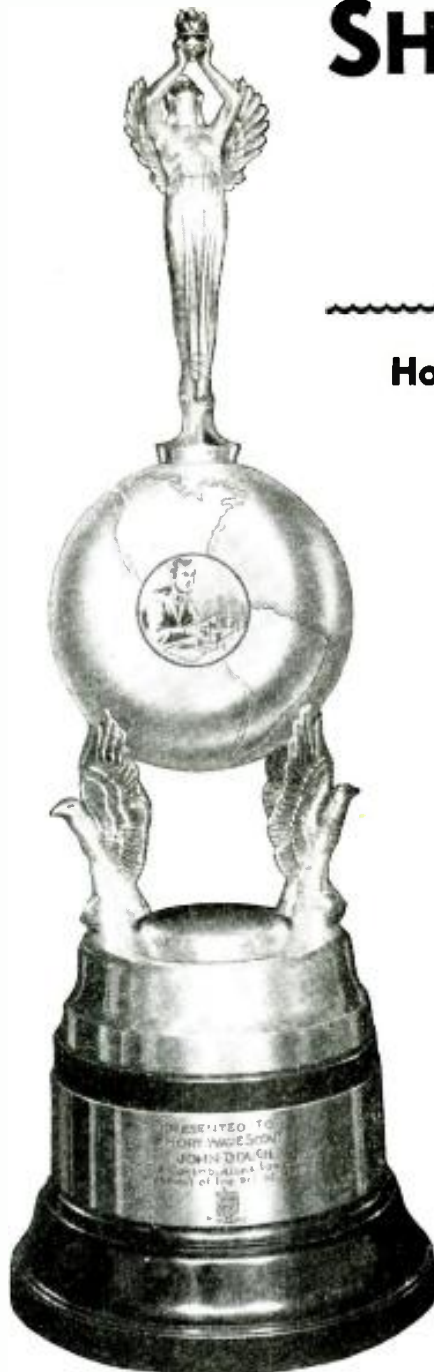
SHORT WAVE SCOUTS are allowed the use of any receiving set, from a one-tube up to one of sixteen tubes or upwards, if they so desire.

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

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

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

(Continued on page 436)



## 20TH TROPHY WINNER

30 Stations, 19 Foreigns

● WE are pleased to award the twentieth Silver Trophy to Adolph B. Rice, of Richmond, Va., for his list of 30 verified stations heard during the month of April. Mr. Rice used a General Electric, model K64 receiver, together with a "G-E" double-doublet antenna, 50 feet high, running in a north and south direction.

We are still receiving many letters from prospective entrants in this contest, asking how much time they have in which to send for veris to "foreign" stations, in order to receive them early enough to submit to the editors with their list of stations. We wish once again to state that you have plenty of time in any case, to send for these veris, as the thirty day period for listening does not have to be any fixed time before the publication date. In other words, the "thirty-day listening period" may be for any given month, or for any period—say from the 15th of one month to the 15th of the next month, etc.

In this case Mr. Rice's listening period extended through the month of April, for example; also note the fact that at least 50% of the verified short-wave stations submitted on your list must be "foreigns," or those located outside of the United States.

Of course, Canadian and South American stations, as well as Mexican and Central American stations, are to be considered as "foreigns." Mr. Rice's verified list of stations appears below, official veris for each station having been submitted to the editors with the list, together with a sworn statement to the effect that he had listened personally to these stations.

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

It is a most imposing piece of work, and stands from tip to base 22 1/2". The diameter of the base is 7 3/4". The diameter of the globe is 5 1/4". The work throughout is first-class, and no money has been spared in its execution. It will enhance any home, and will be admired by everyone who sees it.

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

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

Call	Frequency		Time On Air	City	Country
	K in C y	Met.			
W3XAU	9590	31 28	11 00 a.m. to 6 50 p.m.	Phill., Pa.	U.S.A.
2IRO	9635	31 13	M.W.F. 6:00-7:30-7:45	Italo	Italy
W8XAL	6090	19 30	6:30 a.m.-7:00 p.m.	Credonst	U.S.A.
ORX	10320	29 04	3:00 p.m.-4:00 p.m.	Flinders	Belgium
YV6RV	6240	16 01	5:7-9-11 p.m.	Monexa	Venezuela
BV59	6000	30 00	6:30 a.m.-7:00 p.m.	Rosin	Russia
HPJ	9330	31 28	7:30-10:00 p.m.	St. Leonards	N.Y., U.S.A.
W2XAF	9330	31 48	5:30-11:00 p.m.	Presburgh	U.S.A.
W8XK	6140	18 50	4:30 p.m.-1:00 a.m.	Presburgh	U.S.A.
W4XK	11770	25 27	4:30-10:00 p.m.	Presburgh	U.S.A.
W5XK	15110	15 72	9:00 a.m.-4:00 p.m.	Presburgh	U.S.A.
CIRO	01550	18 78	8:00 p.m.-12:00 a.m.	Wimpeig	Canada
VR2AE	9590	31 28	Irregular	Sydney	Australia
C7IAV	9690	31 25	T.F.S. 3:30-6:00 p.m.	Bufford	U.S.A.
HJ1AB	6417	40 53	11:30 a.m.-1:00 p.m.	Barranquilla	Colombia
W1XAL	6100	19 67	Irregular	Boston	U.S.A.
COE	6220	19 9	Irregular	Havana	Cuba
EAQ	6122	19 43	5:15-7:30 p.m.	Madrid	Spain
YV2RC	6112	19 08	Irregular	Caracas	Venezuela
YV3RMO	5830	11 28	5:15-9:00 p.m.	Maracaibo	Venezuela
W9XA	6080	19 34	Irregular	Chicago	U.S.A.
W9XA	1183	20 60	Irregular	Chicago	U.S.A.
W1XK	9590	31 33	6:00 a.m. to 12:00 m.	Boston	U.S.A.
W9XF	8100	19 18	See Card	Chicago	U.S.A.
HPB	6030	19 75	12 N.-1:00 p.m. 8:00-10:30	Chicago	U.S.A.
HAT	5400	33 56	5:00-10:00-9:00 p.m.	Panama	Panama
HJABE	5500	19 4	See Card	Bu Enos	Hungary
	1524	18 68	6:00-10:00 a.m.	McLellan	France
	1187	21 23	11:00 a.m.-5:00 p.m.	Paris	France
	1172	21 60	6:00 p.m.-10:00 p.m.-M	Paris	France

# This Super-Regenerator

By George W. Shuart, W2AMN

● SOME two years ago the writer designed and built a tuned R.F. super-regenerative 5-meter receiver which operated on a principle entirely different from that of the ordinary receiver. But before we go into that a little incident comes to mind and it happened during a QSO with Mr. C. Runyon, W2AG, a very good friend of ours. After talking to W2AG for about half an hour he asked the writer if his signal was "OK" and how much receiver hiss his carrier was

● UP TO the present time this set undoubtedly represents the greatest advancement in super-regenerative receivers. It operates on a principle entirely different from that of the average receiver and with the proper adjustment of the regeneration control, there need be no "hiss" present in the loudspeaker, even when no station is tuned in. Tuning across the 5-meter band, stations appear and disappear with a slight rushing sound, similar to that heard in a superhet. This set has been tried out by many leading amateurs and has their whole-hearted approval. Mr. Shuart has expended over two years in research on this type of receiver and we are pleased indeed to present this data herewith. Other experiments are being conducted and undoubtedly another version of this "Hiss-less Super" will appear directly. This is a "Certified Seal" Set.

receiver. And the principle was explained carefully to him and he was very much enthused over it. Shortly thereafter Mr. Runyon built a similar

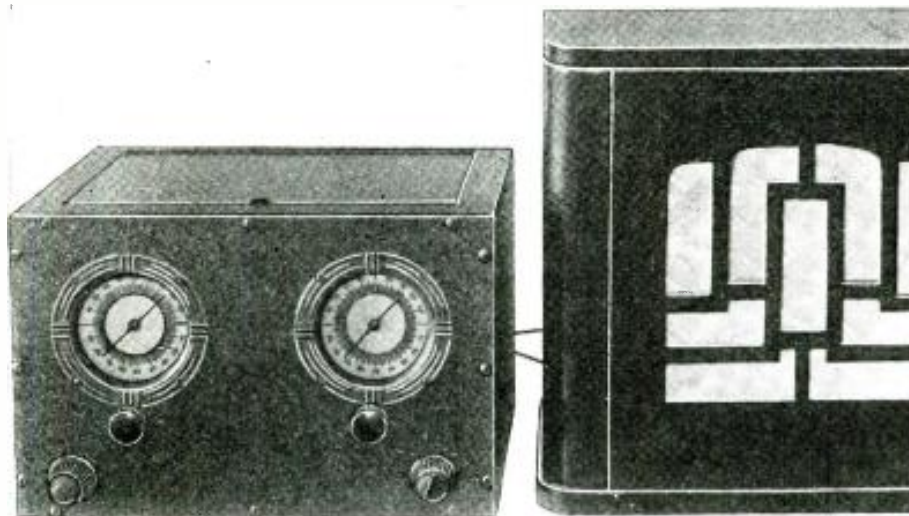
Recently some of our other short-wave friends mentioned that they would like to see a "hiss-less" super-regenerator and the writer related the long withheld story aforementioned. Immediately Frank Lester (W2AM-J), asked to be shown, and the set in the photos was built to convince him. He was immediately convinced upon hearing it and suggested that it be written up in *Short Wave Craft* for the benefit of other "5-meter" hams. There is the whole story leading up to this article and we mention it so that the newcomer to the ranks of 5-meter hams won't think that we are talking through our proverbial hat.

## Acts Like a Superhet!

The receiver is simple to build and get working and it offers the ham something really different in the mode of operation of a super-regenerator. In operation the set handles very much like a superheterodyne, inasmuch as there need be no hiss present in the speaker, even when no station is tuned in! When a station is tuned in there is a slight hissing sound, the same as heard on a superhet—that is the normal rushing or steaming sound heard on any receiver that is tuned to a station. When the transmitting station cuts the carrier, the set goes absolutely "dead," except for the general background noise usually heard on any sensitive receiver.

## The Tube Line-up

Looking at the diagram there appears to be nothing really startling; it consists of a screen-grid tuned R.F. amplifier, a triode regenerative detector, which is modulated by a low-fre-

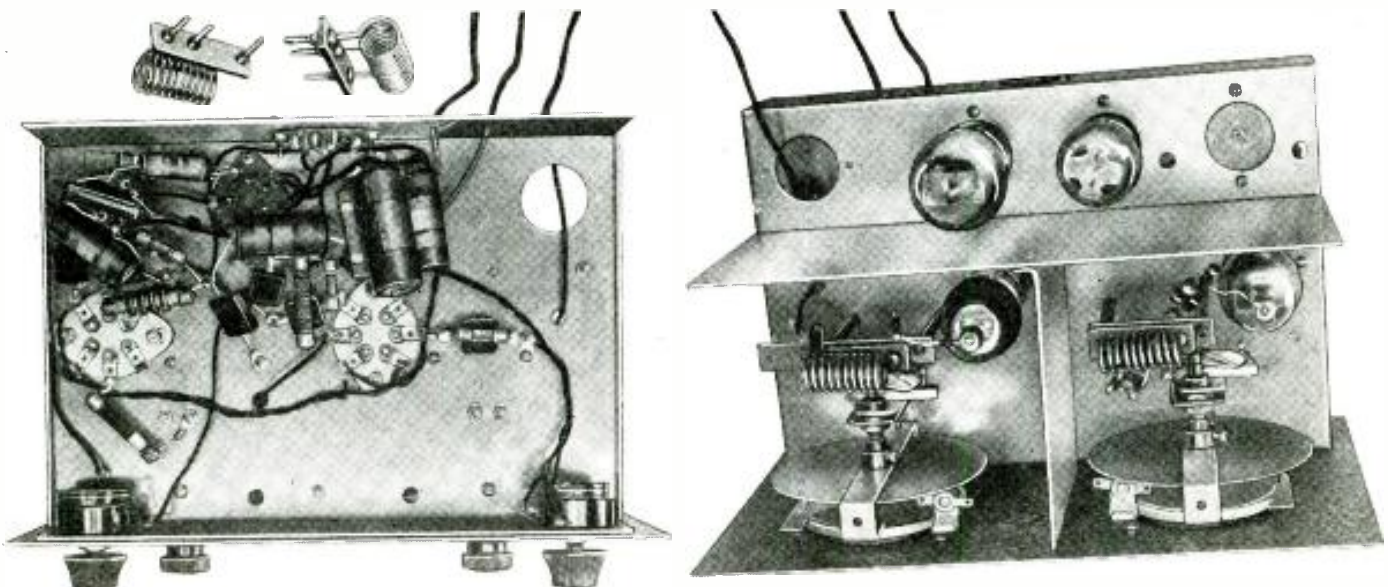


Front view of the Shuart "Hiss-less" Super-regenerator in operation.

suppressing. The answer was something like this: "You are not killing any of the rush—this receiver is not a hisser."

That started a conversation which lasted for several hours, during which "AG" wanted to know all about the re-

ceiver and it has been giving excellent service ever since. Now "AG" is quite an authority on radio and one who does not jump at conclusions; if he says it is good then there is no doubt about it.



Rear view showing the compartments for the T.R.F., detector, I.F. and A.F. stages of this new "Hiss-less" super-regenerator.



# Does Not Hiss!

quency oscillator—commonly termed “interruption frequency” oscillator—followed by a pentode audio amplifier.

The antenna is coupled to the R.F. tube by tapping directly onto the coil, one turn from the ground end. The R.F. stage is coupled to the detector in much the same manner, only a 35 mmf. variable compression-type condenser is used to obtain the proper coupling and keep the “B” plus from being shorted to the chassis or “B” negative. The R.F. choke in the plate circuit of the R.F. tube is made by winding a 1 watt resistor form full of number 28 silk-covered wire, with a spacing between turns equal to the diameter of the wire. A 5 megohm resistor with a ceramic form will serve nicely. The R.F. choke in the cathode of the detector is wound with the same size wire and on the same type form except that there are exactly 38 turns close wound (no spacing between turns); this choke is very critical and should be made as described. The interruption frequency stage is conventional and uses a standard transformer.

### Detector Tube Is a Type 85

The detector tube is one of the best of the ordinary types for this purpose. It is an 85 triode with double diodes in one bulb, the diodes are of course not used. The triode grid-to-plate capacity is only 1.5 mmf., the grid to cathode value is 1.5 mmf. and the plate to cathode capacity is 4.3 mmf. From the above it can be seen that this tube

with its low internal capacities and the grid lead coming out of the top of the bulb makes a very fine ultra high frequency tube.

In a receiver of this type it is advisable to have the interruption frequency as low as possible, but still not so low that it will be within the range of the ear. With different types of I.F. transformers other sizes of grid-tuning condensers will be needed. With the particular one used in this set a .002

mf. condenser was just right. The proper procedure is to build the set and after it is working try various sizes until the frequency is low enough to hear, then use a slightly smaller condenser to bring it just above audibility. The lower the interruption frequency the greater the selectivity and amplification of the detector.

This receiver was built into a chassis and cabinet which can be obtained al-

(Continued on page 427)

## Parts List for “Hiss-Less” Super-Regenerator

- 1—Special cabinet and chassis—Wholesale Radio.
- 6—.0001 mf. mica condensers—Aerovox.
- 1—.001 mf. mica condenser—Aerovox.
- 1—.002 mf. mica condenser—Aerovox.
- 1—.006 mf. mica condenser—Aerovox.
- 3—.1 mf. by-pass condensers—Aerovox.
- 1—10 mf. electrolytic condenser, 35 volts—Aerovox.
- 2—20 mmf. midget tuning condensers—Hammarlund.
- 1—35 mmf. midget padding condenser—Hammarlund.
- 1—5 meg. 1/2 watt resistor—I.R.C.
- 1—300-ohm 1/2-watt resistor—I.R.C.
- 1—50,000-ohm 1/2-watt resistor—I.R.C.
- 1—3300-ohm resistor (approx.)—I.R.C.
- 1—500-ohm 2-watt resistor—I.R.C.
- 1—100,000-ohm 1/2-watt resistor—I.R.C.
- 1—500,000-ohm potentiometer—Electrad.
- 1—50,000- or 100,000-ohm potentiometer—Electrad.
- 2—6-prong isolantite sockets—Hammarlund.
- 1—6-prong wafer socket.
- 2—5-prong wafer sockets.
- RFC1 and RFC2—see text.
- RFC3—2.5 mh.—Hammarlund.
- Plug-in coils—see drawing.
- Plug-in coil mounts and sockets—Wholesale Radio Service Corp.
- 2—Airplane type dials to fit cabinet.
- 1—Interruption frequency transformer—Gen-Win.
- 1—Type 6D6 tube.
- 1—Type 85 tube.
- 1—Type 42 tube.
- 1—Type 37 tube.

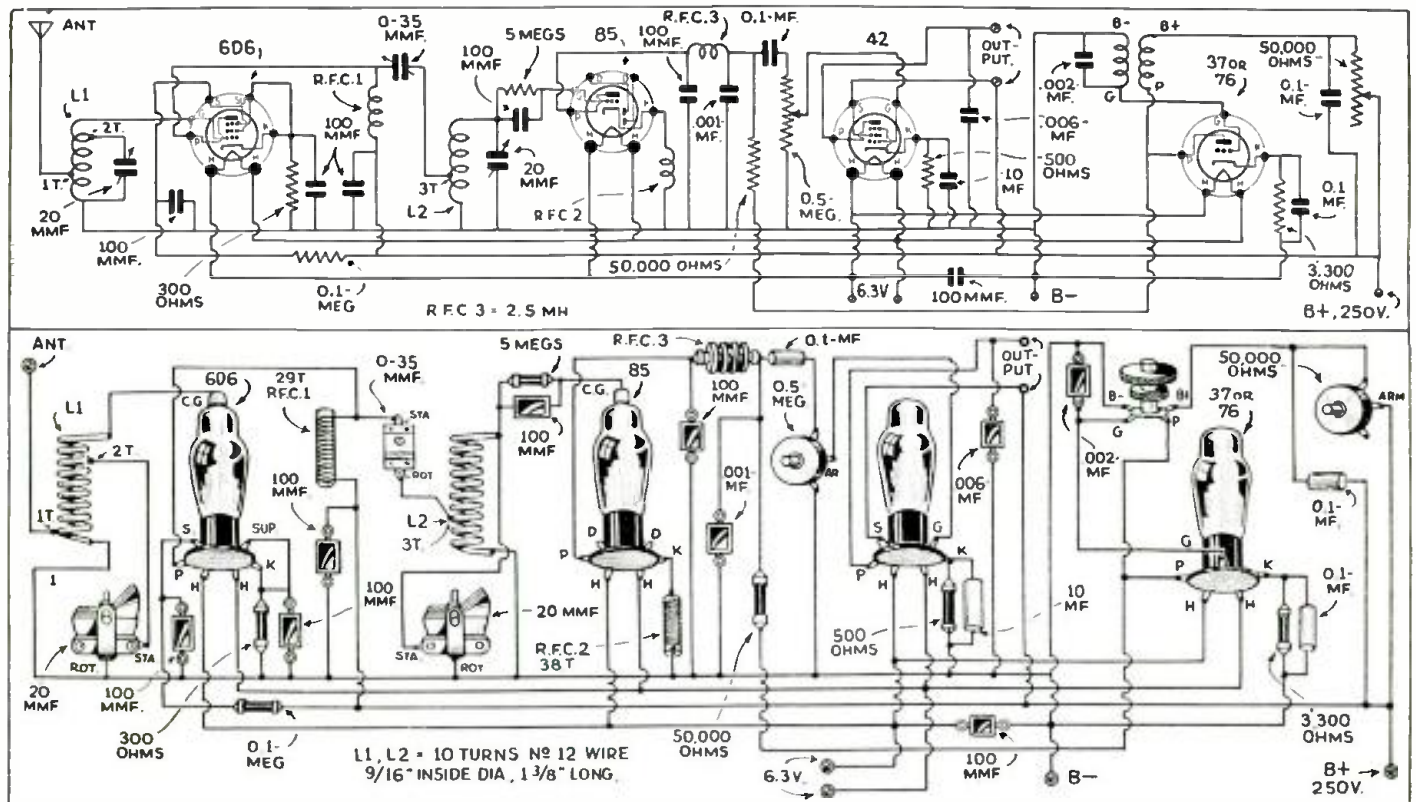


Diagram showing how the “Hiss-less Super” is wired.

# 3 Tube Results With

## How to Use Dual-Purpose Tube in Beginner's



The "3-in-2 Tube" receiver in operation. Foreign stations are brought in with excellent volume.

● HAVING constructed the one tube and rectifier set described by the writer in the article on Standardized Radio which appeared in last month's issue of *Short Wave Craft*, the set builder is now ready to improve this circuit and incidentally to add to his knowledge of radio, by introducing an extra audio stage in the circuit of this receiver. He will find that this makes a very desirable improvement, bringing up the volume considerably and permitting the use of a loud-speaker on many stations which formerly could be brought in only on earphones. As far as earphone reception is concerned, an extra stage will also permit the set-builder to bring in many of the harder-to-get foreign stations which were scarcely audible on his first set.

### 1 Tube Serves 2 Purposes

The addition of the extra stage involves changing only one tube because now, in the place of the 6C6 tube, we will substitute the double-purpose 6F7 tube, which really contains two separate and distinct tubes within the single envelope. In other words, the 6F7 tube consists of a set of elements which function as a pentode. This we will use as our regenerative detector. Another set of elements functions as a triode, or three-element tube and this is used as the audio amplifier. So that the entire matter of changing over the set to the new model involves merely the removal of the 6-prong socket, substitution of the 7-prong socket, the addition of a few small resistors and condensers, correct rewiring of this socket, and the purchase of a 6F7 tube.

In order to make this entirely clear,

even to the merest novice, two diagrams are given; one being a schematic diagram and the other of the type which is known as a picture wiring diagram. From the schematic diagram it can readily be seen that the audio stage is coupled to the regenerative detector by resistors and a condenser. Stated in a less technical way, two resistors and a coupling condenser are made to perform the same service as an expensive audio transformer. This results in greatly lowered cost and many people claim that it also gives better tone quality and is more stable.

### Change to 6F7 Tube Simple

The chief difficulty which the beginner might experience in making the change to the 6F7 tube would be that of making the proper connections to the 7-prong socket terminals. However, this difficulty is entirely obviated by means of the picture wiring diagram, which clearly shows where each terminal is to be connected. The bottom view of the socket is shown as this is the way the socket will appear while the set is being rewired. The two large filament holes which are marked "HH" are to serve as the reference point. Then, as we go around the socket in a clockwise direction, the "PP" terminal is the plate connection of the regenerative detector stage; the "PS" connection is the screen-grid terminal of the same stage; the "TP" connection is the plate of the audio; the "TG" is the grid of the audio, while the "K" is the cathode which is the element common to both tubes. It will be noted that the connections of the 37 tube and of the coil are practically the same as in the first model.

The same method of controlling regeneration is employed, the same antenna control, the same filtering system, etc. Since it is assumed that the set-builder has successfully completed the model outlined in the last issue, it hardly seems necessary to give any additional directions as to procedure in wiring. It suffices to say that all the joints should be mechanically secure and clean, and well soldered and that rosin core solder should be used and that after each connection has been soldered, it should be tested to make sure that it will not pull loose.

### Adding a Second Audio Stage Using 38 Tube

After having added the 6F7 tube,



Rear view of Mr. Cisin's latest "2=3 Tube" receiver.



# This "2-Tuber"

By H. G. Cisin, M.E.



## All-Electric Set To Obtain 3-Tube Results

the next step is to add a second audio stage using an output pentode. For this purpose, the writer has selected a 38 tube which can handle considerably more power than the triode of the 6F7. This is coupled to the triode section of the 6F7 by resistance coupling and the output of the set will now be sufficient to operate an 8-inch magnetic speaker on practically all stations. The schematic diagram, Fig. 3, shows how the second stage is added. The extra socket hole of the chassis is now utilized by fastening a 5-prong socket in place; instead of connecting the audio plate of the 6F7 tube to the earphone jack, it is now connected to the 250,000-ohm resistor of the resistance-coupled stage. The one megohm grid resistor which acts similarly to a transformer secondary goes to the grid of the 38 tube.

The extra expense involved in adding the 38 tube is very small, for the only parts needed are three small resistors, two fixed condensers, a 5-prong socket and a 38 tube. The pic-

This article, the second by Mr. Cisin describing simple receivers for the beginner, uses a 6F7 regenerative detector and resistance-coupled audio amplifier. It will operate on either A.C. or D.C. 110 volts, and bring in "foreign" stations with excellent volume.

ture wiring diagram and the illustration of this third model will appear in the next article of Standardized Radio to be published in an early issue of *Short Wave Craft*.

The writer has recently developed a new type of Find-All coil which is shown in the illustration alongside the set. This is a coil of plug-in type, but with all windings concealed. By means of a unique switching arrangement at the top of the coil, it is possible to cover a range of from 75 to 600 meters with the single coil. Thus one can switch from the lower part of the broadcast band to the upper end, or down to the "police call" band, without having the bother to plug in three different coils.

### Parts List—Cisin Set

- 1—Hammarlund antenna trimmer, type MICS-70, C1.
- 1—Hammarlund variable tuning condenser, type MC-140-M, C2.
- 1—Hammarlund band-spread condenser, type MC-50-5, C3.
- 1—.1 mf. cartridge condenser, C4.
- 2—.01 mf. cartridge condensers, C5, C10.
- 1—.0005 mf. mica condenser, C6.
- 1—.0001 mf. mica condenser, C7.
- 1—Cardboard container, dual electrolytic con-

- denser, 8 mf. each section, C8, C9.
- 1—Electrad potentiometer, 75,000 ohm, R1; with switch SW1.
- 1—I.R.C. metalized resistor 1/4 meg., 1/2 watt, R2.
- 1—I.R.C. metalized resistor, 25,000 ohm, 1/4 watt, R3.
- 2—I.R.C. metalized resistors, 1 meg., 1/2 watt each, R4, R6.
- 1—Resistor in line cord, 350 ohms, R5.
- 1—300-ohm, 20-henry filter choke, CH1.
- 1—4-prong socket for plug-in coil.
- 1—5-prong socket.
- 1—6-prong socket.
- 1—37 tube.
- 1—6F7 tube.

- 1—screen-grid clip
  - One dial.
  - Three knobs.
  - One metal chassis.
  - One twin earphone jack.
  - One roll hook-up wire.
  - One Hammarlund tube shield, type TS-50.
  - One set of 5 Hammarlund plug-in coils. (Covering band from 17 to 560 meters.)
  - One special Find-All plug-in coil, covering 80 to 600 meters.
- The last mentioned coil is of course optional; other 4-pin plug-in coils may be used. The number of turns, etc., will be found on page 435.

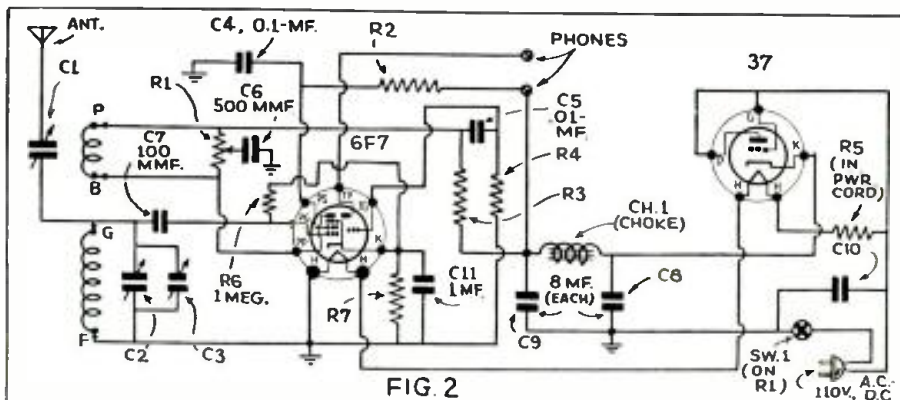


FIG. 2

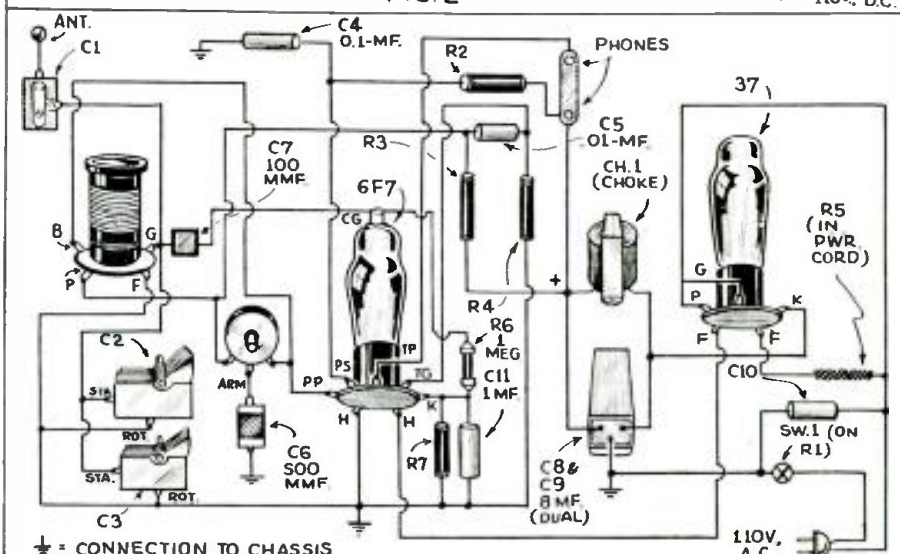


FIG. 1

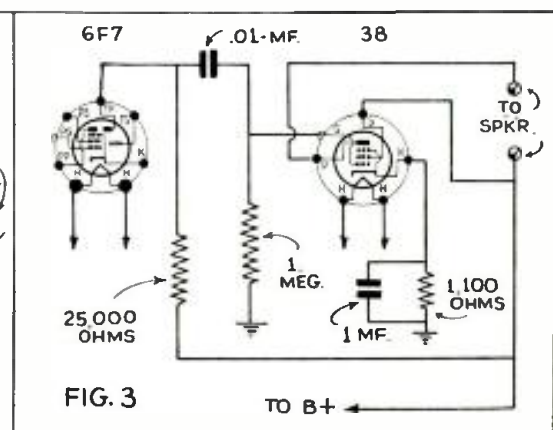
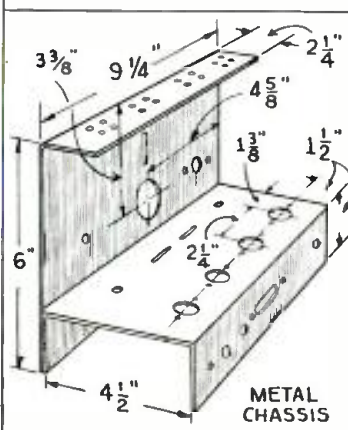
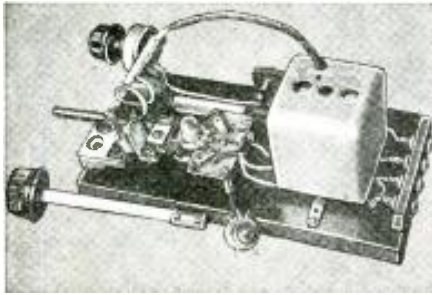


FIG. 3

Complete wiring diagrams of the Cisin 2=3 Tube Receiver.

# WORLD-WIDE SHORT-



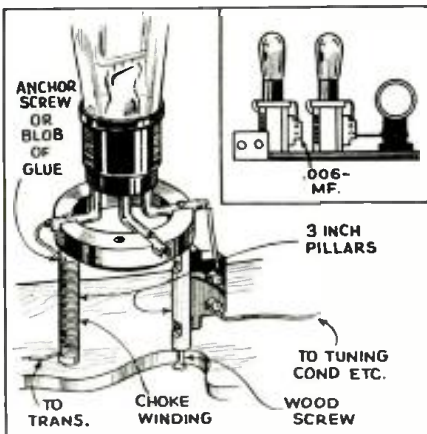
Transmitter Using Acorn Tube

### Austrian 1/2-Meter Transmitter

● THE latest issue of *Radio Welt*, published in Vienna, contained the picture of a 1/2-meter transmitter using the new "Acorn" tube made in the U.S. This transmitter, coupled to a suitable dipole or Lecher wire system makes a very practical unit for sending out these micro waves. While the circuit for this unit was not given in the article, the application of this American tube, in Europe, is of technical interest.

### Raising Up That Tube Socket

● RADIO set builders in England have made it a practice to elevate the detector tube above the chassis or baseboard in order to reduce capacity effects between the grid and plate leads and the metal parts of the set. This might be an interesting plan for fans in this country to try. The particular kink in question is to combine the supporting posts for the socket with R.F. chokes, condenser mountings, etc.; as shown in the illustration here. A wooden or bakelite rod is used to support the socket, and on this rod, the choke coil is wound. On the other post, a grid-leak and condenser may be mounted, so that the lead to the tuning coil is kept as short as possible. Either wood screws or machine screws may be used for mounting the rods on the baseboard, depending on whether wood or bakelite support rods are used.

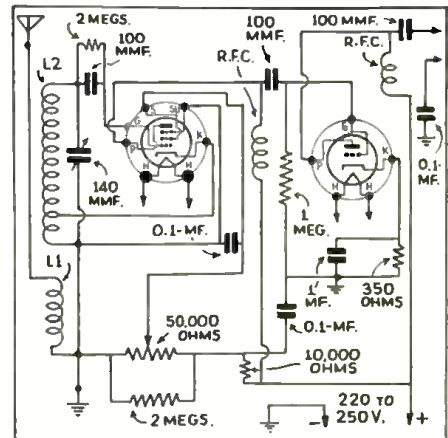


Novel Tube Socket

### Hum in S.W. Sets

● MANY enthusiastic S.W. "fans" refuse to use power-operated sets for short-wave reception because of the difficulty in eradicating hum. This is an expensive

● 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 firsthand. 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.

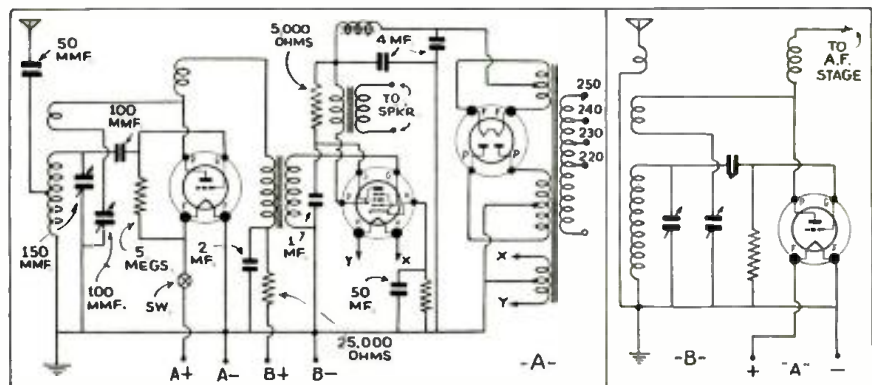


Short Wave Adapter

idea, though, especially if a loudspeaker is to be operated from the set, due to the heavy drain imposed on batteries by a power tube. An article in *Practical and Amateur Wireless* recently, showed a circuit which permits silent operation yet uses the economy of power-operated sets. In this scheme, the detector tube is completely battery operated, since this is usually the

As we have pointed out before, these units are used more extensively in foreign countries than in the U.S. especially since the advent of the all-wave type set. This time, we have a converter which appeared in *Radio Technica*, a magazine published in Buenos Aires. The circuit shows that a pentode, such as a 57 is used

idea, though, especially if a loudspeaker is to be operated from the set, due to the heavy drain imposed on batteries by a power tube. An article in *Practical and Amateur Wireless* recently, showed a circuit which permits silent operation yet uses the economy of power-operated sets. In this scheme, the detector tube is completely battery operated, since this is usually the



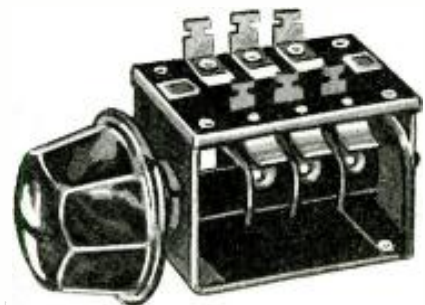
Reducing Hum in S-W Sets

point at which hum originates. Since the battery drain of a detector is naturally very low, the battery problem is not a serious one. The amplifier tubes, which draw the heavy loads from the power supply are operated from the A.C. lines. By proper filtering and layout of parts, the hum originating in any of the amplifiers can be eliminated. A sample circuit is illustrated, here. Of course, this is simply to illustrate the method used. Any circuit can be adapted to employ the same idea. In the same article, another hint was given, which may be of use to American S.W. experimenters. It consists of placing the regeneration coil in "regenerative detector" sets between the grid coil and the aerial inductance. This reduces the damping effect of the aerial on the tuning coil and reduces the losses as well as causing the aerial to have much less effect upon the tuning of the grid circuit, reducing dead spots and the effect of "wobble" due to the aerial swinging. The positions of the coils are shown in the circuit.

as converter tube of the autodyne type, feeding to a triode stage which is aperiodic and serves to couple the mixer to the broadcast receiver. The values of the parts are indicated on the circuit, for the benefit of anyone interested. Since the autodyne principle is used, only one tuning condenser is used, which is detuned from the frequency of the incoming wave by the value of the I.F. (the frequency of the broadcast set).

### A South American S.W. Converter

● IN recent months, we have reprinted on this page the circuits of short-wave converters from many foreign countries.



New Three-Point Switch

### Three-Position Switch

● A NEW type of multi-pole switch has



# WAVE REVIEW.

Edited by  
**C. W. PALMER**

just made its appearance on the English market, according to *Popular Wireless*.

This switch is available with any desired number of switching circuits, and any spacing between circuits. It is expected that this switch will find many applications in short-wave receiver designs.

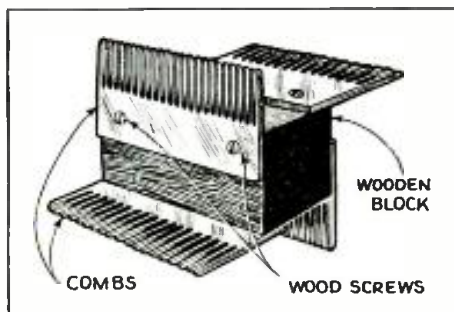
In addition to the features mentioned above, the switch is obtainable in both the *shorting* and *open-circuit* types. In the former, the circuits not in use are automatically connected to the common terminal, and in the second, they are left open. Thus the constructor has his choice of either shorting out unused coils or leaving them open, according to the circuit he is following.

### An Australian Short-Waver

● THE Australian weekly radio magazine *Wireless Weekly* is becoming quite famous for the circuits it publishes. Some very unique arrangements have been presented in recent issues, and we have reprinted several of them on this page.

The latest venture is a T.R.F. set for the short-wave bands, including a stage of tuned radio frequency amplification, a regenerative detector having the regeneration in the suppressor grid circuit of a 6C6 tube, and two stages of A.F. amplification.

The circuit is shown here for the interest of those experimenters who might want to try it. The method of obtaining regeneration in the detector circuit is ex-



Coil Form from Combs

### A Coil Form from Combs

● AN interesting kink appeared recently in *Practical and Amateur Wireless* magazine. This consisted of a short-wave coil form made of four small combs screwed one on each side of a 1 inch block of wood.

A rigid coil of thick wire may be easily wound between the slots with any desired spacing. If each turn is pushed down as far as it will go into the slot, the whole assembly is extremely rigid.

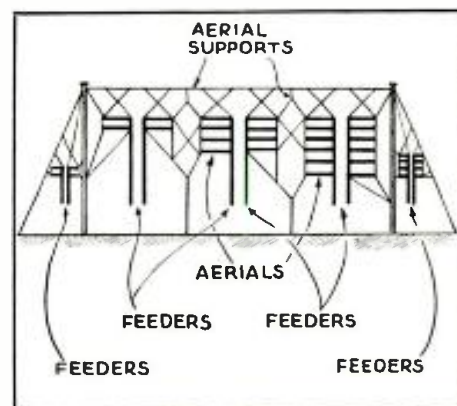
The finished coils can be provided with plug-in sockets or pins, or a switch can be used to change from one coil to another.

If regeneration is desired, the tickler coil may be wound at one end of the spaced winding, by breaking one or more

masts, which are 500 ft. high; some between two new self-supporting masts, 350 ft. high, which are shaped like the Eiffel Tower, and weigh 100 tons each. The masts are insulated from the ground.

New inventions are continually being tried out by the B.B.C. at Daventry. One is a new feeder system for connecting the transmitters to the aerials. The idea is that, instead of using exposed wire supported on poles some 10 ft. high for this purpose, as heretofore, the feeder consists of a copper tube 3/4-inch in diameter, enclosed inside a 4-inch copper pipe. (This is the concentric transmission line which has received so much publicity in this country (U.S.)—Editor.)

Another surprising thing is that the "Empire" transmitters are now arranged so that they deliberately boost up the high audio frequencies. This is because the average short-wave listener uses his set with the regeneration turned all the way up, so cutting side-bands. The accentuation of the high frequencies by the B.B.C. stations makes for better intelligibility.



New English Antennas

### A Small Coil Assembly

● IN the latest issue of *L'Industrie Francaise Radio-Electrique*, a French radio magazine published for the radio trade, an unusually small all-wave coil assembly was shown.

By a unique combination of iron-core and air-core coils, tuning over the entire short-wave and broadcast spectrum is provided in a space little more than twice the size of a small match box. For the broadcast band, the coils have iron cores, which may be moved in and out to provide trimming of the different circuits, such as aerial, oscillator, etc.

For the short-waves, coils wound on the same forms as the broadcast coils, but minus the iron cores, permit entire coverage from 10 to 200 meters.

The use of powdered iron cores for coils is becoming increasingly popular in Europe. It is claimed that these coils provide higher "Q" values than equivalent air-core coils on frequencies as high as 2,000 kc. They are especially valuable for I.F. coils of superheterodynes, where unusually high gain is possible.

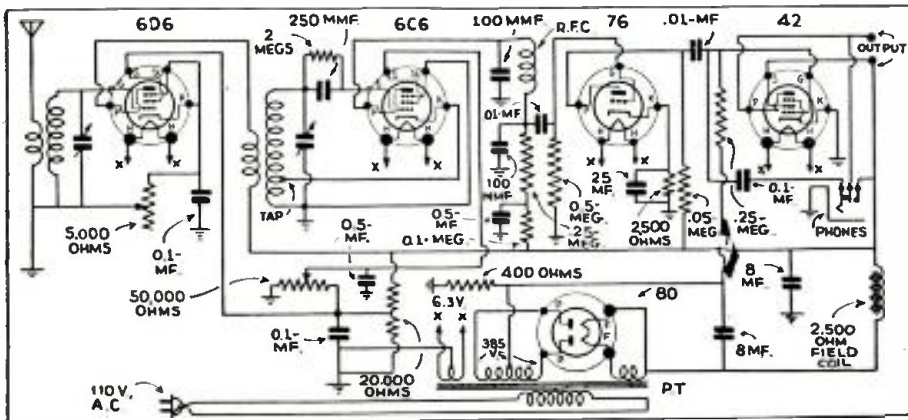


Diagram of Australian S-W Receiver

ceptionally interesting and will probably be one of attraction to experimenters who like to try "different" circuits.

The electron-coupling used in this circuit results in a minimum effect on frequency, it is smooth and silent and provides greater gain than many other forms of regeneration.

Another interesting feature in this set is the phone jack which turns off the pentode output tube when the phones are plugged in.

teeth out of the comb at one end thus providing a wide enough slot for the "jumble-wound" (helter-skelter or without regularity of winding) tickler.

These coil forms can be made by any short-wave experimenter, as they are unusually simple to assemble.

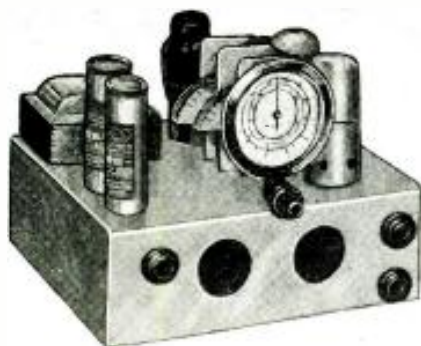
### Some Interesting Facts About Daventry

● IN a recent issue of *Popular Wireless* magazine, an interesting discussion of the changes that have been taking place at Daventry were presented by a member of the staff who made a special visit to this "broadcasting center" just for the purpose. A few of the outstanding facts are reprinted here for the benefit of short-wave listeners.

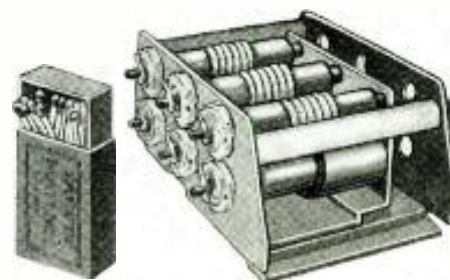
The aerial systems are completely transformed. All the original "beam" aerials, with their reflectors have been scrapped.

The aerials at present favored for the regular programs are all horizontal aerials of the dipole type, varying in length from double-wave to 1/2 and 1/4 wave. They are slung up in stacks, sometimes four or six, as shown in the diagram.

Five complete aerials only are shown. Altogether there are 20 such aerials! Some of these are slung between the old "5XX"



Australian S-W Receiver



French Coil Assembly



# SHORT WAVES and

## W9CEO's Crack "Ham" Station

Awarded prize of one year's subscription to Short Wave Craft



A crackerjack amateur short-wave station owned and operated by A. E. French, W9CEO at Downs, Ill.

Editor, Short Wave Craft:

I have been looking at the photos in *Short Wave Craft* for some time. I have just obtained a new outfit and some pictures of my station, am sending you a couple of the photos both front and rear views.

The accompanying photographs show my station, W9CEO, at Downs, Ill. The first operation was carried on with a pair of 10's in push-pull, which dates back to 1929, and was used on C.W. until Apr. 19 of this year.

The new transmitter shown is used both on phone and C.W.; it consists of a 59 tri-tet oscillator, 802 buffer, 203-A final stage, with 200 watts input to final stage.

The speech input equipment consists of two 56's to excite the grids of a pair of 45's; the latter to drive a pair of 801's in Class B. A double-button microphone is used for phone work.

The rack is made from angle iron which is chrome-plated. The front panel is made from masonite pressed wood, on which is mounted the meters, switches, and controls. The antenna matching network is mounted on top shelf, which tunes up very nicely on all bands when connected to a 132-ft. Zepp antenna.

Each shelf is made with binding post so each unit can be easily removed. The wiring is all cabled and laced.

The transmitter works on all bands, and all coils are the plug-in type.

The receiver used is a National FBX-A. W9CEO has been a reader of *Short Wave Craft* since its first publication. Always glad to get the next number. Also hold an ORS appointment.

A. E. French, W9CEO,  
Downs, Ill.

(We are very glad you sent us these excellent pictures of your station, W9CEO, and we also are pleased to award you this month's prize of a subscription to *Short Wave Craft*. This is what we would call a "first-class" station.—Editor)

## All the Way from France!

Editor, Short Wave Craft:

Here is a photo of my amateur phone and CW station, F8LO, with which I won the R.E.F. Cup Contest in 1934. The room which contains the station is only 5 feet by 5 feet! The transmitter seen on the left is a home-made affair and consists of a 42 Tri-Tet Oscillator and doubler, and a push-pull final amplifier of two TCO4/10 which is plate modulated by four 46's in a double push-pull, class B. The speech

amplifier consists of a 56 for the first stage and a 42 in the second.

The antenna is a 20-meter Zepp with Collins matching circuit. The high tension is all D.C. (110-220 volts D.C. and batteries). On the right is the home-made single-signal superhet, with which I won the first prize of the R.E.F. receiver contest in 1933.

In the center is the 5-meter transmitter with resonant lines; the antenna used with this is a Zepp, with impedance matching.

For 5-meter reception I use a transceiver, not seen in the photo. Now I intend to put this transceiver on my motorcar, with antenna and concentric lead-ers as described on page 178 of *Short Wave Craft*, July issue.

René Jourdan, F8LO,  
17 Rue Hoche,  
Cannes (Alpes-Marit.)  
France.



We are glad to see a photo of this interesting "ham" station in France, which is owned by René Jourdan, F8LO.

(We salute you, René, and we are very happy indeed to present the photo of your station in France to our readers. We hope to hear from many other readers in foreign countries, together with photos of their stations.—Editor)

## LIKES OUR "RADIO AMATEUR COURSE"

Editor, Short Wave Craft:

I noticed in your September issue of *Short Wave Craft* that you are beginning a *Radio Amateur Course*. I must say this is certainly a wonderful idea, especially for me, as I am taking a "radio course" from the Radio College of Canada, Toronto, Ont., and I am just nicely into the A.C. part of one section.

The diagrams and explanations are certainly well written up; there is absolutely no excuse for anyone not being able to understand them. I hope you keep up the "good work" because I know, personally, I will benefit a great deal by your course.

I want to wish you every success in your wonderful work and you certainly do fine work when you produce a magazine like *Short Wave Craft*. It surely is money well spent.

If it had not been for this magazine which I started to take three years ago, I would have still been on the "outside" of short wave radio, but—thanks to *Short Wave Craft*—I became so interested. I built two sets, one being the "2-Tube Doerle," that I decided to take a *Radio*

(Continued on page 434)



## LONG WAVES . . .

OUR  
READERS' FORUM

## A Cracker-jack S-W "Listening Post"



G. Len De Cou of Bartlesville, Okla., has a very efficient-looking outfit, and several receivers are used at his station, including the 16-tube Midwest all-wave job.

I am enclosing a couple of pictures of my "outfit." I have a 16-tube Midwest—an All-Star, Jr., and a battery set for ham band reception. On the Midwest and All-Star, Jr. I have an RCA Double Doublet Antenna, connected to a booster, which you see on left end of shelf over table. Next to it a coil and condenser tuner for Zepp antenna for my battery set. The All-

Star, Jr., is hooked up to the right-De Coster Speaker at the right-hand end of the shelf and the horn-speaker for my battery set. All three sets are equipped with headphone jacks.

Most foreign stations come in like locals. Was all set for the "stratosphere" experiment, one set tuned on balloon transmitter, 13.05 meg. and the other set on the

ground Xmtr. at 6.25 meg. But you know the outcome of that.

G. Len De Cou,  
1205 So. Keeler Ave.,  
Bartlesville, Okla.

(You certainly have a "corking" short-wave listening station "G. L.", and with the excellent short-wave receivers you have, you should hear the "whole world."—Editor)

HE STARTED WITH THE 2-TUBE  
DOERLE!

Editor, *Short Wave Craft*:

I don't see many letters from the young short-wave fans in the "Short Waves and Long Raves" column, so I decided to write and tell you some of the results I have obtained with my receivers.

I first became interested in short waves in the fall of 1933. I acquired my first receiver, a Doerle 2-tuber in March '34 and got excellent results. With the Doerle I was able to tune in most of the powerful European and South American broadcasters.

This receiver was used for the rest of the year, and in January, 1935, I became the proud possessor of a Harrison Fultone-Five set. This set is now being used regularly for DX-ing in my radio den. It uses the following tubes: one 6F7 as R.F. stage and regenerative detector; one 76 as first audio stage; one 12A7 as pentode output tube and rectifier. I use head phones most of the time, although during the winter this set worked a magnetic speaker on several 49-meter "foreigners." A 50-foot, straight wire antenna is at present being used. With the aid of the antenna data given in a recent *Short Wave Craft*, I plan to erect a more elaborate system. Using this set, I logged VK3LR in Melbourne, Australia, and the following stations (U.S. excluded): most of London's GS-stations, most DJ-stations, EAQ, 2RO, CT1AA, PCJ, PIII, HBP, HBI, HVJ, FYA, RKI, COC, COH, most South Americans, and amateurs and police, far too numerous to mention.

On April 2, '35, I received the greatest thrill ever afforded me from the short waves. From 9:15 to 10:00 p.m., E.S.T., I heard SUV of Cairo, Egypt, on 10.055 kilocycles, working GCP, Rugby, England. The whole transmission came through R7-8 on head phones, and I have already sent for a verification. I now have "veris" from W1XAL, W3XAL, W8XAL, W8XK, W9XF, and HP5B, Panama City.

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

Closing date for each contest—75 days preceding date of issue: Oct. 15 for Jan. 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've been reading your magazine since the February, 1934, issue and haven't missed a single copy. I am now a regular subscriber and think that your "mag" is "FB" for the short-wave fan. Hope to see more S-W "fiction" in the near future.

James R. Maloney,  
610 Grand St.,  
Mechanicville, N.Y.

DUO-AMPLIDYNE SUITS HIM  
FIRST-RATE!

Editor, *Short Wave Craft*:

I have built the "Duo-Amplidyne" described in the June, 1934 issue. It is the first radio I ever built that really operated! I received DJP, EAQ and GSE the second night. They came in with surprising volume and quality.

Clayton Alway,  
Scottville, Mich.

(A very interesting letter, even if it is a short one, Clayton, and your experience with the "Duo-Amplidyne" shows that the popularity which this receiver has created is quite genuine indeed. Undoubtedly you will obtain even more surprising results as you become more familiar with the operation of the "Duo-Amplidyne" receiver. We highly recommend it to beginners.—Editor)

● THE photo at the right shows the very interesting short-wave transmitting and receiving station operated by Captain B. Leidl, whose address is Praha-Brevnov Hostalkova 21, Prague Czechoslovakia.

He writes the editor that *Short Wave Craft* has many friends in his country. The call letters of Captain Leidl's station are OKILL, and some of our ham friends may like to give him a call. The Captain has phone as well as C. W. transmitting equipment.

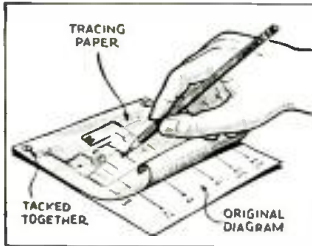
## Capt. Leidl of Prague has fine station



**First Prize \$5.00  
SIMPLIFYING RADIO  
CONSTRUCTION**

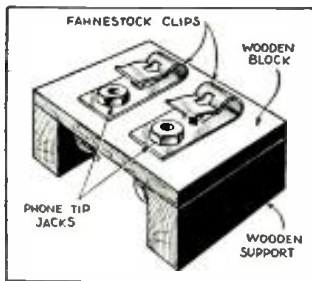
I wish to offer the following short-wave kink which has proved to be of great value to me and is, as far as I know, an original idea.

Take a piece of ordinary tracing paper and lay it over the diagram or blue-print from which you are hooking up a receiver. As each connection is made, mark it with a pencil on the tracing paper. When the diagram on the tracing paper corresponds with the original, you know the set is correctly wired. This eliminates a lot of hunting for "lost" or "forgotten" leads and is invaluable in wiring complicated "supers" where a short connection may be accidentally overlooked.—John C. Sherard.



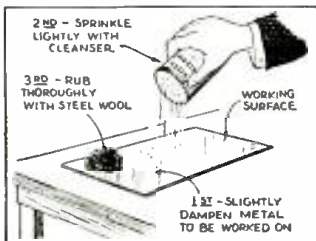
**CONNECTION BLOCK FOR  
EXPERIMENTERS**

I have found this kink very useful in connecting head-phones or speakers to experimental sets. When wiring up "bread-board" sets, one does not always have the phone tin jacks or clips ready to use. The kink described will do away with this worry. Holes large enough for the tin jacks are drilled in the Fahnestock clips. The clips are then fastened to a small wooden platform by the jacks.—Samuel Peters.



**FINISHING PANELS  
AT HOME**

Many set-builders refrain from using low-cost galvanized iron for chassis or panels because of its finish, but by following these instructions, they may produce a beautiful satin finish on it. Lay the piece to be worked on, on a flat surface and pour a little water on it. Next, sprinkle a little Dutch cleanser or kitchen cleanser on it, and then rub it with steel wool, in a circular motion. In about five minutes a very silvery finish will be obtained, equal to that of aluminum. It may be given a high luster if polished with silver polish. The sketch is enclosed on another sheet. I hope this kink will be acceptable.—Lloyd Canty, Jr.



**LARGE REAMER FOR  
WORKING CHASSIS**

I have found this idea of cutting holes in metal chassis and panels to be better, quicker and easier than any other tool I know of. I simply use an ordinary plumbers' pipe reamer that has a taper of 1/2 inch to 2 1/2 or 3 inches.

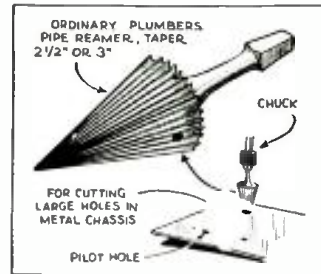
This tool is one that will drill any size hole, while an ordinary one has only one

**\$5.00 FOR BEST  
SHORT-WAVE KINK**

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

size, it is also a tool that won't wear out quickly and it will fit an ordinary brace. It is easy to use and drill neat holes for tube sockets or anything else. I don't believe a sketch would be necessary as every one knows what a pipe reamer or counter-sink is; you have my permission to express my idea in any sketch for the magazine. I am a reader of Short Wave Craft and find it my favorite radio magazine.—Leonard J. Ohmes.

(An illustration is given.—Editor)

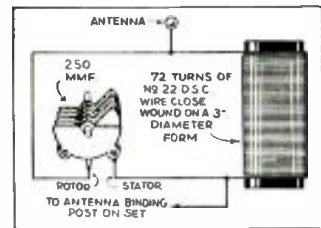


**WAVE-TRAP ELIMINATES  
INTERFERENCE**

I submit the following kink for entrance in your monthly contest. I have found it quite useful in S.W. work.

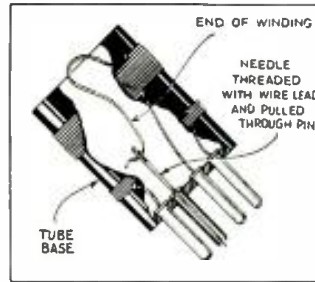
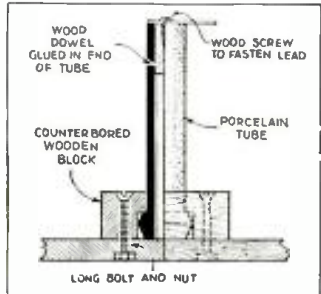
This is a wave-trap to overcome interference from a near-by station. The trap consists of a parallel-connected coil and condenser inserted in the antenna lead of the set. The coils consist of 72 turns of No. 22 D.S.C. wire on a 3-inch diameter form. The condenser should be of .00025 mf. capacity. Simply tune the set to the best setting for the desired station.

It may prove necessary to shield the wave-trap if the undesirable station is very close.—F. J. Spatz, Jr.



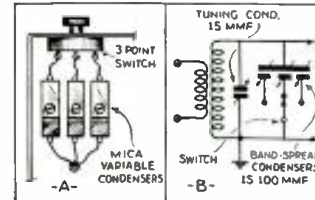
**PORCELAIN TUBE  
STAND-OFF INSULATOR**

Inexpensive stand-off insulators can be made from ordinary porcelain lead-in tubes. A length of dowel is glued in one end of the tube and any form of clamp or soldering lug is fastened to this with a screw. The large end of the insulator is clamped to its support by a small counter-sink block of wood and two long bolts or screws. To avoid splitting the tubes, a hole should be drilled in the end before driving the screw.—Lesley Towle.



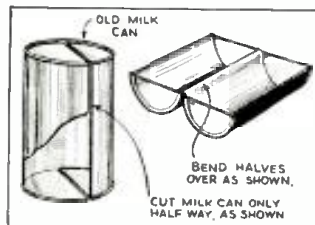
**COIL-WINDING KINK**

Here is a simple little kink used when winding plug-in coils with fine wire. After the coil was wound I found it difficult to lead the thin wire through the coil prongs. To overcome this difficulty, I took a thin sewing needle and threaded the end of the coil wire on it, then by pushing the needle through the prong I could draw the wire after it. The wire was then pulled tight and soldered. If tube bases are used for coil forms, the solder must first be cleaned from the prongs so that the needle will slip through easily.—Hurley Kauffman.



**SIMPLIFIED BAND-  
SPREAD**

Today no receiver is really complete without some arrangement for "band-spreading." This system is not merely a substitute, but one that I use in preference to the conventional "large condenser" method of band-spreading. Not only is it possible to construct the receiver on a much smaller base, but by using this method, one can have a truly "calibrated" receiver. It is no longer necessary to tune critically for a reference station, for by simply flipping the switch to one of the three positions, one can find the desired station at exactly the same position on the dial every time.—Walter J. Kowalchik.

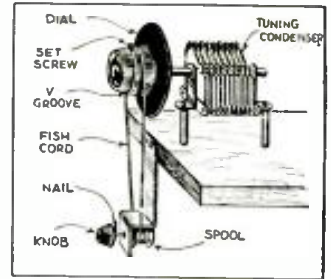


**HANDY TRAY FROM OLD  
TIN CAN**

After looking all over the place for containers for nuts, bolts, resistors, etc., I hit upon this idea. Take an old milk can, large size, cut through as shown in the dotted line, then bend over. This makes a two-compartment container. Several of these cans may be laid side by side, making very handy trays.—F. W. O'Brien.

**HOME-MADE VERNIER**

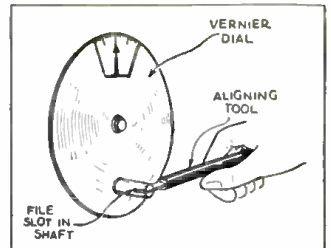
Sometimes ago when in the need of a vernier dial, I hit upon the following idea, which is clearly shown in the drawing. The



only necessary parts are an old dial, some string or fish cord, a spool, and a short length of metal strip. The knob of the regular dial should be ground for the fish cord. The metal is formed as shown in the drawing and fastened below the mounting board on which the condenser is fastened. Another advantage of this system is the total absence of "body-capacity" effects, because the hand is so far removed from the condenser.—Claude E. Longstreth.

**ALIGNING TOOL FOR  
FINE TUNING**

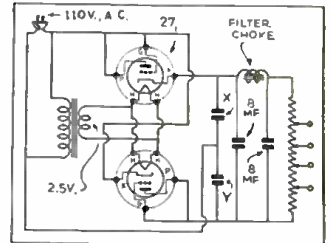
Here's a kink I find very satisfactory for eliminating "body-capacity" where an insulated shaft coupling is not available. Remove the knob from the front of a vernier dial and file a slot in the shaft to fit the end of a trimmer condenser tool. This being insulated, gives very good results in eliminating "hand" capacities. It is especially



adjustable to ultra-short wave receivers, where hand capacities are annoying.—I. R. Blundin.

**VOLTAGE-DOUBLING  
POWER SUPPLY**

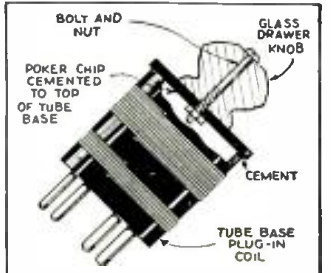
Here is a simple method of obtaining a high voltage "B" supply without the use of a power transformer. A couple of 27's are made to double the voltage and rectify it at the same time. The output voltage depends on the value of the condensers X



and Y, which should be from 1 to 8 mf. Although this kink is not original, I do not recall having seen it in Short Wave Craft.—Jerome Farmer.

**COIL HANDLE**

My plug-in coils are fixed as shown in above drawing. Then use sandpaper to roughen the top edge of the coil; next cement a poker chip with glass knob fastened through hole in top to the coil. This is very handy when changing coils, and does not injure the coil windings.—Charles F. Deane.

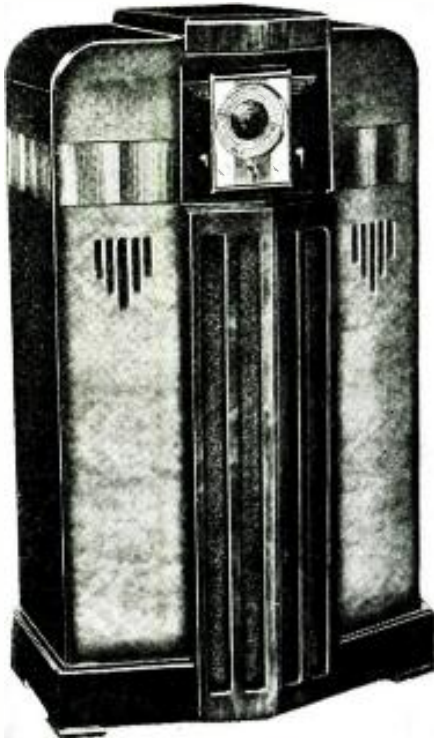




# WHAT'S NEW

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

## In Short-Wave Apparatus



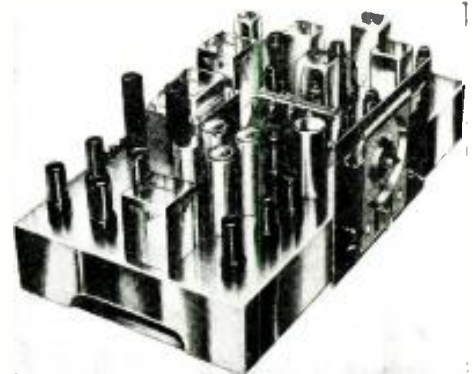
Front view of 18-tube Midwest "6-band" short-broadcast and long-wave receiver.

### New 18-TUBE Receiver Has Unique Dial and Controls

vanced engineering displayed in the radio itself. The engineers have not been satisfied to incorporate only the controls required to operate the radio in the ordinary way. They have insisted that any control which would add to the ease and accuracy in operating this new model must be adopted as standard equipment. The makers have discarded old-fashioned round control knobs in favor of streamlined chromium-plated levers, which not only add to the distinctive beauty but make it easier to handle. At a glance you can tell in what working position they are set. Every control used in the operation of this receiver is on the front panel where they are readily accessible. All adjustments are made with the seven controls on the front panel.

The Line-O-Lite is a thin pencil of light which points out with great accuracy the frequency the set is tuned to. There is no "parallax" in this system of pointers of the clock-hand type. Obviously, this is a fine improvement. Imagine the amount of effort required in keeping your station log accurately if you must always remember to look at the dial from the same position! No matter from what position you look at the dial, the line-o-lite will always read the same true frequency.

The Tun-A-Lite is a very sensitive light which is bright on either side of a station but which dims when a station is tuned in. It is dimmest when the receiver is tuned to exactly the frequency of the tuned sta-

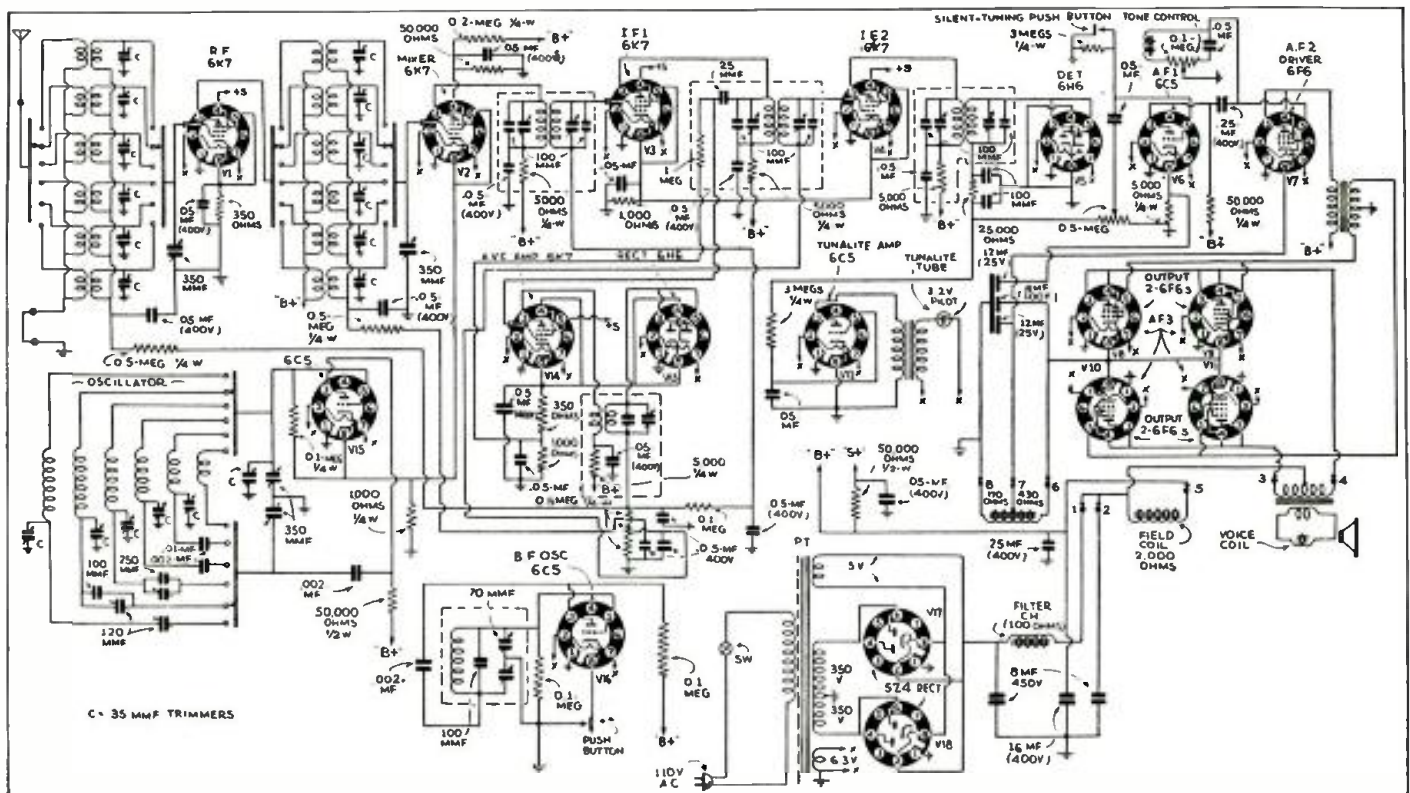


Appearance of chassis with 18 metal tubes. Range 4.5 to 2400 meters.

tion. The tun-a-lite is superior to meter and shadow tuning in three respects: The Tun-A-Lite is centered on the Line-O-Lite frequency indicator and it moves automatically to which ever band you desire to use. Thus at all times, it is at the exact spot on the dial to which the radio is tuned.

Tun-a-lite tuning is very accurate tuning because it takes advantage of the scientifically determined fact that the human eye is very sensitive to even very small changes in light intensity. The tun-a-lite (Continued on page 429)

● THE new 1936 Midwest panel is strikingly different from anything else on the market. Its modern, up-to-the-minute appearance is in harmony with the ad-



Wiring diagram of 18 tube latest model CC triple wave receiver. It tunes in short, broadcast and long waves up to 2400 meters! (No. 321.)

# New Band-Spread Communications Receiver Has Metal Tubes

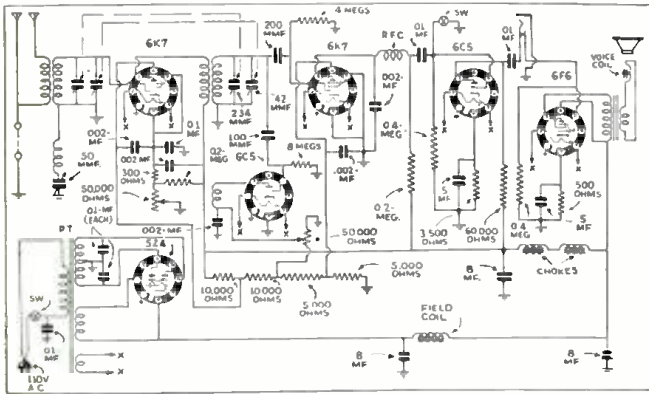
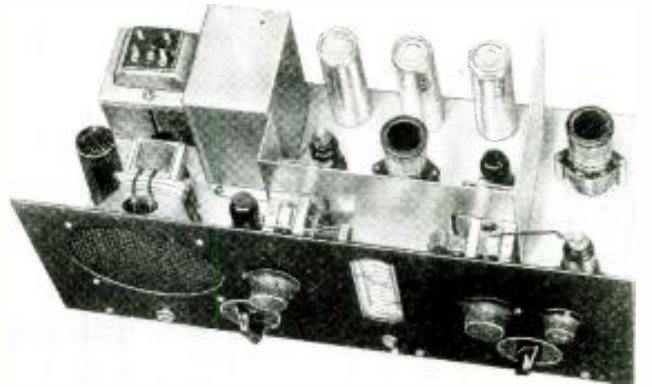
● THE new possibilities opened by the all-metal tubes are utilized in the New Royal model "Pro-Six." By the use of all-metal tubes a new high in shielding is reached. Every tube down to the rectifier has a metal shell which is bonded to the chassis. The metal tubes have a higher gain and are much more uniform in their characteristics. The consequent gain from these and other advantages has resulted in this new, more efficient communications receiver.

Here at last is a set with continuous band-spread all the way from 9<sup>3</sup>/<sub>4</sub> up to 625 meters. This is accomplished by the use of one large two-gang condenser for tuning the detector and R.F. stages, and another small two-gang condenser in parallel. Each one is brought to a separate parallel reading control.

Through the use of high-gain *interleaved* winding inductances, a very high signal-to-noise ratio is attained. The antenna winding has been left *ungrounded* so that either a doublet or a single-wire antenna may be used. An examination of the diagram will reveal that regeneration is not obtained in the usual way. The oscillator winding of the detector inductor is not in any portion



The photos show the very "Prof" appearance of the new Harrison short-wave receiver—the Royal model "Pro-Six." This set has full coverage and a range of 9<sup>3</sup>/<sub>4</sub> to 625 meters—with band-spread!



A study of the hook-up of the new Harrison Royal "Pro-6" proves that here is a set which will appeal to ham and fan alike. (No. 322.)

of the detector circuit. Instead the detector tube is built with the best operating voltages fixed and permanently applied to the plate and screen, and a separate oscillator tube is used to obtain regenerative feedback. The result is amazing! There is no detuning effect with the regeneration control, regeneration is smooth and constant over the entire tuning range of the receiver, and the detector, being adjusted to operate at maximum efficiency as a detector and a detector alone, provides the set with an additional sensitivity and gain not otherwise obtainable.

### The Circuit

The input signal is fed from the antenna to the tuned R.F. stage through a coil with an average gain of 1 to 20. The signal to the detector is controlled by the gain or sensitivity control in the cathode circuit of this tube. Next (Continued on page 428)



Above—A very interesting and useful 2-stage A.F. amplifier, complete with speaker and power supply. (No. 323.)

## 2-Stage A.F. Amplifier With Speaker and Power Supply

By Guy Stokely, EE\*

● THERE are thousands of short-wave fans who are the proud possessors of a simple one- or two-tube short-wave receiver. Many of them are desirous of obtaining more volume on headphones or full loudspeaker strength on foreign as well as domestic short-wave stations, yet hesitate to go to the expense of discarding their present low-

cost receiver for a larger and expensive model.

cost receiver for a larger and expensive model. The type AM3 amplifier has been designed to aid this type of short-wave fan. When used with any one-, two-, or three-tube short-wave receiver it is possible to obtain enormous volume on the great majority of DX stations which are audible on the small unaided receiver. A volume control is incorporated in the unit, permitting the signal strength to be varied from a whisper to a roar. A complete built-in power supply and high quality dynamic speaker make the unit completely self-contained. Two stages of resistance-coupled amplification, the latter being of the power pentode type, give considerable gain.

Inspection of the electrical circuit diagram reveals the use of a type 76 as first audio frequency stage. The outer terminals of the potentiometer R1 connect to the output posts of any small S-W receiver. Signal input to the grid of the 76 stage is varied by this potentiometer.

The grid of this tube is isolated from the positive voltage appearing across the output terminals of most receivers, by means of the coupling condenser C1, whose capacity is approximately 0.01 to 0.10 mf. The second condenser (C2 (0.01 mf.)) completes the audio input circuit to the amplifier. A grid leak of 250,000

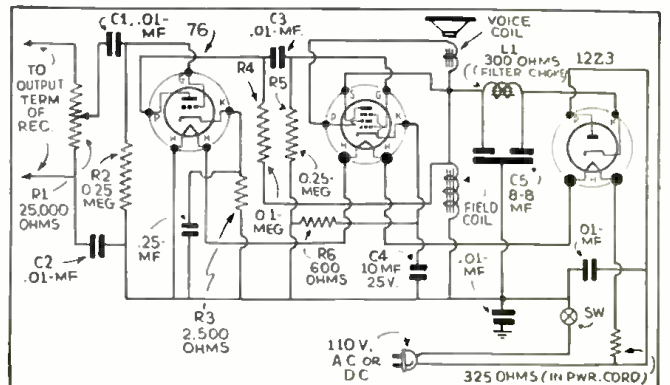
ohms used in conjunction with a biasing resistor R3 of 2500 ohms, furnishes the negative bias for this stage.

The output of the first stage is resistance-capacity coupled into the grid of the type 43 power pentode amplifier. Values of 100,000 ohms, 0.01 mf. and 250,000 ohms are suitable for the values of R4, C3, and R5.

Bias for the power stage is obtained from the resistor R6 having a value of 600 ohms. This biasing resistor is by-passed by condenser C4.

The output of the 43 works directly into the dynamic speaker mounted on the chassis of the unit. Plate voltage is furnished by the half-wave rectifier using a type 12Z3 tube. The A.C. hum is removed by the filter choke L1 (300 ohms) and the dual section electrolytic condenser C5 having a capacity of approximately 10 mf. per section.

The filaments of the three tubes are connected in series and by means of the series resistor R7, are operated directly from the 110 volt A.C. or D.C. house-lighting circuit. (Continued on page 428)



Wiring diagram of the newest Eilen product—2-stage A.F. amplifier with power supply and speaker.

\*Eilen Radio Laboratories.



# New SILVER Receiver for "Hams" or "Fans"

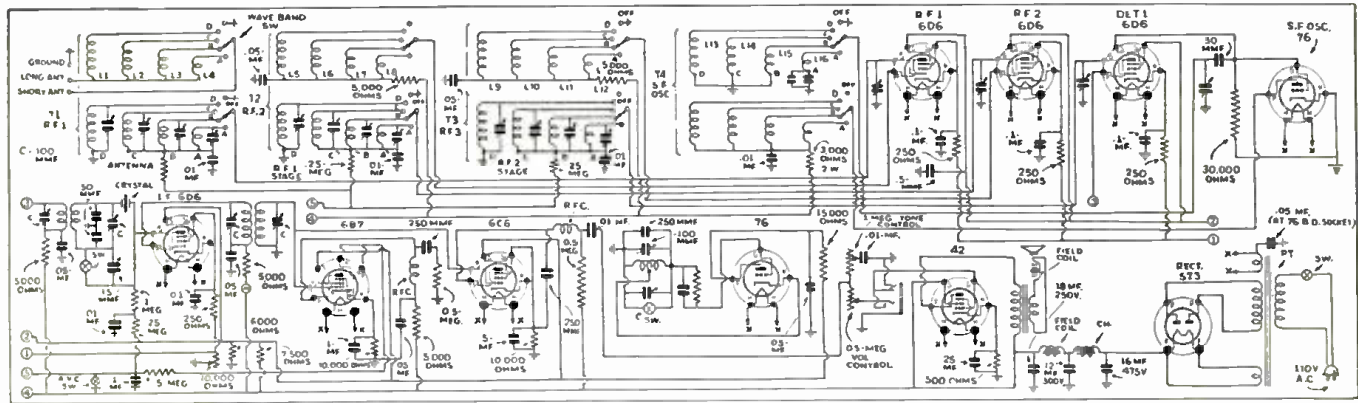
By McMurdo Silver

● OF all the receivers available to the serious amateur or short-wave B. C. L., (broadcast listener) superheterodynes predominate today due to their high selectivity, especially with crystal filter, and their ease and dependability of operation. They are, however, mostly all alike in that they use but one R.F. stage if any, and the usual and typical crystal filters in a conventional one or two stage I.F. amplifier. The past year has taught that more can be, and is, desired, as evidenced by the increasing appreciation of the image selectivity and noise elimination benefits of not one, but of two R.F. stages, of a quiet low gain I.F. amplifier and stable air-tuned and temperature-isolated circuits throughout.

The receiver illustrated herewith satisfies these latter day requirements and is described in this article—an amateur, not a "revamped" broadcast receiver, designed by amateurs for amateurs and to fit amateur pocketbooks, and usually to fit an amateur junk box assortment of standard (Continued on page 444)



The "ship-shape" commercial appearance of this ultra modern 10 tube, 1200 to 33,000 kc. super-het, plus every new feature, makes it ideal for amateur or short-wave "DXer." (No. 319)

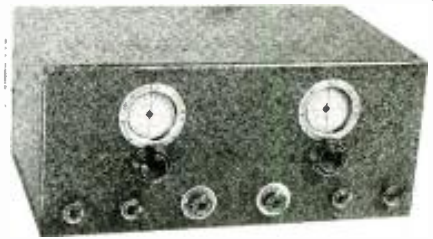


Wiring diagram for the new "Silver" super-het for short and broadcast waves.

# A Dandy 9-Tube All-Around Receiver With Pre-Selection

● THIS is a receiver that has been designed to satisfy the discriminating demands of experienced amateurs and short-wave listeners. The circuit is the regular super-het type, with a stage of pre-selection, separate detector and oscillator tubes, two stages of intermediate frequency amplification on 525 K.C., second detector, beat oscillator, and pentode audio output. The regular Sargent mechanical band-spread system, as described on page 278 of *Short Wave Craft*, September 1935, is used, the band spread dial being calibrated in megacycles for direct reading on amateur bands.

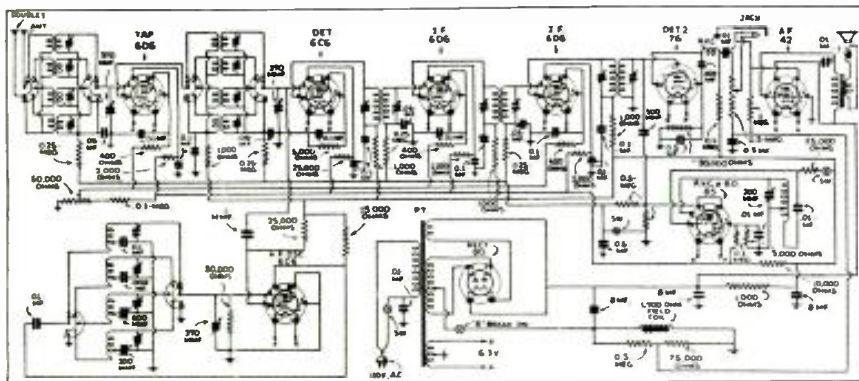
The volume control system is of unusual interest. The new Model 20 Sargent has both manual volume control and A. V. C. with a switch to cut from one to the other so that the operator may use either. However, with the switch on A.V.C., the manual volume control becomes a sensitivity control, and may be adjusted for the amount of amplification best suited to the location. Contrary to usual procedure, the beat oscillator tube is used also as the A.V.C. tube. An 85 tube is used in the B.F.O. socket, the triode section acting as the beat oscillator and the diode section as a "separate" A.V.C. tube. Thus it is



The "Sargent 20" Super-het.

possible to retain the well known benefits of a triode second detector, and a 76 is used for this purpose. There is no interaction between A.V.C. and beat oscillator circuits, and if desired the beat oscillator may be used while the receiver is on A.V.C. Such a combination is unusual however, as most operators prefer manual control when using the B.F.O.

This new receiver is available in two tuning ranges, 15-550 meters and 15-1500 meters. The circuit can also be extended to higher wavelengths if desired. It will be noted that in covering 15-1500 meters the receiver tunes right through its own intermediate frequency. Ability to do this is a good test for isolation of circuits in any receiver, and only those built with the utmost regard for circuit isolation can do it. Difficulty is experienced with uncontrollable oscillation in the vicinity of the I.F. frequency if the slightest amount of inter-coupling with the rest of the receiver exists. Such couplings can only be eliminated by generous use of isolation resistors, individual bypass condensers, single point grounding, and proper arrangement of cir-



Hook-up of the Sargent "Model 20"—a new receiver with pre-selection, band-spread, et al. No. 320.

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

# THE RADIO AMATEUR

*Conducted by Geo. W. Stuart*

## Radio Amateur Course

• THIS is the third lesson in our Amateur Radio Course and it will deal with resistance, capacity, and inductance, as concerned with radio circuits. In order to understand how a vacuum tube oscillates, how tuned circuits work, and the function of a tuning condenser, it is necessary to become familiar with these three very important subjects.

### Resistance

When electrical current flows through a wire or some other conducting medium it encounters resistance or opposition, the same as the flow of material substances. For instance, a certain amount of water can be forced through a length of one-inch pipe with a definite pressure. In other words, the size of the pipe offers resistance to the flow. The larger the pipe becomes, the greater the amount of water can be forced through it at a definite pressure, or the larger the pipe becomes, the less its resistance would be.

This holds true in conductance of electricity inasmuch as a fine wire or conductor offers a greater amount of resistance than a heavy conductor. The resistance of a conductor is inversely proportional to its cross sectional area

### No. 3—Resistance, Inductance, and Capacity

and with some materials, in fact most of them, the resistance also increases as the temperature rises.

In dealing with resistance in electrical circuits, we have what is known as Ohm's Law. In Ohm's Law, we have to consider three things: First, the flow of electricity, which is current; second, the force or pressure, which is voltage; and third, the resistance which the flow of electricity encounters. Three letters are assigned to the above, and they are:

$$I = \text{Current}$$

$$E = \text{Voltage (EMF)}$$

$$R = \text{Resistance}$$

The formulae for finding the resistance, voltage, or current, where either two of the three are known are as follows:

$$I = \frac{E}{R}$$

$$R = \frac{E}{I}$$

$$E = R \times I$$

When two or more resistors are connected in series the total value of the resistance is the *sum* of all the resistors. In other words, three 5-ohm resistors in series would have a total resistance of 15 ohms.

However, when resistors are connected in parallel the method of calculation is a bit more complicated. For instance, if we have three resistors connected in parallel, one has the resistance of 5 ohms, another of 10, and another of 20. The formula for expressing this is:

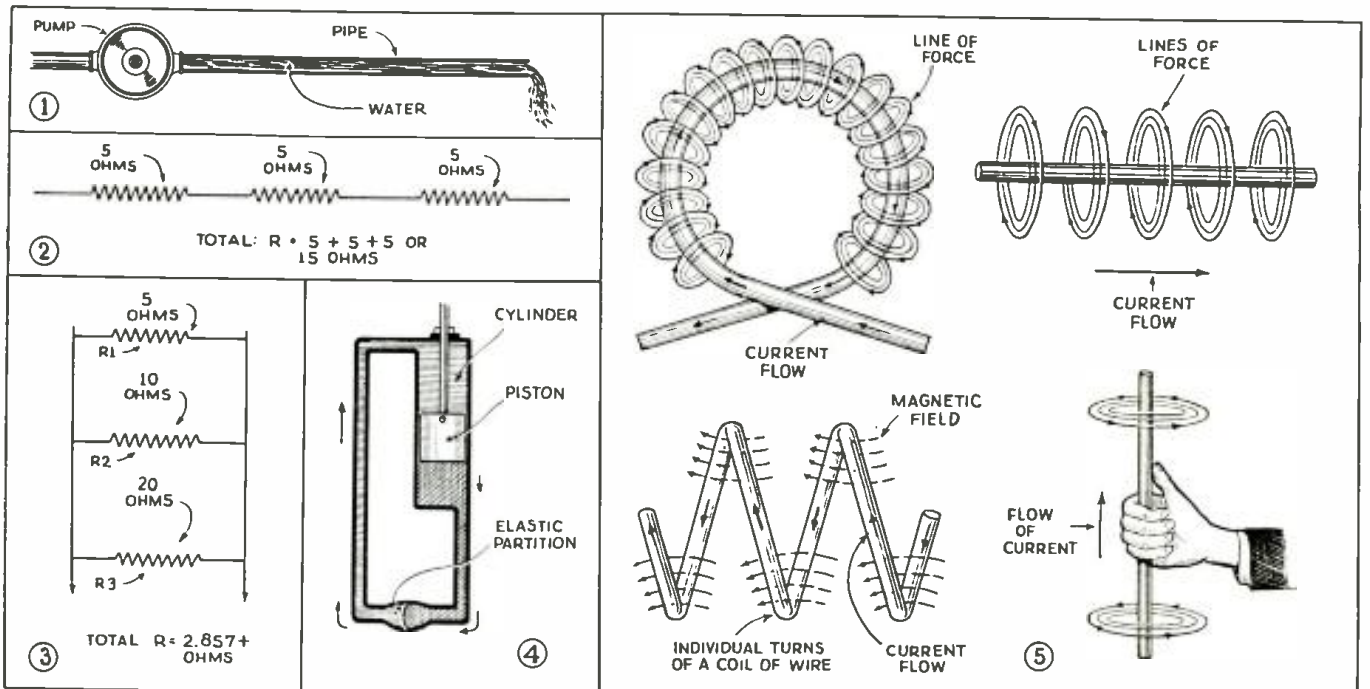
$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} \text{ or}$$

$$R = \frac{1}{.2 + .1 + .05} \text{ or}$$

$$R = \frac{1}{.35} \text{ or } R = 2.857 +$$

### Capacity

Most of us are familiar with the now well-known condenser which is an instrument capable of storing up a certain amount of electricity and consists of two or more plates placed adjacent to each other, with insulation of



In Fig. 1 we have a diagram showing how the size of a pipe governs the amount of water that can be forced through it. In Fig. 2 we have resistors connected in series; in Fig. 3 they are connected in parallel; the formulae are given in the text. In Fig. 4 is the hydraulic analogy for the action of a condenser when alternating current is applied to it. Fig. 5 shows the magnetic fields and direction of current flow in straight wires and coils; also the right-hand rule is given, where, if the thumb points in the direction of the current flow, the four fingers will curve around the conductor in the direction of the magnetic field.



# WAVE REVIEW.

Edited by  
**C. W. PALMER**

just made its appearance on the English market, according to *Popular Wireless*.

This switch is available with any desired number of switching circuits, and any spacing between circuits. It is expected that this switch will find many applications in short-wave receiver designs.

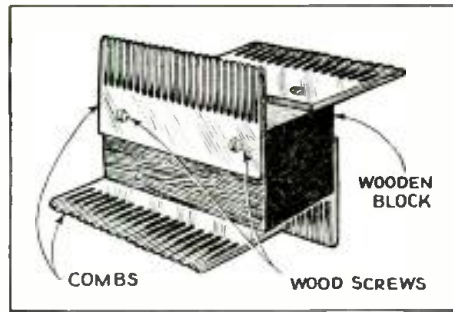
In addition to the features mentioned above, the switch is obtainable in both the *shorting* and *open-circuit* types. In the former, the circuits not in use are automatically connected to the common terminal, and in the second, they are left open. Thus the constructor has his choice of either shorting out unused coils or leaving them open, according to the circuit he is following.

### An Australian Short-Waver

● THE Australian weekly radio magazine *Wireless Weekly* is becoming quite famous for the circuits it publishes. Some very unique arrangements have been presented in recent issues, and we have reprinted several of them on this page.

The latest venture is a T.R.F. set for the short-wave bands, including a stage of tuned radio frequency amplification, a regenerative detector having the regeneration in the suppressor grid circuit of a 6C6 tube, and two stages of A.F. amplification.

The circuit is shown here for the interest of those experimenters who might want to try it. The method of obtaining regeneration in the detector circuit is ex-



Coil Form from Combs

### A Coil Form from Combs

● AN interesting kink appeared recently in *Practical and Amateur Wireless* magazine. This consisted of a short-wave coil form made of four small combs screwed one on each side of a 1 inch block of wood.

A rigid coil of thick wire may be easily wound between the slots with any desired spacing. If each turn is pushed down as far as it will go into the slot, the whole assembly is extremely rigid.

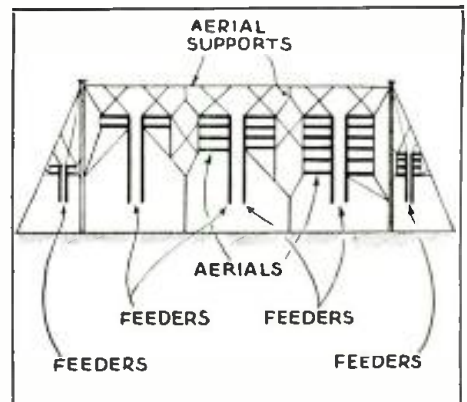
The finished coils can be provided with plug-in sockets or pins, or a switch can be used to change from one coil to another.

If regeneration is desired, the tickler coil may be wound at one end of the spaced winding, by breaking one or more

masts, which are 500 ft. high; some between two new self-supporting masts, 350 ft. high, which are shaped like the Eiffel Tower, and weigh 100 tons each. The masts are insulated from the ground.

New inventions are continually being tried out by the B.B.C. at Daventry. One is a new feeder system for connecting the transmitters to the aerials. The idea is that, instead of using exposed wire supported on poles some 10 ft. high for this purpose, as heretofore, the feeder consists of a copper tube 3/4-inch in diameter, enclosed inside a 4-inch copper pipe. (This is the concentric transmission line which has received so much publicity in this country (U.S.)—Editor.)

Another surprising thing is that the "Empire" transmitters are now arranged so that they deliberately boost up the high audio frequencies. This is because the average short-wave listener uses his set with the regeneration turned all the way up, so cutting side-bands. The accentuation of the high frequencies by the B.B.C. stations makes for better intelligibility.



New English Antennas

### A Small Coil Assembly

● IN the latest issue of *L'Industrie Francaise Radio-Electrique*, a French radio magazine published for the radio trade, an unusually small all-wave coil assembly was shown.

By a unique combination of iron-core and air-core coils, tuning over the entire short-wave and broadcast spectrum is provided in a space little more than twice the size of a small match box. For the broadcast band, the coils have *iron cores*, which may be moved in and out to provide trimming of the different circuits, such as aerial, oscillator, etc.

For the *short-waves*, coils wound on the same forms as the broadcast coils, but minus the iron cores, permit entire coverage from 10 to 200 meters.

The use of *powdered iron cores* for coils is becoming increasingly popular in Europe. It is claimed that these coils provide higher "Q" values than equivalent air-core coils on frequencies as high as 2,000 kc. They are especially valuable for I.F. coils of superheterodynes, where unusually high gain is possible.

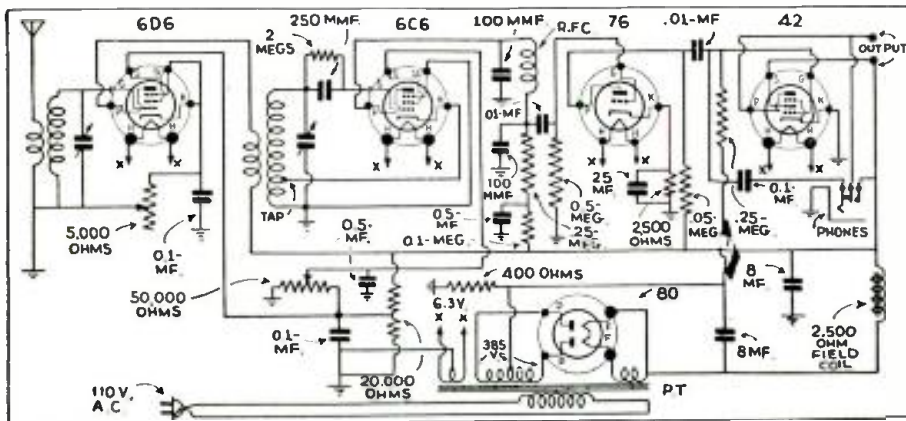
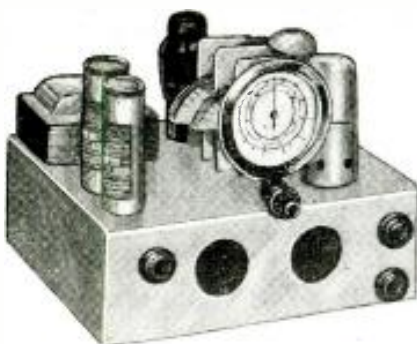


Diagram of Australian S-W Receiver

ceptionally interesting and will probably be one of attraction to experimenters who like to try "different" circuits.

The electron-coupling used in this circuit results in a minimum effect on frequency, it is smooth and silent and provides greater gain than many other forms of regeneration.

Another interesting feature in this set is the phone jack which turns off the pentode output tube when the phones are plugged in.



Australian S-W Receiver

teeth out of the comb at one end thus providing a wide enough slot for the "jumble-wound" (helter-skelter or without regularity of winding) tickler.

These coil forms can be made by any short-wave experimenter, as they are unusually simple to assemble.

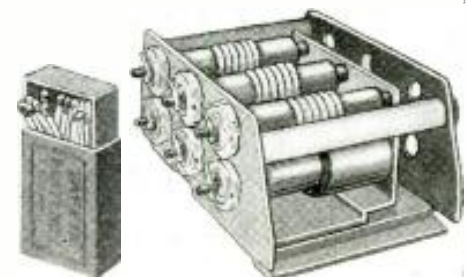
### Some Interesting Facts About Daventry

● IN a recent issue of *Popular Wireless* magazine, an interesting discussion of the changes that have been taking place at Daventry were presented by a member of the staff who made a special visit to this "broadcasting center" just for the purpose. A few of the outstanding facts are reprinted here for the benefit of short-wave listeners.

The aerial systems are completely transformed. All the original "beam" aerials, with their reflectors have been scrapped.

The aerials at present favored for the regular programs are all horizontal aerials of the dipole type, varying in length from double-wave to 1/2 and 1/4 wave. They are slung up in stacks, sometimes four or six, as shown in the diagram.

Five complete aerials only are shown. Altogether there are 20 such aerials! Some of these are slung between the old "5XX"



French Coil Assembly



# SHORT WAVES and

## W9CEO's Crack "Ham" Station

Awarded prize of one year's subscription to Short Wave Craft



A crackerjack amateur short-wave station owned and operated by A. E. French, W9CEO at Downs, Ill.

Editor, Short Wave Craft:

I have been looking at the photos in *Short Wave Craft* for some time. I have just obtained a new outfit and some pictures of my station, am sending you a couple of the photos both front and rear views.

The accompanying photographs show my station, W9CEO, at Downs, Ill. The first operation was carried on with a pair of 10's in push-pull, which dates back to 1929, and was used on C.W. until Apr. 19 of this year.

The new transmitter shown is used both on phone and C.W.; it consists of a 59 tri-tet oscillator, 802 buffer, 203-A final stage, with 200 watts input to final stage.

The speech input equipment consists of two 56's to excite the grids of a pair of 45's; the latter to drive a pair of 801's in Class B. A double-button microphone is used for phone work.

The rack is made from angle iron which is chrome-plated. The front panel is made from masonite pressed wood, on which is mounted the meters, switches, and controls. The antenna matching network is mounted on top shelf, which tunes up very nicely on all bands when connected to a 132-ft. Zepp antenna.

Each shelf is made with binding post so each unit can be easily removed. The wiring is all cabled and laced.

The transmitter works on all bands, and all coils are the plug-in type.

The receiver used is a National FBX-A. W9CEO has been a reader of *Short Wave Craft* since its first publication. Always glad to get the next number. Also hold an ORS appointment.

A. E. French, W9CEO,  
Downs, Ill.

(We are very glad you sent us these excellent pictures of your station, W9CEO, and we also are pleased to award you this month's prize of a subscription to *Short Wave Craft*. This is what we would call a "first-class" station.—Editor)

## All the Way from France!

Editor, Short Wave Craft:

Here is a photo of my amateur phone and CW station, F8LO, with which I won the R.E.F. Cup Contest in 1934. The room which contains the station is only 5 feet by 5 feet! The transmitter seen on the left is a home-made affair and consists of a 42 Tri-Tet Oscillator and doubler, and a push-pull final amplifier of two TCO4/10 which is plate modulated by four 46's in a double push-pull, class B. The speech

amplifier consists of a 56 for the first stage and a 42 in the second.

The antenna is a 20-meter Zepp with Collins matching circuit. The high tension is all D.C. (110-220 volts D.C. and batteries). On the right is the home-made single-signal superhet, with which I won the first prize of the R.E.F. receiver contest in 1933.

In the center is the 5-meter transmitter lines; the antenna used with this is a Zepp, with impedance matching.

For 5-meter reception I use a transceiver, not seen in the photo. Now I intend to put this transceiver on my motorcar, with antenna and concentric lead-ers as described on page 178 of *Short Wave Craft*, July issue.

René Jourdan, F8LO,  
17 Rue Hoche,  
Cannes (Alpes-Marit.)  
France.



We are glad to see a photo of this interesting "ham" station in France, which is owned by René Jourdan, F8LO.

(We salute you, René, and we are very happy indeed to present the photo of your station in France to our readers. We hope to hear from many other readers in foreign countries, together with photos of their stations.—Editor)

## LIKES OUR "RADIO AMATEUR COURSE"

Editor, Short Wave Craft:

I noticed in your September issue of *Short Wave Craft* that you are beginning a *Radio Amateur Course*. I must say this is certainly a wonderful idea, especially for me, as I am taking a "radio course" from the Radio College of Canada, Toronto, Ont., and I am just nicely into the A.C. part of one section.

The diagrams and explanations are certainly well written up; there is absolutely no excuse for anyone not being able to understand them. I hope you keep up the "good work" because I know, personally, I will benefit a great deal by your course.

I want to wish you every success in your wonderful work and you certainly do fine work when you produce a magazine like *Short Wave Craft*. It surely is money well spent.

If it had not been for this magazine which I started to take three years ago, I would have still been on the "outside" of short wave radio, but—thanks to *Short Wave Craft*—I became so interested, I built two sets, one being the "2-Tube Doerle," that I decided to take a *Radio*

(Continued on page 431)



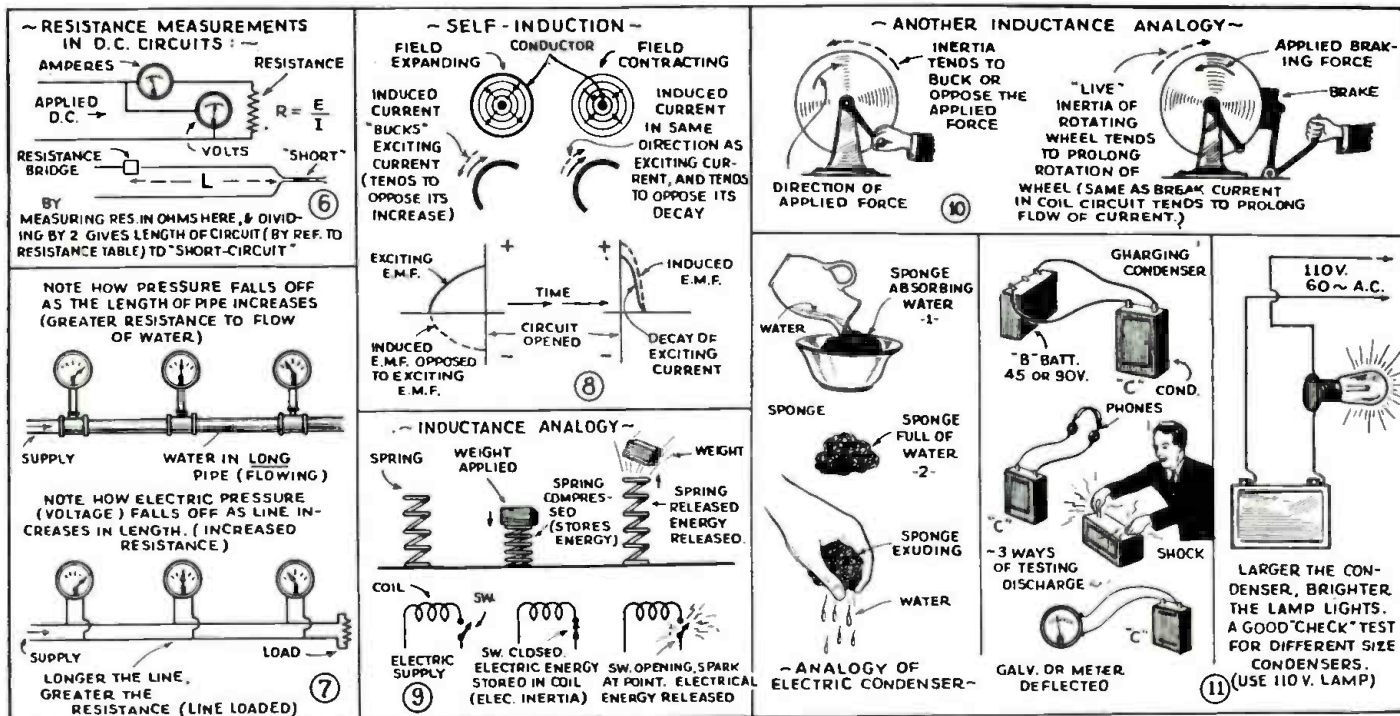


Fig. 6 above shows measurement of resistance. Fig. 7 shows how pressure or voltage decreases with increase in resistance to flow of water or electric current. Fig. 8 shows action of expanding and contracting magnetic fields. Fig. 9 shows mechanical "spring" analogy for inductance; Fig. 10—Fly-wheel analogy of inductance. Fig. 11—Analogies for condenser.

either air or some other insulating medium. When a constant direct voltage is applied between the plates of a condenser, current will flow into the condenser, until the condenser becomes charged to its maximum capacity. The current then ceases to flow and the condenser is charged. Then, after the source of electricity (battery for example) is removed from the circuit, the condenser will hold its charge until, due to its inherent (conductivity of dielectric) resistance, the power is dissipated.

If the insulation is mica or paraffined (waxed) paper, the condenser will hold its charge for a considerable length of time. In large condensers of one or two microfarads the charge may remain in the condenser for several hours. This can be proved by short-circuiting the two terminals of the condenser and noting the spark, or an ammeter could be connected across the condenser and it would indicate the current flowing until the condenser was completely discharged and the power dissipated. The unit of capacity is a *farad*; however, in radio work, we use considerably smaller units in our condensers.

A *microfarad* is one millionth of a farad, and one *micro-micro-farad* is one millionth of a microfarad. The most important part of a condenser is the dielectric or insulating material because, contrary to popular belief, it is in the dielectric that the charge resides. When a condenser is charged, the dielectric opposes the setting up of an electric displacement of an electric field in the dielectric and the charge is said to be the energy of the charging source stored up as electro-static energy in the dielectric.

A simple analogy for the action of an electrical condenser is a sponge, which absorbs water when placed in a cupful of it, for example, and afterwards if pressure is exerted on the sponge, then it gives up the water stored in it. It requires 1 coulomb (ampere-second) to charge a condenser

of 1 farad to a potential of 1 volt. A condenser having a capacity of 1 mf. (1 mf.=1 millionth of 1 farad) requires a charge of 1 millionth of 1 coulomb to charge it to a potential of 1 volt.

**Inductance**

The coils used in radio circuits are called *inductances* or *inductors*. In the drawings we see how an electro-magnetic field may be produced around the wire when a current is passed through it. If the flow of current through a conductor is constant (D.C.) a *steady* electro-magnetic field is produced around the conductor. However, when alternating current (abbreviated A.C.) flows through a conductor, the current flow is constantly changing and likewise the field is changing.

When current begins to flow through a wire the circular electro-magnetic field originates at the center of the conductor and travels outwardly away from this center in constantly increasing diameters and of course, extends into the space surrounding the wire. Until this field becomes of larger diameter than the wire, it causes a second current to flow in opposition to the main current.

When the current flow through the wire decreases or stops, the circular

fields collapse and are then said to cut the wire in ever-diminishing diameters. This induces a current in the opposite direction to the field but in the same direction as the original (exciting) applied current, tending to prolong the flow of the exciting current.

This property of a coil or conductor to act upon itself or another inductor in close proximity to it, is called *inductance*. The unit of inductance is the henry and in most formulas it is usually designated by the symbol "L." A *henry* is the inductance of a circuit in which the induced E.M.F. is one volt, when the (varying) current travels at the rate of one ampere in one second. Usually in radio circuits, inductance values are indicated as one thousandth of a henry or one *milli-henry*; a millionth of a henry is known as a *micro-henry*. The physical dimensions and form of a circuit, determine the amount of inductance and it is for this reason that our radio circuits consist of coils rather than straight wire, because a greater amount of inductance can be obtained by coiling the wire, also allowing considerably less D.C. resistance because less wire is used. A straight wire, of course, would have less inductance than one of the same length which was coiled.

Induction subdivides into two branches—*self* and *mutual induction*. If the current passing through a coil, for example, is rising from zero to maximum value, such as when the circuit is closed from a battery, (or the first half of an alternation of an alternating current) the magnetic field around the wire is expanding and while this is taking place there is induced in the conductor a counter-current (and counter e.m.f. or voltage) which tends to buck or oppose the current (and voltage) which is producing the field.

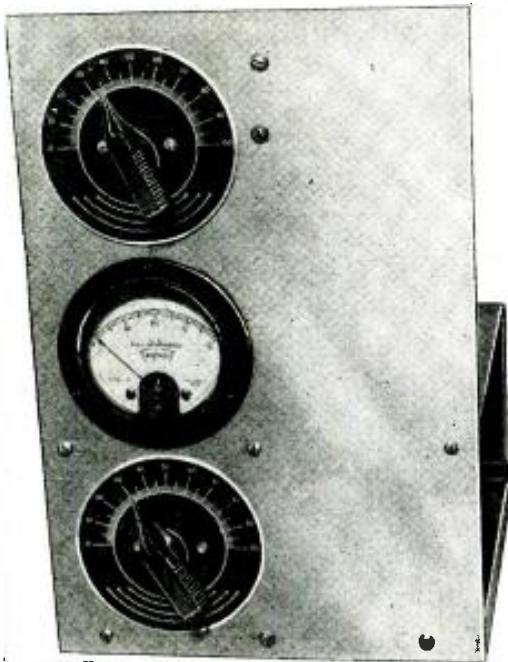
As one of the diagrams shows there is electrical energy stored up in an inductive circuit, just as if you had compressed a spring. The opening of the circuit, and spark at the switch,

(Continued on page 422)

**In the fourth lesson of our Amateur Radio Course, which will appear in the following issue of SHORT WAVE CRAFT, the action and principles involved in Regeneration and Oscillating Vacuum Tube circuits will be discussed. Don't miss the next installment.**



# Hi-Power



The screen-grid phone-CW amplifier, front view, with the RK28 shown alongside.



than suffice. These tubes require 2000 volts for the plate supply, which is not the cheapest thing to obtain, but considering the current low prices of "ham" equipment and the saving in modulation requirements for these tubes, the over-all cost will be much less than it would be if conventional tubes were used.

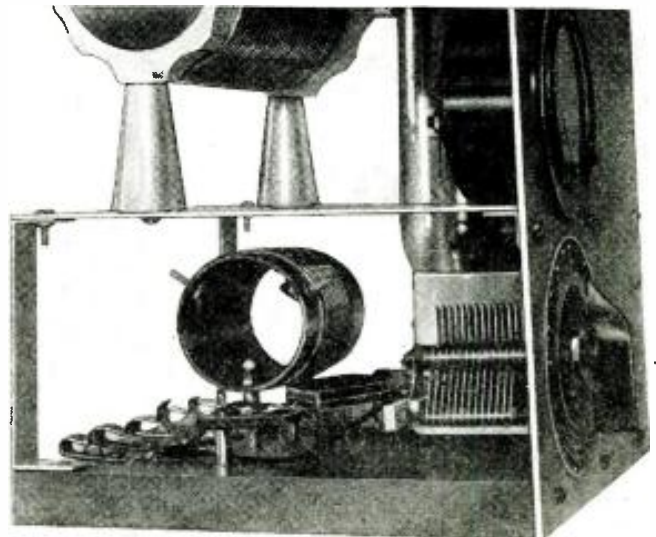
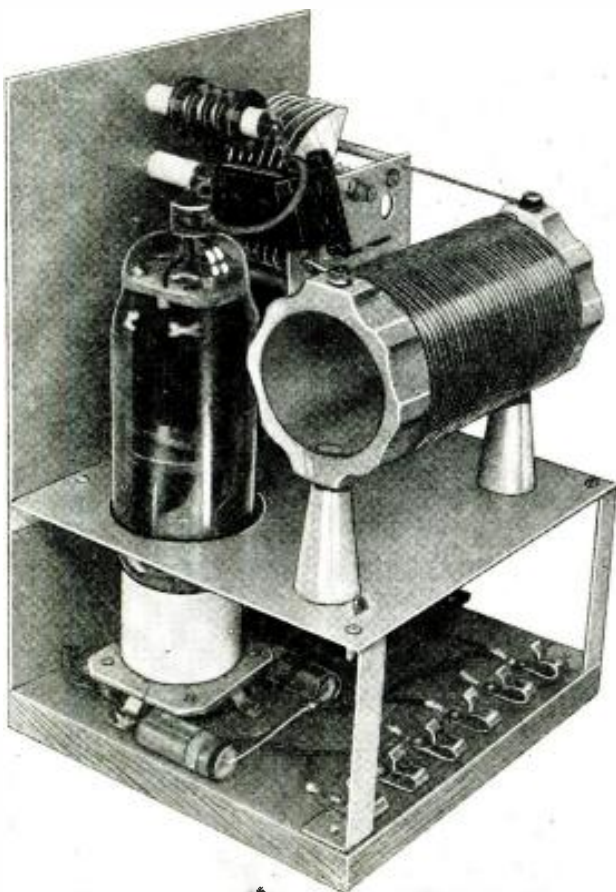
Considerable experimenting was done with these new tubes and it was found that a single 2A5 tube, connected as a pentode oscillator, would drive the pentodes to full output. For operation on the crystal frequency the 2A5 was a straight pentode oscillator, while on the second harmonic of the crystal, the well-known "tritet" circuit was used. The small R.F. pentodes, such as the 802 or the 23 could be used just as well as the 2A5 with the advantage that the tritet circuit could be used, even on the crystal frequency.

No fussy neutralizing adjustments are required, because the new tubes are so shielded internally that no self-oscillation is encountered; that is, providing proper shielding precautions are observed.

The audio modulator used during tests was a commercial 6 watt affair and it proved to be entirely adequate. A diagram of a suitable modulator and speech amplifier is shown in one of the drawings. With a carbon microphone (double-button) the single stage of speech amplification provides plenty of pick-up. Only the R.F. amplifier is shown and described as the average "Ham" has some sort of crystal controlled oscillator which can be used as a driver.

The entire R.F. portion of the amplifier is mounted behind a heavy metal panel, measuring 8x12 inches and  $\frac{3}{32}$  of an inch thick. The base is a  $\frac{1}{4}$  inch thick board 8 inches square. In order to provide shielding between the input and output circuits, a metal shelf is used and is located far enough above the base to allow the input circuit tuning condenser and coil to be mounted under it. The tube is mounted vertically and extends up above the shield shelf. The hole in the shelf should be large enough to provide a clearance around the tube of at least  $\frac{1}{8}$  inch. This shelf also serves for mounting the plate tank coil. Parallel feed is used in the plate circuit so that the condenser does not have to be insulated from the grounded panel. While the grid condenser could be easily insulated from the panel, the plate condenser would require 2000 volt insulation and the simplest method is the parallel plate voltage feed.

Left—Rear view, showing amplifier coil and RCA 803 tube. Below—View of the input compartment; the shelf forms a shield between the input and output circuits.



● WITH the introduction of the new 200 watt R.F. pentode transmitting tubes the amateur is offered an opportunity of building a really efficient, low-cost medium-power phone and CW transmitter.

These tubes are the new RK28 and the RCA803 both rated at over 200 watts output for CW with only two or three watts of excitation; for phone work a 50 watt carrier can be obtained with an output of 200 watts on modulation peaks. The audio frequency requirements for phone operation are very small because suppressor grid modulation can be used. Five or six watts will more



# Phone-CW Amplifier



By George W. Shuart, W2AMN

On the front of the panel appears the plate tuning condenser at the top, and the grid condenser at the bottom. The meter in the center is used for reading the plate current. The screen-grid and control-grid currents must (or should) be metered also, but there was not enough space on the panel for them. These meters were connected in the circuit externally.

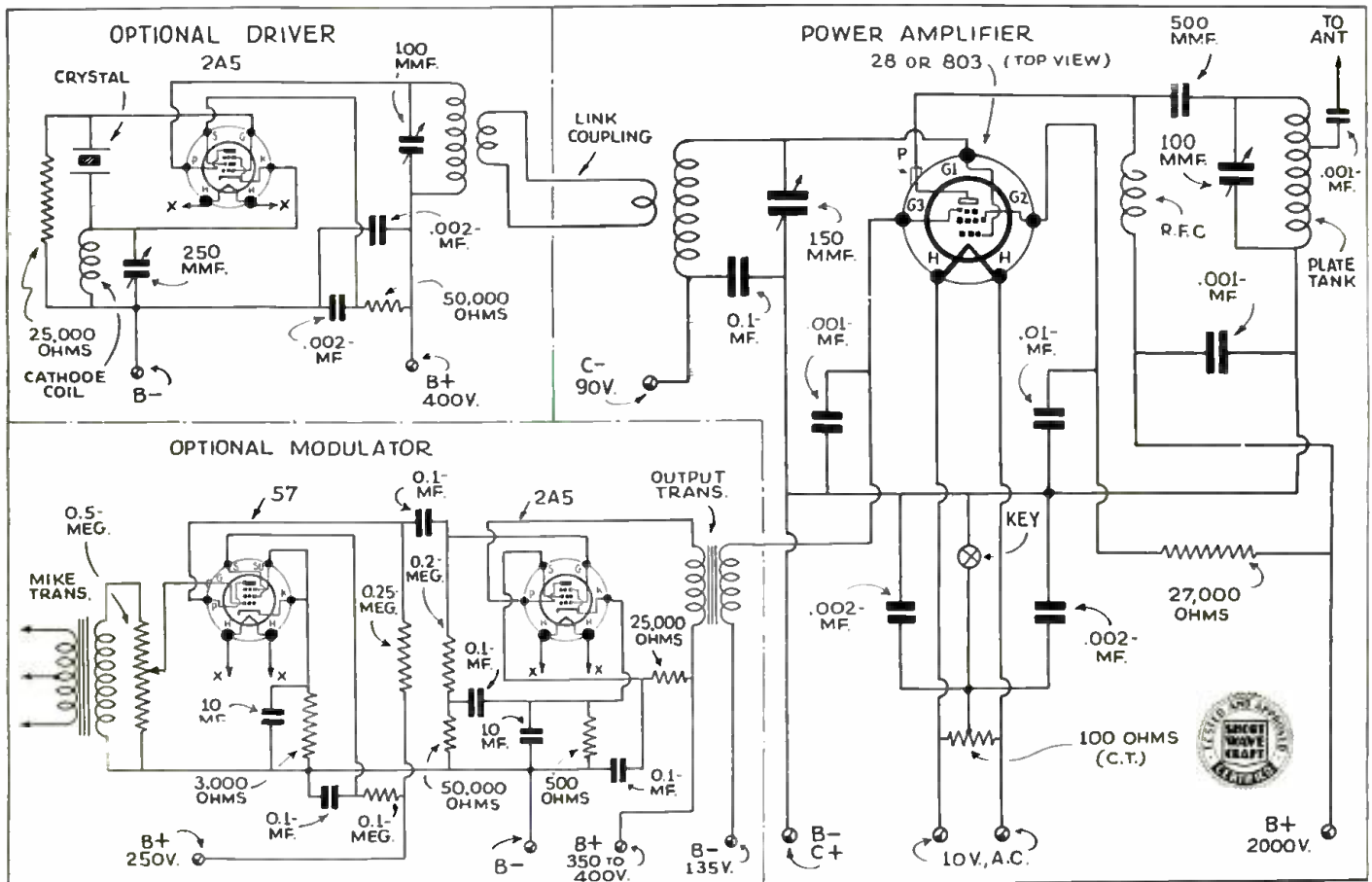
The grid and plate coils are arranged so that they can be easily changed for operation on the different bands. In order to have a low "C" plate circuit, a 100 mmf. (.0001 mf.) tuning condenser was used. This requires a very large coil for the 80 meter amateur band and it was wound with No. 12 tinned copper wire on a National 80 meter coil form, to obtain rigidity. The 40 and 20 meter coils consisted of 1/4 inch copper tubing, which is self-supporting and needs no form. The grid coils are wound on bakelite tubing three inches long and two inches in diameter. These are equipped with pins and jacks for quick changing.

Link coupling is used between the driver and the amplifier and the coil consists of three turns of wire spaced about 1/4 inch from the grid coil. These are both wound with No. 16 D.C.C. copper wire with no spacing between turns. Due to the low excitation requirements the grid tuning condenser may be of the receiving type, but the plate condenser should have a voltage rating of at least 6000. The large National transmitting R.F. choke is mounted directly on the panel the base that comes with the choke was removed to conserve space. It is important to use a good choke here because the losses in a poorly designed one are liable to be excessive. Par-

The amateur is at last offered an opportunity to construct a really simple, powerful and economical phone-CW transmitter. The new 200 watt screen-grid pentode tubes require only two or three watts of R.F. excitation and can be suppressor-grid modulated, with five or six watts of audio. Complete details are given in this article.

allel plate feed always requires a very good choke.

In tuning up the amplifier we will consider CW operation first. Adjust the exciter unit to the proper frequency before connecting it to the amplifier. Do not use a powerful exciter, unless the output can be cut down to two or three watts! Connect the feed wires to the link coil of the amplifier and turn on the filament voltage. Adjust the grid condenser until a deflection in the plate meter of the driver is noticed. With about 90 volts minus on the control grid and 45 volts plus on the suppressor grid, the plate voltage of the amplifier can be applied. *Be prepared to adjust the plate tuning condenser for minimum plate current, immediately upon applying plate and screen voltages.* Adjustments should be made with low voltage (around 1000 volts is plenty) in order that no damage is done to the tube. After the adjustments have been made and the amplifier is behaving properly, the full plate voltage may be applied. The antenna can now be coupled to the amplifier; (Continued on page 434)



Diagrams of the pentode amplifier—a suitable exciter unit and the necessary modulating equipment.

# Superhet For 2.5, 5 and 10 Meters

By B. Herbert Russ\*



Here's the new "Peak" Q5 Superhet working on 2.5, 5 or 10 meters. (324)

● ABOUT a year and a half ago the writer attempted some experimental work on the possibility of using the conventional superheterodyne receiver for ultra-high frequency reception on 28 and 56 megacycles and higher. Results were extremely discouraging, due to several reasons, some of which were (1) Extreme selectivity allowed none but the most stable of signals to come through the loudspeaker satisfactorily. (2) Poor input sensitivity. (3) High average level of I.F. gain was necessary, resulting in the thermal agitation noise reaching such high levels as to be unbearable.

The comparative selectivity of a superhet is one of the reasons for its wide popularity. However, the great majority of amateur signals on 28 mc. and higher are modulated self-excited transmitters and the "wobulation" resulting therefrom not only results in the impossibility to receive such signals, but makes such high receiver selectivity undesirable and unnecessary.

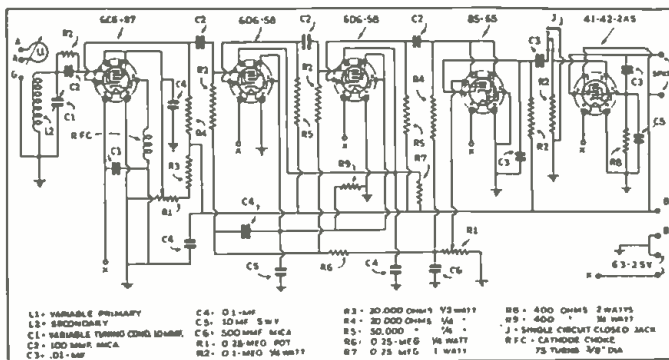
Poor sensitivity is one of the "bugaboos" of ultra-high frequency reception.

It was decided to construct a superhet receiver that would do away with the faults outlined above. A "conventional" superhet was built using 6D6 first detector, 76 oscillator, two 6D6's for I.F., 85 second detector and A.V.C. and first audio, and finally a 41 power audio. From this basic layout we attempted to get performance satisfactory for ultra-high frequencies.

The first attack was aimed at reducing selectivity. One by one the grid I.F. coils were removed and substituted with .0001 mf. mica coupling condensers and resistors of 100,000 ohms. On the lower frequencies this method showed that it had reduced selectivity markedly. The 5-meter coils were plugged in and results were encouraging—about two out of ten amateur stations were understandable, a very poor percentage, proving the tremendous amount of frequency modulation that exists in high-frequency amateur transmitters.

Incidentally it can be mentioned here that the intermediate frequency used was 1,000 kc. This frequency was chosen to reduce "image" response.

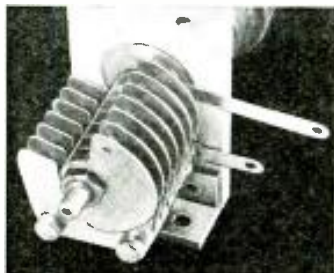
Selectivity had to be reduced to a still greater extent. The plate I.F. coils were removed in all stages except at the output of the first detector. Resistors of 50,000 ohms were substituted in their stead, in order not to reduce the plate voltage to too low a value. The plate coil of the first detector was made to "peak" at about 70 kc. This stage in the experimentation showed that the proper course was being taken. Seven out of ten stations now came through the loudspeaker (Continued on page 435)



Wiring diagram for the "Q5" Superhet.

\*Eastern Radio Specialty Co.

## NEW APPARATUS FOR THE HAM



New midget condenser. (H13)

### Ultra Midget Condenser—H-13

This is one of a series of National ultra midget tuning condensers, designed particularly for ultra high frequencies. They are obtainable in various sizes and equipped with a universal isolantite mounting panel, permitting them to be mounted on a base or directly on the panel.



Chokes and condensers. (H14)

### Chokes and Condensers—H-14

Here is an array of apparatus consisting of chokes, both for receiving and transmission on ultra high frequencies and low frequencies, also a dual 5-meter inductance for use in transceivers or regular receivers, operated on 5-meters. A new midget condenser with isolantite insulation is also shown. This is obtainable in either all variable, or partially variable with a fixed section.



New "Acorn" tube socket. (H15)

### New Acorn Tube Socket—H-15

This Acorn tube socket is especially designed for the 954 pentode and has several unusual features. It has a drawn-aluminum base which serves as a shield between the control grid and plates circuits. Constant R.F. impedance contacts and inherent high capacity electrostatic by-passing of heater, cathode, and screen circuits. This is ideally suited to the design of ultra high frequency tuned R.F. or superheterodyne receivers, and is manufactured by the National Company.

### New Wire-Wound Resistors—H-16

The resistors shown in the photograph are made by Aero-vox in 5, 10, 15, and 20 watt sizes. They are wire-wound and vitreous enamelled and have pig-tail connections. The 5-watt resistor measures 1/4 by 1 inch, 10 watts—1/4 by 1 1/4 inches, 15 watts—7/16 by 2 inches, 20 watts—7/16 by 3 inches, and are available in various sizes from 100 to 100,000 ohms.



Small resistors. (H16)

### Jumbo Socket—H-17

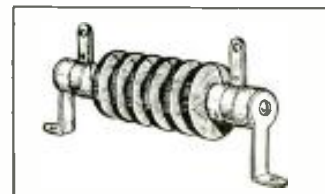
This new National Jumbo isolantite socket is designed for the use of the RK28 and R.C.A. 803 high-power R.F. pentodes. It is designed along the same lines as the standard National isolantite sockets, with such standard features as guide groove, and steel spring re-inforced "non-turning" contacts.



Jumbo tube socket. (H17)

### Heavy-Duty Xmitting Choke H-18

This Hammarlund choke is especially designed for medium and high-power transmitters operating on 20, 40, 80, and 160 meters. It has six separate windings connected in series and mounted on an isolantite form. The inductance is 2.5 mh. with a distributed capacity of less than 1.5 mmf. and a D.C. resistance of 8 ohms. This heavy-duty choke will carry continuously 500 milli-amperes D.C.



Transmitting choke. (H18)

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





# Short-Wave Stations of the World

## Complete List of Broadcast, Police and Television Stations

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

All the stations in this list use telephone transmission of one kind or another

and can therefore be identified by the average listener.

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

Please write to us about any new stations or other important data that you

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

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

### Around-the-Clock Listening Guide

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

ance of these simple rules will save time. From daybreak till 5 p.m. and particularly during bright daylight, listen between 13 and 19 meters (2150 to 15800 kc.). To the east of the listener, from about 3 p.m.—8 p.m., the 25-35 meter will be found very pro-

ductive. To the west of the listener this same band is best from about 10 p.m. until shortly after daybreak. (After dark, results above 35 meters are usually much better than during daylight.) These general rules hold for any location in the Northern Hemisphere.

### Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

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

<b>21540 kc. W8XK</b> -B- 13.93 meters WESTINGHOUSE ELECTRIC PITTSBURGH, PA. 7-9 a.m.; relays KDKA	<b>19220 kc. WKF</b> -C- 15.80 meters LAWRENCEVILLE, N. J. Calls England, daytime	<b>17790 kc. ★GSG</b> -B- 16.88 meters DAVENTRY. B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column	<b>15880 kc. FTK</b> -C- 18.90 meters ST. ASSISE, FRANCE Phones Saigon, mornings	<b>15250 kc. W1XAL</b> -B- 19.67 meters BOSTON, MASS. Irregular, in morning
<b>21420 kc. WKK</b> -C- 14.01 meters A. T. & T. CO. LAWRENCEVILLE, N. J. Calls Argentina, Brazil and Peru, daytime	<b>19160 kc. GAP</b> -C- 15.66 meters RUGBY, ENGLAND Calls Australia, early a.m.	<b>17780 kc. ★W3XAL</b> -B- 16.87 meters NATIONAL BROAD. CO. BOUND BROOK, N. J. Relays WJZ, Daily exc. Sun. 8-10 a.m.	<b>15810 kc. LSL</b> -C- 18.98 meters HURLINGHAM, ARGENTINA Calls Brazil and Europe, daytime	<b>15245 kc. ★</b> -B- 19.68 meters "RADIO COLONIAL" PARIS, FRANCE Service de la Radiodiffusion 103 Rue de Grenelle, Paris 7-11 a.m.
<b>21060 kc. WKA</b> -C- 14.25 meters LAWRENCEVILLE, N. J. Calls England noon	<b>18970 kc. GAQ</b> -C- 15.81 meters RUGBY, ENGLAND Calls S. Africa, mornings	<b>17775 kc. ★PHI</b> -B- 16.88 meters HUIZEN, HOLLAND Daily exc. Tues. and Wed. 8:30- 10:30, Sat. and Sun. till 11:30	<b>15760 kc. JYT</b> -X- 19.04 meters KEMIKWA-CHO, CHIBA- KEN, JAPAN Irregular in late afternoon and early morning	<b>15220 kc. ★PCJ</b> -B- 19.71 meters N.V. PHILIPS' RADIO EINDHOVEN, HOLLAND Sat. and Sun. 8:30-11:30 a.m. Also Tues. 3-6 a.m., Wed. 7-11 a.m.
<b>21020 kc. LSN6</b> -C- 14.27 meters HURLINGHAM, ARG. Calls N. Y. C. 8 a. m.-5 p. m.	<b>18830 kc. ★PLE</b> -C- 15.93 meters BANDOENG, JAVA Calls Holland, early a. m. Broadcasts Tues., Thurs., Sat. 10-10:30 a.m.	<b>17760 kc. ★DJE</b> -B- 16.89 meters BROADCASTING HOUSE BERLIN, GERMANY Irregular 8-11:30 a.m.	<b>15660 kc. JVE</b> -C- 19.16 meters NAZAKI, JAPAN Phones Java 3-5 a.m.	<b>15210 kc. ★W8XK</b> -B- 19.72 meters WESTINGHOUSE ELECTRIC & MFG. CO. PITTSBURGH, PA. 9 a.m.-7 p.m. Relays KDKA
<b>20700 kc. LSY</b> -C- 14.49 meters MONTE GRANDE ARGENTINA Tests Irregularly	<b>18620 kc. GAU</b> -C- 16.11 meters RUGBY, ENGLAND Calls N. Y., daytime	<b>17760 kc. IAC</b> -C- 16.89 meters PISA, ITALY Calls ships, 6:30-7:30 a. m.	<b>15620 kc. JVF</b> -C- 19.2 meters NAZAKI, JAPAN Phones U.S., 5 a.m. & 4 p.m.	<b>15200 kc. ★DJB</b> -B- 19.74 meters BROADCASTING HOUSE BERLIN, GERMANY 3:45-7:15 a.m., 8-11:30 a.m.
<b>20380 kc. GAA</b> -C- 14.72 meters RUGBY, ENGLAND Calls Argentina, Brazil, mornings	<b>18345 kc. FZS</b> -C- 16.35 meters SAIGON, INDO-CHINA Phones Paris, early morning	<b>17310 kc. W3XL</b> -X- 17.33 meters NATIONAL BROAD. CO. BOUND BROOK, N. J. Tests Irregularly	<b>15415 kc. KWO</b> -C- 19.46 meters DIXON, CAL. Phones Hawaii 2-7 p.m.	<b>15140 kc. ★GSF</b> -B- 19.82 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column
<b>19900 kc. LSG</b> -C- 15.08 meters MONTE GRANDE, ARGENTINA Tests Irregularly, daytime	<b>18340 kc. WLA</b> -C- 16.36 meters LAWRENCEVILLE, N. J. Calls England, daytime	<b>17120 kc. WOO</b> -C- 17.52 meters A. T. & T. CO., OCEAN GATE, N. J. Calls ships	<b>15370 kc. ★HAS3</b> -B- 19.52 meters BUDAPEST, HUNGARY Broadcasts Sundays, 9-10 a.m.	<b>15140 kc. ★GSF</b> -B- 19.82 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column
<b>19820 kc. WKN</b> -C- 15.14 meters LAWRENCEVILLE, N. J. Calls England, daytime	<b>18310 kc. GAS</b> -C- 16.38 meters RUGBY, ENGLAND Calls N. Y., daytime	<b>17080 kc. GBC</b> -C- 17.56 meters RUGBY, ENGLAND Calls Ships	<b>15355 kc. KWU</b> -C- 19.53 meters DIXON, CAL. Phones Pacific Isles and Japan	<b>15120 kc. ★HVJ</b> -B- 19.83 meters VATICAN CITY ROME, ITALY 10:30 to 10:45 a.m., except Sunday
<b>19650 kc. LSN5</b> -C- 15.27 meters HURLINGHAM, ARGENTINA Calls Europe, daytime	<b>18250 kc. FTO</b> -C- 16.43 meters ST. ASSISE, FRANCE Calls S. America, daytime	<b>16270 kc. WLK</b> -C- 18.44 meters LAWRENCEVILLE, N. J. Phones Arg., Braz., Peru, daytime	<b>15330kc. ★W2XAD</b> -B- 19.56 meters GENERAL ELECTRIC CO. SCHENECTADY, N. Y. Relays WGY daily, 2-3 p.m. Sun. 10:30 a.m.-4 p.m.	<b>15090 kc. RKI</b> -C- 19.88 meters MOSCOW, U.S.S.R. Phones Tashkent near 7 a.m. and relays RNE on Sundays irregularly
<b>19600 kc. LSF</b> -C- 15.31 meters MONTE GRANDE, ARGENTINA Tests Irregularly, daytime	<b>18200 kc. GAW</b> -C- 16.48 meters RUGBY, ENGLAND Calls N. Y., daytime	<b>16270 kc. WOG</b> -C- 18.44 meters OCEAN GATE, N. J. Calls England, morning and early afternoon	<b>15280 kc. DJQ</b> -B- 19.63 meters BROADCASTING HOUSE BERLIN, GERMANY 8-11:30 a.m.	<b>15055 kc. WNC</b> -C- 19.92 meters HIALEAH, FLORIDA Calls Central America, daytime
<b>19380 kc. WOP</b> -C- 15.48 meters OCEAN GATE, N. J. Calls Peru, daytime	<b>18135 kc. PMC</b> -C- 16.54 meters BANDOENG, JAVA Phones Holland, early a. m.	<b>16240 kc. KTO</b> -C- 18.47 meters MANILLA, P. I. Calls Cal., Tokio and ships 8-11:30 a.m.	<b>15270 kc. ★W2XE</b> -B- 19.65 meters ATLANTIC BROADCASTING CORP. 485 Madison Av., N.Y.C. Relays WABC daily, 11 a.m.-5 p.m.	<b>14980 kc. KAY</b> -C- 20.03 meters MANILA, P. I. Phones Pacific Isles
<b>19355 kc. FTM</b> -C- 15.50 meters ST. ASSISE, FRANCE Calls Argentine, mornings	<b>18040 kc. GAB</b> -C- 16.63 meters RUGBY, ENGLAND Calls Canada, morn. and early aftn.	<b>16233 kc. FZR3</b> -C- 18.48 meters SAIGON, INDO-CHINA Calls Paris and Pacific Isles	<b>15260 kc. GSI</b> -B- 19.66 meters DAVENTRY, ENGLAND B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column	<b>14950 kc. HJB</b> -C- 20.07 meters BGDTA, COL. Calls WNC, daytime

(All Schedules Eastern Standard Time)

<p><b>14600 kc. JVH</b> -B.C. 20.55 meters. NAZAKI, JAPAN Broadcasts daily 4-5 p.m. and 12 m.-1 a.m.</p>	<p><b>12290 kc. GBU</b> -C. 24.41 meters RUGBY, ENGLAND Calls N.Y.C., afternoon</p>	<p><b>11680 kc. KIO</b> -X. 25.68 meters KAHUKU, HAWAII Tests in the evening</p>	<p><b>10140 kc. OPM</b> -C. 29.59 meters LEOPOLDVILLE, BELGIAN CONGO Phones around 3 a.m.</p>	<p><b>9570 kc. ★W1XK</b> -B. 31.35 meters WESTINGHOUSE ELECTRIC &amp; MFG. CO. SPRINGFIELD, MASS. Relays WBZ, 7 a.m.-1 a.m.</p>
<p><b>14590 kc. WMN</b> -C. 20.56 meters LAWRENCEVILLE, N. J. Phones England morning and afternoon</p>	<p><b>12235 kc. TFJ</b> -C. 24.52 meters REYKJAVIK, ICELAND Phones England mornings, Broadcasts irregularly</p>	<p><b>11500 kc. VIZ3</b> -X. 26.09 meters AMALGAMATED WIRELESS OF AUSTRALASIA MELBOURNE, AUSTRALIA Calls Canada evening and early a.m.</p>	<p><b>10055 kc. ZFB</b> -C. 29.84 meters HAMILTON, BERMUDA Phones N. Y. C. daytime</p>	<p><b>9568 kc. LKJ1</b> -B. 31.35 meters JELOY, NORWAY 5-8 a.m., 11 a.m.-6 p.m.</p>
<p><b>14535 kc. HBJ</b> -B. 20.64 meters RADIO NATIONS, GENEVA, SWITZERLAND Broadcasts irregularly</p>	<p><b>12150 kc. GBS</b> -C. 24.69 meters RUGBY, ENGLAND Calls N.Y.C., afternoon</p>	<p><b>11413 kc. CJA4</b> -C. 26.28 meters DRUMMONDVILLE, QUE., CAN. Tests with Australia irregularly in evening</p>	<p><b>9950 kc. GCU</b> -C. 30.15 meters RUGBY, ENGLAND Calls N.Y.C. evening</p>	<p><b>9565 kc. VUB</b> -B. 31.36 meters BOMBAY, INDIA 11 a.m.-12:30 p.m., Wed., Thurs., Sat.</p>
<p><b>14500 kc. LSM2</b> -C. 20.69 meters HURLINGHAM, ARGENTINA Calls U. S., evening</p>	<p><b>12000 kc. ★RNE</b> -B. 25 meters MOSCOW, U. S. S. R. Sun. 6-9, 10-11 a.m., 3-6 p.m. Daily 3-6 p.m., Wed. also 5-6 a.m.</p>	<p><b>11000 kc. PLP</b> -B-C. 27.27 meters BANDOENG, JAVA Relays NIRM programs 5:30-11 a.m. irregular</p>	<p><b>9890 kc. LSN</b> -C. 30.33 meters HURLINGHAM, ARGENTINA Calls New York, evenings</p>	<p><b>9560 kc. ★DJA</b> -B. 31.38 meters BROADCASTING HOUSE, BERLIN 5:05-9:15 p.m. 12:30-2 a.m. 8-11:30 a.m.</p>
<p><b>14485 kc. TIR</b> -C. 20.71 meters CARTAGO, COSTA RICA Phones Cen. Amer. &amp; U.S.A. Daytime</p>	<p><b>11991 kc. FZS2</b> -C. 25.02 meters SAIGON, INDO-CHINA Phones Paris, morning</p>	<p><b>10990 kc. ZLT</b> -C. 27.3 meters WELLINGTON, N. ZEALAND Phones Australia and England early a.m. Also broadcasts ir- regularly on Sunday, 9-10 a.m.</p>	<p><b>9870 kc. WON</b> -C. 30.4 meters LAWRENCEVILLE, N. J. Phones England, evening</p>	<p><b>9560 kc. ★DJA</b> -B. 31.38 meters BROADCASTING HOUSE, BERLIN 5:05-9:15 p.m. 12:30-2 a.m. 8-11:30 a.m.</p>
<p><b>14485 kc. HPF</b> -C. 20.71 meters PANAMA CITY, PAN. Phones WNC daytime</p>	<p><b>11950 kc. KKQ</b> -X. 25.10 meters BOLINAS, CALIF. Tests, irregularly, evenings</p>	<p><b>10770 kc. GBP</b> -C. 27.85 meters RUGBY, ENGLAND Calls Sydney, Austral. early a. m.</p>	<p><b>9860 kc. ★EAQ</b> -B. 30.43 meters P. O. Box 951 MADRID, SPAIN Daily 5:15-7:30 p.m.; Saturday also 12 n.-2 p.m.</p>	<p><b>9540 kc. ★DJN</b> -B. 31.45 meters BROADCASTING HOUSE BERLIN, GERMANY 12:30-2 a.m. 3:45-7:15 a.m. 5:05-10:45 p.m.</p>
<p><b>14485 kc. TGF</b> -C. 20.71 meters GUATEMALA CITY, GUAT. Phones WNC daytime</p>	<p><b>11940 kc. FTA</b> -C. 25.13 meters STE. ASSISE, FRANCE Phones CNR morning, Hurlingham, Arge., nights</p>	<p><b>10740 kc. ★JVM</b> -C. 27.93 meters NAZAKI, JAPAN Phones California evenings</p>	<p><b>9840 kc. JYS</b> -X. 30.49 meters KEMIKAWA-CHO, CHIBA- KEN, JAPAN Irregular, 4-7 a. m.</p>	<p><b>9530 kc. ★W2XAF</b> -B. 31.48 meters GENERAL ELECTRIC CO. SCHENECTADY, N. Y. Relays WGY 6:30 p.m.-12 m. Sun. 4:15 p.m.-12 m.</p>
<p><b>14485 kc. YNA</b> -C. 20.71 meters MANAGUA, NICARAGUA Phones WNC daytime</p>	<p><b>11890 kc. ★</b> -B. 25.23 meters "RADIO COLONIAL" PARIS, FRANCE 11:50 a.m.-6 p.m.</p>	<p><b>10675 kc. WNB</b> -C. 28.1 meters LAWRENCEVILLE, N. J. Calls Bermuda, daytime</p>	<p><b>9800 kc. LSE</b> -C. 30.61 meters MONTE GRANDE, ARGENTINA Tests irregularly</p>	<p><b>9518 kc. ★VK3ME</b> -B. 31.54 meters AMALGAMATED WIRELESS, Ltd. G. P. O. Box 1272L MELBOURNE, AUSTRALIA Daily except Sun. 5:00-7:00 a. m.</p>
<p><b>14470 kc. WMF</b> -C. 20.73 meters LAWRENCEVILLE, N. J. Phones England morning and afternoon</p>	<p><b>11870 kc. ★W8XK</b> -B. 25.26 meters WESTINGHOUSE ELECTRIC &amp; MFG. CO. PITTSBURGH, PA. 5-9 p.m. Fri. 11:12 m Relays KDKA</p>	<p><b>10660 kc. ★JVN</b> -C. 28.14 meters NAZAKI, JAPAN Broadcasts irregularly 2-7:45 a.m.</p>	<p><b>9790 kc. GCW</b> -C. 30.64 meters RUGBY, ENGLAND Calls N.Y.C., evening</p>	<p><b>9510 kc. ★GSB</b> -B. 31.55 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column</p>
<p><b>14440 kc. GBW</b> -C. 20.78 meters RUGBY, ENGLAND Calls U.S.A., afternoon</p>	<p><b>11860 kc. GSE</b> -B. 25.29 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column</p>	<p><b>10550 kc. WOK</b> -C. 28.44 meters LAWRENCEVILLE, N. J. Phones Arge., Braz., Peru, nights</p>	<p><b>9760 kc. VLJ-VLZ2</b> -C. 30.74 meters AMALGAMATED WIRELESS OF AUSTRALIA SYDNEY, AUSTRALIA Phones Java and N. Zealand early a.m.</p>	<p><b>9501 kc. ★PRF5</b> -B. 31.58 meters RIO DE JANEIRO, BRAZIL Daily except Sun. 5:30-6:15 p. m.</p>
<p><b>13990 kc. GBA</b> -C. 21.44 meters RUGBY, ENGLAND Calls Buenos Aires, late afternoon</p>	<p><b>11830 kc. W2XE</b> -B. 25.36 meters ATLANTIC BROADCASTING CORP. 485 MADISON AVE., N. Y. C.</p>	<p><b>10520 kc. VLK</b> -C. 28.51 meters SYDNEY, AUSTRALIA Calls Rugby, early a.m.</p>	<p><b>9750 kc. WOF</b> -C. 30.77 meters LAWRENCEVILLE, N. J. Phones England, evening</p>	<p><b>9501 kc. ★PRF5</b> -B. 31.58 meters RIO DE JANEIRO, BRAZIL Daily except Sun. 5:30-6:15 p. m.</p>
<p><b>13610 kc. JYK</b> -C. 22.04 meters KEMIKAWA-CHO, CHIBA- KEN, JAPAN Phones California till 11 p. m.</p>	<p><b>11810 kc. ★2RO</b> -B. 25.4 meters E.I.A.R. Via Montello 5 ROME, ITALY 8:15-9 a.m., 9:15-10:15 a.m., 2:30-5 p.m.</p>	<p><b>10430 kc. YBG</b> -C. 28.76 meters MEDAN, SUMATRA 5:30-6:30 a. m., 7:30-8:30 p. m.</p>	<p><b>9710 kc. GCA</b> -C. 30.89 meters RUGBY, ENGLAND Calls Arge. &amp; Brazil, evenings</p>	<p><b>9428 kc. ★COH</b> -B. 31.8 meters 2 B ST., VEDADO, HAVANA, CUBA 10 a.m.-12 n., 4-6:30, 8-10 p.m. also 11 a.m.-12 N. Thurs.</p>
<p><b>13585 kc. GBB</b> -C. 22.08 meters RUGBY, ENGLAND Calls Egypt &amp; Canada, afternoon</p>	<p><b>11800 kc. CO9WR</b> -X. 25.42 meters P. O. Box 85 SANCTI SPIRITUS, CUBA Testing in early evening</p>	<p><b>10420 kc. XGW</b> -C. 28.79 meters SHANGHAI, CHINA Calls Manila and China, 6-9 a.m. and California late evening</p>	<p><b>9700 kc. GCA</b> -C. 30.89 meters RUGBY, ENGLAND Calls Arge. &amp; Brazil, evenings</p>	<p><b>9415 kc. PLV</b> -C. 31.87 meters BANDOENG, JAVA Phones Holland around 9:45 a.m. Broadcasts Tues. and Thurs. 10-10:30 a.m.</p>
<p><b>13415 kc. GCJ</b> -C. 22.36 meters RUGBY, ENGLAND Calls Japan &amp; China early morning</p>	<p><b>11790 kc. W1XAL</b> -B. 25.45 meters BOSTON, MASS. Tues., Thurs. 7:30-9 p.m., Sun. 5-7 p.m.</p>	<p><b>10410 kc. PDK</b> -C. 28.80 meters KOOTWIJK, HOLLAND Calls Java 7:30-9:40 a. m.</p>	<p><b>9625 kc. ★CT1AA</b> -B. 31.17 meters LISBON, PORTUGAL Tues., Thurs., Sat. 4:30-7 p.m.</p>	<p><b>9330 kc. CJA2</b> -C. 32.15 meters DRUMMONDVILLE, CANADA Phones England irregularly</p>
<p><b>13390 kc. WMA</b> -C. 22.40 meters LAWRENCEVILLE, N. J. Phones England morning and afternoon</p>	<p><b>11770 kc. ★DJD</b> -B. 25.49 meters BROADCASTING HOUSE, BERLIN, GERMANY 12-4:30, 5:05-10:45 p.m.</p>	<p><b>10410 kc. KES</b> -X. 28.80 meters BDLINAS, CALIF. Tests evenings</p>	<p><b>9595 kc. ★HBL</b> -B. 31.27 meters LEAGUE OF NATIONS GENEVA, SWITZERLAND Saturdays, 5:30-6:15 p. m. Mon. at 1:45 a.m.</p>	<p><b>9280 kc. GCB</b> -C. 32.33 meters RUGBY, ENGLAND Calls Can. &amp; Egypt, evening</p>
<p><b>13345 kc. YVC</b> -O. 22.48 meters MARACAY, VENEZUELA Calls Hialeah daytime</p>	<p><b>11750 kc. ★GSD</b> -B. 25.53 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column</p>	<p><b>10350 kc. LSX</b> -C. 28.98 meters MONTE GRANDE, ARGENTINA Tests irregularly 8 p.m.-12 mid- night.</p>	<p><b>9590 kc. ★VK2ME</b> -B. 31.28 meters AMALGAMATED WIRELESS, LTD. 47 YORK ST. SYDNEY AUSTRALIA For October, Sunday 12:30-2:30, 4:30-8:30, 9:30-11:30 a.m.</p>	<p><b>9170 kc. WNA</b> -C. 32.72 meters LAWRENCEVILLE, N. J. Phones England, evening</p>
<p><b>13075 kc. VPD</b> -X. 22.94 meters SUVA, FIJI ISLANDS Daily exc. Sun. 12:30-1:30 a.m.</p>	<p><b>11730 kc. PHI</b> -B. 25.57 meters HUIZEN, HOLLAND Daily exc. Tues. and Wed. 8:30- 10:30 a.m., Sun. 8:30-11:30 a.m.</p>	<p><b>10330 kc. ORK</b> -B-C. 29.04 meters RUYSELEDE, BELGIUM Broadcasts 1:30-3 p.m.</p>	<p><b>9590 kc. W3XAU</b> -B. 31.28 meters NEWTOWN SQUARE, PA. Relays WCAU 12 N-7:50 p.m.</p>	<p><b>9125 kc. HAT4</b> -B. 32.88 meters "RADIOLABOR" GYALI-UT, 22 BUDAPEST, HUNGARY Sunday 6-7 p.m.</p>
<p><b>12840 kc. WOO</b> -C. 23.36 meters OCEAN GATE, N. J. Calls ships</p>	<p><b>11715 kc. ★</b> -B. 25.61 meters "RADIO COLONIAL" PARIS, FRANCE 7-10:10 p.m. 11 p.m.-1 a.m., 6-8:10 a.m.</p>	<p><b>10300 kc. LSL2</b> -C. 29.13 meters HURLINGHAM, ARGENTINA Calls Europe, evenings</p>	<p><b>9580 kc. ★GSC</b> -B. 31.32 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column</p>	<p><b>9060 kc. TFK</b> -C. 33.11 meters REYKJAVIK, ICELAND Phones London afternoons. Broadcasts irregularly.</p>
<p><b>12825 kc. CNR</b> -B. C. 23.39 meters DIRECTOR GENERAL Telegraph and Telephone Stations, Rabat, Morocco Broadcasts, Sunday, 7:30-9 a. m.</p>	<p><b>11710 kc. ★HJ4BA</b> -B. 25.62 meters P. O. BOX 50, MEDELLIN, COLOMBIA 11:30 a.m.-1 p.m., 6:30-10:30 p.m.</p>	<p><b>10290 kc. DIQ</b> -X. 29.16 meters KONIGSWISTER PHAUSEN, GERMANY Broadcasts irregularly</p>	<p><b>9580 kc. ★VK3LR</b> -B. 31.32 meters Research Section, Postmaster Gen'l's. Dept., 61 Little Collins St., MELBOURNE, AUSTRALIA 4-8:30 a.m. except Sun. also Fri. 10:30 p.m.-2 a.m.</p>	<p><b>9020 kc. GCS</b> -C. 33.26 meters RUGBY, ENGLAND Calls N.Y.C., evenings</p>
<p><b>12800 kc. IAC</b> -C. 23.45 meters PISA, ITALY Calls Italian ships, morning</p>	<p><b>11710 kc. ★HJ4BA</b> -B. 25.62 meters P. O. BOX 50, MEDELLIN, COLOMBIA 11:30 a.m.-1 p.m., 6:30-10:30 p.m.</p>	<p><b>10260 kc. PMN</b> -C. 29.24 meters BANDOENG, JAVA Calls Australia 5 a.m.</p>	<p><b>9580 kc. ★VK3LR</b> -B. 31.32 meters Research Section, Postmaster Gen'l's. Dept., 61 Little Collins St., MELBOURNE, AUSTRALIA 4-8:30 a.m. except Sun. also Fri. 10:30 p.m.-2 a.m.</p>	<p><b>9010 kc. KEJ</b> -C. 33.3 meters BOLINAS, CAL. Relays NBC &amp; CBS Programs in evening irregularly</p>
<p><b>12780 kc. GBC</b> -C. 23.47 meters RUGBY, ENGLAND Calls ships</p>	<p><b>12396 kc. CT1GO</b> -B. 24.2 meters PAREDO, PORTUGAL Sun. 10-11:30 a.m., Tues., Thur., Fri. 1:00-2:15 p.m.</p>	<p><b>10220 kc. PSH</b> -C. 29.35 meters RIO DE JANEIRO, BRAZIL</p>	<p><b>9580 kc. ★VK3LR</b> -B. 31.32 meters Research Section, Postmaster Gen'l's. Dept., 61 Little Collins St., MELBOURNE, AUSTRALIA 4-8:30 a.m. except Sun. also Fri. 10:30 p.m.-2 a.m.</p>	<p><b>8795 kc. HKV</b> -B. 33.09 meters BOGOTA, COLOMBIA Irregular; 6:30 p.m.-12 m.</p>

(All Schedules Eastern Standard Time)



<p><b>8775 kc. PNI</b> -C- 34.19 meters MAKASSAR, CELEBES, N.I. Phons Java around 4 a. m.</p> <p><b>8760 kc. GCQ</b> -C- 34.25 meters RUGBY, ENGLAND Calls S. Africa, afternoon</p> <p><b>8750 kc. ZEK</b> -B- 34.29 meters HONGKONG, CHINA Relays ZBW Daily 11:30 p. m.-1:15 a. m. Mon. and Thurs. 3-7 a. m. Tues., Wed., Fri. 6-10 a. m. Sat. 6-11 a. m.</p> <p><b>8730 kc. GCI</b> -C- 34.36 meters RUGBY, ENGLAND Calls India, 8 a. m.</p> <p><b>8680 kc. GBC</b> -C- 34.58 meters RUGBY, ENGLAND Calls ships</p> <p><b>8560 kc. WOO</b> -C- 35.05 meters OCEAN GATE, N. J. Calls ships irregular</p> <p><b>8380 kc. IAC</b> -C- 35.8 meters Pisa, Italy</p> <p><b>8220 kc. ZP10</b> -B- 36.4 meters ASUNCION, PARAGUAY 7-9 p. m.</p> <p><b>8214 kc. HCJB</b> -B- 36.5 meters QUITO, ECUADOR 7-11 p. m., except Monday Sun. 11 a. m.-12 n.; 4-10 p. m.</p> <p><b>8185 kc. PSK</b> -C- 36.65 meters RIO DE JANEIRO, BRAZIL Irregularly</p> <p><b>8036 kc. CNR</b> -B- 37.33 meters RABAT, MOROCCO Sunday, 2:30-5 p. m.</p> <p><b>7901 kc. LSL</b> -C- 37.97 meters HURLINGHAM, ARGENTINA Calls Brazil, night</p> <p><b>7880 kc. JYR</b> -B- 38.07 meters KEMIKAWA-CHO, CHIBAKEN, JAPAN 4-7:40 a. m.</p> <p><b>7860 kc. HC2JSB</b> -B- 38.17 meters GUAYAQUIL, ECUADOR 8:15-11:15 p. m.</p> <p><b>7799 kc. HBP</b> -B- 38.47 meters LEAGUE OF NATIONS, GENEVA, SWITZERLAND 5:30-6:15 p. m., Saturday</p> <p><b>7715 kc. KEE</b> -C- 38.89 meters BOLINAS, CAL. Relays NBC &amp; CBS Programs in evening irregularly</p> <p><b>7630 kc. ZHJ</b> -B- 39.32 meters PENANG, MALAYA Daily 7-9 a. m. also Sat. 11 p. m.-1 a. m. (Sun.)</p> <p><b>7510 kc. JVP</b> -C- 39.95 meters NAZAKI, JAPAN Heard irregularly</p> <p><b>7400 kc. HJ3ABD</b> -B- 40.54 meters P. O. Box 509 BOGOTA, COLOMBIA Daily 12-2 p. m.; 7-11 p. m. Sunday, 5-9 p. m.</p> <p><b>7380 kc. XECR</b> -B- 40.65 meters FOREIGN OFFICE, MEXICO CITY, MEX. Sun. 6-7 p. m.</p> <p><b>7310 kc. HJ1ABD</b> -B- 41.04 meters CARTAGENA, COLO. Irregularly, evenings</p> <p><b>7100 kc. HKE</b> -B- 42.25 meters BOGOTA, COL., S. A. Tue. and Sat. 8-9 p. m.; Mon. &amp; Thurs. 6:30-7 p. m.</p> <p><b>7030 kc. HRP1</b> -B- 42.67 meters SAN PEDRO SULA, HONDURAS Reported on this and other waves irregularly in evening</p>	<p><b>7000 kc. HJ5ABE</b> -B- 42.86 meters CALI, COLUMBIA Irregular in evening</p> <p><b>6905 kc. GDS</b> -C- 43.45 meters RUGBY, ENGLAND Calls N.Y.C. evening</p> <p><b>6860 kc. KEL</b> -X- 43.70 meters BOLINAS, CALIF. Tests Irregularly 11 a. m.-12 n.; 6-9 p. m.</p> <p><b>6800 kc. HIH</b> -B- 44.12 meters SAN PEDRO de MACORIS DOMINICAN REP. 12:10-1:40 p. m., 6:40-7:40 p. m., Sun. 3-4 a. m. 12:10-1:40 p. m., 2:20-4:40 p. m.</p> <p><b>6755 kc. WOA</b> -C- 44.41 meters LAWRENCEVILLE, N. J. Phons England, evening</p> <p><b>6750 kc. JVT</b> -X- 44.44 meters NAZAKI, JAPAN KOKUSAI DENWA KAISHA, LTD., TOKIO Broadcasts 2-7:45 a. m.</p> <p><b>6710 kc. TIEP</b> -B- 44.71 meters LA-VOZ DEL TROPICO SAN JOSE, COSTA RICA APARTADO 257, Daily 7-10 p. m.</p> <p><b>6672 kc. YVQ</b> -C- 44.95 meters MARACAY, VENEZUELA Broadcasts Sat. 8-9 p. m.</p> <p><b>6650 kc. HC2RL</b> -B- 45.06 meters P. O. BOX 759, GUAYAQUIL, ECUADOR, S. A. Sunday, 5:45-7:45 p. m. Tues., 9:15-11:15 p. m.</p> <p><b>6650 kc. IAC</b> -C- 45.1 meters PISA, ITALY Calls ships, evenings</p> <p><b>6620 kc. PRADO</b> -B- 45.30 meters RIOBAMBA, ECUADOR Thurs. 9-11:45 p. m.</p> <p><b>6611 kc. RV72</b> -B- 45.38 meters MOSCOW, U. S. S. R. 1-6 p. m.</p> <p><b>6610 kc. HI4D</b> -B- 45.39 meters SANTO DOMINGO, DOMINICAN REPUBLIC Except Sun. 11:55 a. m.-1:40 p. m.; 4:40-7:40 p. m.</p> <p><b>6550 kc. TIRCC</b> -B- 45.77 meters RADIDEMISORA CATOLICA COSTARRICENSE SAN JOSE, COSTA RICA Irregularly 12n-2 p. m. and 5-7 p. m.</p> <p><b>6550 kc. TI2PG</b> -B- 45.77 meters APARTADO 225, SAN JOSE, COSTA RICA "Costa Rica Broadcasting" 9-10 p. m.</p> <p><b>6528 kc. HIL</b> -B- 45.95 meters SANTO DOMINGO, D.R. Sat., 8-10 p. m.</p> <p><b>6520 kc. YV6RV</b> -B- 46.01 meters VALENCIA, VENEZUELA 5-7, 9-11 p. m., irregular</p> <p><b>6500 kc. HJ5ABD</b> -B- 46.15 meters MANIZALES, COL. 12:1-30 p. m., 7-10 p. m.</p> <p><b>6447 kc. HJ1ABB</b> -B- 46.53 meters BARRANQUILLA, COL., S. A. P. O. BOX 715, 11:30 a. m.-1 p. m.; 5-10 p. m.</p> <p><b>6425 kc. W3XL</b> -X- 46.70 meters NATIONAL BROADCASTING CO. BOUND BROOK, N. J. Tests Irregularly</p> <p><b>6425 kc. VE9AS</b> -X- 46.7 meters FREDERICTON, N.B., CANADA Operates Irregularly</p>	<p><b>6385 kc. YN1GG</b> -B- 46.99 meters "LA VOZ de LOS LAGOS," MANAGUA, NICARAGUA Irregular in evening</p> <p><b>6375 kc. YV4RC</b> -B- 47.06 meters CARACAS VENEZUELA 4:30-10:30 p. m.</p> <p><b>6316 kc. HIZ</b> -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.</p> <p><b>6250 kc. HJ4ABC</b> -B- 48 meters PERIERA, COL. 9:30-11:30 a. m., 7-8 or 9 p. m.</p> <p><b>6230 kc. OAX4G</b> -B- 48 meters Apartado 1242 LIMA, PERU Wed. &amp; Sun. 7-10 p. m.</p> <p><b>6198 kc. CT1GO</b> -B- 48.4 meters Portuguese Radio Club, PAREDE, PORTUGAL Sun. 11:30 a. m.-1 p. m. Daily exe. Tues. 7:20-8:30 p. m.</p> <p><b>6185 kc. HI1A</b> -B- 48.5 meters P. O. BOX 423, SANTIAGO, DOMINICAN REP. 11:40 a. m.-1:40 p. m. 7:40-9:40 p. m.</p> <p><b>6175 kc. HJ2ABA</b> -B- 48.58 meters TUNJA, COLOMBIA 1-2; 7:30-9:30 p. m.</p> <p><b>6170 kc. HJ3ABF</b> -B- 48.62 meters BOGOTA, COLOMBIA 6-11 p. m.</p> <p><b>6160 kc. YV3RC</b> -B- 48.7 meters CARACAS, VENEZUELA Generally 4:00-10:00 p. m.</p> <p><b>6155 kc. CO9GC</b> -B- 48.74 meters GRAU &amp; CAMENERS LABS. BOX 137, SANTIAGO, CUBA 9-10 a. m., 11:30 a. m.-1:30 p. m., 3-4:30 p. m., 10-11 p. m., 12 m.-2 a. m.</p> <p><b>6150 kc. CSL</b> -B- 48.78 meters LISBON, PORTUGAL 7:8:30 a. m., 2-7 p. m.</p> <p><b>6150 kc. CJRO</b> -B- 48.78 meters WINNIPEG, MAN., CANADA 8 p. m.-12 m. Sun. 3-10:30 p. m.</p> <p><b>6140 kc. W8XK</b> -B- 48.88 meters WESTINGHOUSE ELECTRIC &amp; MFG. CO., PITTSBURGH, PA. Relays KOKA 9 p. m.-1 a. m.</p> <p><b>6130 kc. COCD</b> -B- 48.92 meters "La Voz del Aire" CALLE G y 25, VEDADO, HAVANA, CUBA Relays CMCD 8 p. m.-12 m.</p> <p><b>6130 kc. HJ1ABE</b> -B- 48.92 meters CARTAGENA, COL. P. O. Box 31 Daily 11:15 a. m.-1 p. m.; Sun. 9-11 a. m.; Mon. 10 p. m.-12 m. Wed. 8-11 p. m.</p> <p><b>6130 kc. ZGE</b> -B- 48.92 meters KUALA LUMPUR, FED. MALAY STATES Sun., Tue. and Fri., 6:40-8:40 a. m.</p> <p><b>6120 kc. VQ7LO</b> -B- 49.02 meters NAIROBI, KENYA, AFRICA Mon.-Fri. 5:45-6:15 a. m., 11:30 a. m.-2:30 p. m. Also 8:30-9:30 a. m. on Tues. and Thurs. Sat. 11:30 a. m.-3:30 p. m. Sun. 11 a. m.-2 p. m.</p> <p><b>6120 kc. W2XE</b> -B- 49.02 meters ATLANTIC BROADCASTING CORP. 485 MADISON AVE., N. Y. C. Relays WABC, 6-11 p. m.</p>	<p><b>6112 kc. YV2RC</b> -B- 49.08 meters CARACAS, VENEZUELA Sun. 8:30 a. m.-10:30 p. m. Daily except Sun. 11 a. m.-1:30 p. m., 4-9:30 p. m.</p> <p><b>6110 kc. GSL</b> -B- 49.10 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" column</p> <p><b>6110 kc. VUC</b> -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.</p> <p><b>6110 kc. HJ4ABB</b> -B- 49.1 meters MANIZALES, COL., S. A. P. O. Box 175 Mon. to Fri. 12:15-1 p. m.; Tues. &amp; Fri. 7:30-10 p. m.; Sun. 2:30-5 p. m.</p> <p><b>6100 kc. W3XAL</b> -B- 49.18 meters NATIONAL BROADCASTING CO. BOUND BROOK, N. J. Relays WJZ Monday, Wednesday, Saturday, 6 p. m.-12 m.</p> <p><b>6100 kc. W9XF</b> -B- 49.18 meters DOWNERS GROVE, ILL. Relays WENR, Chicago Daily except Mon., Wed. &amp; Sat. 2:30 p. m.-1 a. m. Mon., Wed., 2:30-4:5 p. m.-2 a. m. Sat 2:30-4:5 p. m.-11 p. m.</p> <p><b>6097 kc. JB</b> -B- 49.2 meters AFRICAN BROADCASTING CO. JOHANNESBURG, SOUTH AFRICA. Sun.-Fri. 11:45 p. m. 12:30 a. m. (next day) Mon.-Sat. 3:30-7 a. m. 9 a. m.-4 p. m. Sun. 8-10:15 a. m.; 12:30-3 p. m.</p> <p><b>6090 kc. VE9GW</b> -B- 49.26 meters BOWMANVILLE, ONTARIO, CANADA</p> <p><b>6090 kc. VE9BJ</b> -B- 49.26 meters SAINT JOHN, N. B., CAN. 7-8:30 p. m.</p> <p><b>6080 kc. CP5</b> -B- 49.34 meters LAPAZ, BOLIVIA 7-10:30 p. m.</p> <p><b>6080 kc. W9XAA</b> -B- 49.34 meters CHICAGO FEDERATION OF LABOR CHICAGO, ILL. Relays WCFL Sunday 11:30 a. m.-9 p. m. and Tues., Thurs., Sat., 4 p. m.-12 m.</p> <p><b>6072 kc. OER2</b> -B- 49.41 meters VIENNA, AUSTRIA 9 a. m.-5, 7-10 p. m.</p> <p><b>6070 kc. HP5H</b> -B- 49.42 meters COLON, PANAMA Testing in evening.</p> <p><b>6070 kc. VE9CS</b> -B- 49.42 meters VANCOUVER, B. C., CANADA Sun. 1:45-9 p. m., 10:30 p. m.-1 a. m.; Tues. 6-7:30 p. m., 11:30 p. m.-1:30 a. m. Daily 6:7-30 p. m.</p> <p><b>6065 kc. HJ4ABL</b> -B- 49.46 meters MANIZALES, COL. Daily 11 a. m.-12 n., 5:30-7:30 p. m. Sat. 10:30-11:30 p. m.</p> <p><b>6060 kc. OXY</b> -B- 49.50 meters SKAMLEBOAEK, DENMARK 1-6:30 p. m.; also 11 a. m.-12 n. Sunday</p> <p><b>6060 kc. W8XAL</b> -B- 49.50 meters CROSLY RADIO CORP. CINCINNATI, OHIO 6:30 a. m.-7 p. m.; 10 p. m.-1 a. m. Relays WLW</p> <p><b>6060 kc. W3XAU</b> -B- 49.50 meters NEWTOWN SQUARE, PA. Relays WCAU Philadelphia 8 p. m.-11 p. m.</p>	<p><b>6050 kc. GSA</b> -B- 49.58 meters DAVENTRY, B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND See "When to Listen In" Column.</p> <p><b>6045 kc. HJ3ABI</b> -B- 49.63 meters BOGOTA, COLO. Irregular in evening</p> <p><b>6042 kc. HJ1ABG</b> -B- 49.65 meters BARRANQUILLA, COLO. 12 n.-1 p. m., 6-10 p. m. Sun. 1-6 p. m.</p> <p><b>6040 kc. PRA8</b> -B- 49.67 meters RADIO CLUB OF PERNAMBUCCO PERNAMBUCCO, BRAZIL 3:00-3:30 p. m. and from about 4-7 p. m. daily</p> <p><b>6040 kc. W1XAL</b> -B- 49.67 meters BOSTON, MASS.</p> <p><b>6030 kc. HP5B</b> -B- 49.75 meters P. O. BOX 910 PANAMA CITY, PAN. 12 N.-1 p. m., 8-10:30 p. m.</p> <p><b>6030 kc. VE9CA</b> -B- 49.75 meters CALGARY, ALBERTA, CAN. Thurs. 9 a. m.-2 a. m. (Fri.); Sun. 12 n.-12 m. Irregularly on other days from 9 a. m.-12 m.</p> <p><b>6020 kc. CQN</b> -B- 49.83 meters MACAO, CHINA Mon. and Fri. 3-5 a. m.</p> <p><b>6020 kc. DJC</b> -B- 49.83 meters BROADCASTING HOUSE, BERLIN 12 n.-4:30 p. m., 5:05-10:45 p. m.</p> <p><b>6020 kc. HJ3ABH</b> -B- 49.83 meters BOGOTA, COLO. APARTADO 565 7-11 p. m.</p> <p><b>6018 kc. ZHI</b> -B- 49.8 meters RADIO SERVICE CO., 20 ORCHARD RD., SINGAPORE, MALAYA Mon., Wed. and Thurs 5:40-8:10 a. m. Sat. 10:40 p. m.-1:10 a. m. (Sun.) Every other Sunday 5:10-6:40 a. m.</p> <p><b>6010 kc. COCO</b> -B- 49.92 meters P. O. BOX 98 HAVANA, CUBA Daily 9:30-11 a. m., 4-7 p. m. and 8-10 p. m. Sat. also 11:30 p. m.-1:30 a. m.</p> <p><b>6000 kc. TGW</b> -B- 50 meters GUATEMALA CITY, GUAT. 12n-2 p. m., 7:30-8:30 p. m., 10 p. m.-12 m. Sat. also from 12 m.-6 a. m. (Sun.)</p> <p><b>6000 kc. RV59</b> -B- 50 meters MOSCOW, U. S. S. R.</p> <p><b>5990 kc. XEBT</b> -B- 50.08 meters MEXICO CITY, MEX. P. O. Box 79-44 8 a. m.-1 a. m.</p> <p><b>5980 kc. XECW</b> -B- 50.17 meters CALLE del BAJIO 120 MEXICO CITY, MEX. 4-4:30 p. m., 10:30 p. m., 12 m.</p> <p><b>5980 kc. HIX</b> -B- 50.17 meters SANTO DOMINGO, DOMINICAN REP. Sun. 7:10 a. m.; Tues. and Fri. 11:10 a. m., 4:40 and 8:10 p. m.; Mon., Wed., Thurs. and Sat. 11:10 a. m. and 4:40 p. m.</p> <p><b>5968 kc. HVJ</b> -B- 50.27 meters VATICAN CITY (ROME) 2-2:15 p. m., daily, Sun., 5-5:30 a. m.</p> <p><b>5950 kc. HJ1ABJ</b> -B- 50.42 meters SANTA MARTA, COLO. 11 a. m.-1 p. m., 7-9 p. m.</p> <p><b>5950 kc. HJ4ABE</b> -B- 50.42 meters MEDELLIN, COLO. Mon. 7-11 p. m., Tues., Thurs., Sat. 6:30-8 p. m., Wed. and Fri. 7:30-11 p. m.</p>
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(All Schedules Eastern Standard Time)

<p><b>5940 kc. TG2X</b> -B- 50.5 meters GUATEMALA CITY, GUAT. 4-6, 9-10 p.m.</p>	<p><b>5780 kc. OAX4D</b> -B- 51.9 meters P.O. Box 853 LIMA, PERU Mon., Wed. &amp; Sat. 9-11:30 p.m.</p>	<p><b>5500 kc. T15HH</b> -B- 54.55 meters SAN RAMON, COSTA RICA Irregularly around 9:45 p.m.</p>	<p><b>4752 kc. WOO</b> -C- 63.1 meters OCEAN GATE, N. J. Calls ships irregularly</p>	<p><b>4098 kc. WND</b> -C- 73.21 meters HIALEAH, FLORIDA Calls Bahama Isles</p>
<p><b>5890 kc. HJ2ABC</b> -B- 50.97 meters CUCUTA, COL.</p>	<p><b>5714 kc. HCK</b> -B- 52.5 meters QUITO, ECUADOR, S. A.</p>	<p><b>5077 kc. WCN</b> -C- 59.08 meters LAWRENCEVILLE, N. J. Phones England irregularly</p>	<p><b>4600 kc. HC2ET</b> -B- 65.22 meters Apartado 249 GUAYACUIL, ECUADOR Reported Wed. Sat. 9-11:30 p.m.</p>	<p><b>4002 kc. CT2AJ</b> -B- 74.95 meters PONTA DELGADA, SAO MIGUEL, AZORES Wed. and Sat. 5-7 p.m.</p>
<p><b>5853 kc. WOB</b> -C- 51.26 meters LAWRENCEVILLE, N. J. Calls Bermuda, nights</p>	<p><b>5713 kc. TGS</b> -B- 52.51 meters GAUTEMALA CITY, GUAT. Tues., Thurs., and Sun. 6-8 p.m.</p>	<p><b>5025 kc. ZFA</b> -C- 59.7 meters HAMILTON, BERMUDA Calls U.S.A., nights</p>	<p><b>4470 kc. YDB</b> -B- 67.11 meters N.I.R.O.M. SOERABAJA, JAVA 10:30 p.m.-1:30 a.m., 5:30-11 a.m., 5:45-6:45 p.m.</p>	<p><b>3543 kc. CR7AA</b> -B- 84.67 meters P. O. BOX 594 LOURENCO MARQUES, MO- ZAMBIQUE, E. AFRICA 1:30-3:30 p.m., Mon., Thurs., and Sat.</p>
<p><b>5825 kc. TIGPH</b> -B- 51.5 meters SAN JOSE, COSTA RICA 6:15-11 p.m.</p>	<p><b>5660 kc. HJ5ABC</b> -B- 53 meters CALI, COLOMBIA 11 a. m.-12 N. Tues. and Thurs. 8-10 p. m. Sun. 12 N.-1 p. m.</p>	<p><b>5000 kc. TFL</b> -C- 60 meters REYKJAVIK, ICELAND Calls London at night. Also broadcasts irregularly</p>	<p><b>4320 kc. GDB</b> -C- 69.44 meters RUGBY, ENGLAND Tests, 8-11 p. m.</p>	<p><b>3490 kc. YDH3</b> -B- 85.96 meters BANDONG, JAVA Daily except Fri., 4:30-5:30 a. m.</p>
<p><b>5790 kc. JVV</b> -C- 51.81 meters NAZAKI, JAPAN Broadcasts 2-7:45 a.m.</p>	<p><b>5650 kc. YV5RMO</b> -B- 53.1 meters CALLE REGISTRO, LAS DE- LICIAS APARTADO de COR- REO 214 MARACAIBO, VENEZUELA 11:30 a.m.-1 p.m., 5:30-10 p.m.</p>	<p><b>4975 kc. GBC</b> -C- 60.30 meters RUGBY, ENGLAND Calls Ships, late at night</p>	<p><b>4273 kc. RV15</b> -B- 70.20 meters KHABAROVSK, SIBERIA, U. S. S. R. Daily, 3-9 a.m.</p>	<p><b>3040 kc. YDA</b> -B- 98.68 meters N.I.R.O.M. TANDJONGPRIOK, JAVA 10:30 p.m.-1:30 a.m., 5:30-11 a.m.</p>
<p><b>5780 kc. HI1J</b> -B- 51.8 meters SAN PEDRO de MACORIS, DOM. REP. 7-9:30 p.m.</p>		<p><b>4820 kc. GDW</b> -C- 62.24 meters RUGBY, ENGLAND Calls N.Y.C., late at night</p>	<p><b>4272 kc. WOO</b> -C- 70.22 meters OCEAN GATE, N. J. Calls ships irregularly</p>	

(All Schedules Eastern Standard Time)

# Police Radio Alarm Stations

<p><b>CGZ</b> Vancouver, B.C. 2342 kc. <b>CJW</b> St. Johns, N.B. 2390 kc. <b>CJZ</b> Verdeen, Que. 2390 kc.</p>	<p>Portable-Mobile In State of Wash. 2490 kc.</p>	<p><b>KNFB</b> Idaho Falls, Idaho 2414 kc. <b>KNFC</b> SS Gov. Stevens, (Wash.) 2490 kc. <b>KNFD</b> SS Gov. J. Rogers, (Wash.) 2490 kc. <b>KNFE</b> Duluth, Minn. 2382 kc. <b>KNFF</b> Leavenworth, Kans. 2422 kc. <b>KNFG</b> Olympia, Wash. 2490 kc. <b>KNFH</b> Garden City, Kans. 2474 kc. <b>KNFI</b> Mt. Vernon, Wash. 2414 kc. <b>KNFJ</b> Pomona, Cal. 1712 kc. <b>KNFK</b> Bellingham, Wash. 2490 kc. <b>KNFL</b> Shuksan, Wash. 2490 kc. <b>KNFM</b> Compton, Cal. 2490 kc. <b>KNFN</b> Waterloo, Iowa 1682 kc. <b>KNFO</b> Storm Lake, Iowa 1682 kc. <b>KNFP</b> Everett, Wash. 2414 kc. <b>KNFQ</b> Skykomish, Wash. 2490 kc. <b>KNGE</b> Cleburne, Tex. 1712 kc. <b>KNGF</b> Sacramento, Cal. 2422 kc. <b>KNGG</b> Phoenix, Ariz. 1698 kc. <b>KNGH</b> Dodge City, Kans. 2474 kc. <b>KNGI</b> El Centro, Cal. 2490 kc. <b>KNGL</b> Dunean, Okla. 2450 kc. <b>KSNE</b> Galveston, Tex. 1712 kc. <b>KSNW</b> Duluth, Minn. 2382 kc. <b>KSP</b> Berkeley, Cal. 1658 kc. <b>KVP</b> Dallas, Tex. 1712 kc. <b>VDM</b> Halifax, N.S. 1690 kc. <b>VYR</b> Montreal, Can. 1706 kc. <b>VYW</b> Winnipeg, Man. 2396 kc. <b>WCK</b> Belle Island, Mich. 2414 kc. <b>WEY</b> Boston, Mass. 1650 kc. <b>WKDT</b> Detroit, Mich. 1650 kc. <b>WKDU</b> Cincinnati, Ohio 1706 kc. <b>WMDZ</b> Indianapolis, Ind. 2442 kc. <b>WMJ</b> Buffalo, N.Y. 2422 kc. <b>WMO</b> Highland Park, Mich. 2414 kc. <b>WMP</b> Framingham, Mass. 1666 kc. <b>WNFP</b> Niagara Falls, N.Y. 2422 kc. <b>WPDA</b> Tulare, Cal. 2414 kc. <b>WPDB</b> Chicago, Ill. 1712 kc. <b>WPDC</b> Chicago, Ill. 1712 kc. <b>WPDD</b> Chicago, Ill. 1712 kc. <b>WPDE</b> Louisville, Ky. 2442 kc. <b>WPDF</b> Flint, Mich. 2466 kc. <b>WPDG</b> Youngstown, Ohio 2458 kc. <b>WPDH</b> Richmond, Ind. 2442 kc. <b>WPGD</b> Columbus, Ohio 2430 kc. <b>WPDJ</b> Milwaukee, Wis. 2450 kc. <b>WPKL</b> Lansing, Mich. 2442 kc. <b>WPKM</b> Dayton, Ohio 2430 kc. <b>WPKN</b> Auburn, N.Y. 2382 kc. <b>WPKO</b> Akron, Ohio 2458 kc. <b>WPKP</b> Philadelphia, Pa. 2474 kc. <b>WPKR</b> Rochester, N.Y. 2422 kc. <b>WPKS</b> St. Paul, Minn. 2430 kc. <b>WPKT</b> Kokomo, Ind. 2490 kc. <b>WPKU</b> Pittsburgh, Pa. 1712 kc. <b>WPKV</b> Charlotte, N.C. 2458 kc. <b>WPKW</b> Washington, D.C. 2422 kc. <b>WPKX</b> Detroit, Mich. 2414 kc. <b>WPKY</b> Atlanta, Ga. 2414 kc. <b>WPDZ</b> Fort Wayne, Ind. 2490 kc. <b>WPEA</b> Syracuse, N.Y. 2382 kc. <b>WPEB</b> Grand Rapids, Mich. 2442 kc. <b>WPEC</b> Memphis, Tenn. 2466 kc. <b>WPED</b> Arlington, Mass. 1712 kc. <b>WPEE</b> New York, N.Y. 2450 kc. <b>WPEF</b> New York, N.Y. 2450 kc. <b>WPEG</b> New York, N.Y. 2450 kc. <b>WPEH</b> Somerville, Mass. 1712 kc. <b>WPEI</b> E. Providence, R.I. 1712 kc. <b>WPEK</b> New Orleans, La. 2430 kc. <b>WPEL</b> W. Bridgewater, Mass. 1666 kc. <b>WPEM</b> Woonsocket, R.I. 2466 kc. <b>WPEO</b> Kenosha, Wis. 2450 kc. <b>WPEP</b> Saginaw, Mich. 2442 kc. <b>WPES</b></p>	<p><b>WPET</b> Lexington, Ky. 1706 kc. <b>WPEV</b> Portable (in Mass.) 1666 kc. <b>WPEW</b> Northampton, Mass. 1666 kc. <b>WPFA</b> Newton, Mass. 1712 kc. <b>WPFC</b> Muskegon, Mich. 2442 kc. <b>WPFE</b> Reading, Pa. 2442 kc. <b>WPFG</b> Jacksonville, Fla. 2442 kc. <b>WPFH</b> Baltimore, Md. 2414 kc. <b>WPFI</b> Columbus, Ga. 2414 kc. <b>WPFJ</b> Hammond, Ind. 1712 kc. <b>WPFK</b> Hackensack, N.J. 2430 kc. <b>WPLL</b> Gary, Ind. 2470 kc. <b>WPFM</b> Birmingham, Ala. 2382 kc. <b>WPFN</b> Fairhaven, Mass. 1712 kc. <b>WPFQ</b> Knoxville, Tenn. 2474 kc. <b>WPFV</b> Clarksville, W.Va. 2490 kc. <b>WPFW</b> Swathmore, Pa. 2474 kc. <b>WPFY</b> Johnson City, Tenn. 2470 kc. <b>WPGS</b> Asheville, N.C. 2474 kc. <b>WPGT</b> Lakeland, Fla. 2442 kc. <b>WPGU</b> Portland, Me. 2422 kc. <b>WPGV</b> Pawtucket, R.I. 2466 kc. <b>WPGW</b> Bridgeport, Conn. 2466 kc. <b>WPGX</b> Palm Beach, Fla. 2442 kc. <b>WPGY</b> Yonkers, N.Y. 2442 kc. <b>WPGZ</b> Miami, Fla. 2442 kc. <b>WPGA</b> Bay City, Mich. 2466 kc. <b>WPGB</b> Port Huron, Mich. 2466 kc. <b>WPGC</b> S. Schenectady, N.Y. 1658 kc. <b>WPGD</b> Rockford, Ill. 2458 kc. <b>WPGF</b> Providence, R.I. 1712 kc. <b>WPGG</b> Findlay, Ohio 1596 kc. <b>WPGH</b> Albany, N.Y. 2414 kc. <b>WPGI</b> Portsmouth, Ohio 2430 kc. <b>WPGJ</b> Utica, N.Y. 2414 kc. <b>WPGK</b> Cranston, R.I. 2466 kc. <b>WPGL</b> Binghamton, N.Y. 2442 kc. <b>WPGN</b> South Bend, Ind. 2490 kc. <b>WPGO</b> Huntington, N.Y. 2490 kc. <b>WPGP</b> Muncie, Ind. 2442 kc. <b>WPGQ</b> Columbus, Ohio 1596 kc. <b>WPGS</b> Mineola, N.Y. 2490 kc. <b>WPGT</b> New Castle, Pa. 2482 kc. <b>WPGU</b> Cohasset, Mass. 1712 kc. <b>WPGV</b> Boston, Mass. 1712 kc. <b>WPGW</b> Mobile, Ala. 2382 kc. <b>WPGX</b> Worcester, Mass. 2466 kc. <b>WPGY</b> Johnson City, Tenn. 2474 kc. <b>WPHA</b> Fitchburg, Mass. 2466 kc. <b>WPHB</b> Nashua, N.H. 2422 kc. <b>WPHC</b> Massillon, Ohio 1682 kc. <b>WPHD</b> Steubenville, Ohio 2458 kc. <b>WPHF</b> Marion Co., Ind. 1634 kc. <b>WPHG</b> Richmond, Va. 2450 kc. <b>WPHI</b> Medford, Mass. 1712 kc. <b>WPHJ</b> Charleston, W.Va. 2490 kc. <b>WPHK</b> Fairmont, W.Va. 2490 kc. <b>WPHL</b> Wilmington, Ohio 1596 kc. <b>WPHM</b> Portable in Ohio 1682 kc. <b>WPHN</b> Orlando, Fla. 2442 kc. <b>WPHO</b> Tampa, Fla. 2466 kc. <b>WPHP</b> Zanesville, Ohio 2430 kc. <b>WPHQ</b> Jackson, Mich. 2466 kc. <b>WPHR</b> Parkersburg, W.Va. 2490 kc. <b>WPHS</b> Culver, Ind. 1634 kc. <b>WPHT</b> Cambridge, Ohio 1682 kc. <b>WPHV</b> Bristol, Va. 2450 kc. <b>WPHY</b> Elizabethton, Tenn. 2474 kc. <b>WPSA</b> Harrisburg, Pa. 1674 kc. <b>WQFA</b> New Haven, Conn. 2466 kc. <b>WQFE</b> Seymour, Ind. 1634 kc. <b>WRBH</b> Cleveland, Ohio 2458 kc. <b>WRDQ</b> Toledo, Ohio 2474 kc. <b>WRDR</b> Grosse Pt. Village, Mich. 2414 kc. <b>WRDS</b> E. Lansing, Mich. 1666 kc. <b>WIXAO</b> Boston, Mass. 1712 kc.</p>
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"WHEN TO LISTEN IN"  
Appears on Page 431

FOR TELEVISION STATIONS SEE PAGE 440



# 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*

## How to Form "Short Wave League" Clubs

● THE *Short Wave League* has many clubs or chapters in various parts of the country, and also numerous groups in foreign countries. We have received many letters asking how to form a club and the following general suggestions are offered to aid those unfamiliar with how to properly form a local organization.

Probably the first thing that should be done is to write to the *Short Wave League* and obtain a copy of the "Privileges and Duties of Members of the *Short Wave League*." Of course there has to be a beginning somewhere, and

and frequently is, held at the home of the organizer or one of the other prospective members. The organizer usually opens the meeting and asks who the members want for temporary chairman. The temporary chairman, after being duly elected on motion seconded and carried, then asks the assembly who they wish for permanent chairman, or, in some cases, the temporary chairman "carries on" throughout the first meeting, until the officers (President, Vice-Pres., Secretary and Treasurer) and the necessary committees have been appointed—one for finance, one for publicity, one on constitution and by-laws, and one on membership—and any others that may be decided upon.

Experience has shown that large committees are not the most efficient in all cases, and for small organizations a committee of three is a very happy

number. It has also been proven that in many cases where certain important matters come up for discussion and no definite solution of the problem seems imminent, the chairman will find it expedient indeed to appoint a committee to look into the matter and report at the next meeting. In some cases the chairman or president, appoints such a committee, or in fact all of the committees himself (usually after consultation with other members of the club) or in other cases, depending upon the constitution and by-laws of the club, committees are appointed from the floor. Names are suggested by members present at the meeting and they are then voted upon either orally or by written ballot.

The above procedure may seem a little irregular, but it will serve as an outline for the average club just starting off. Those familiar with a more formal parliamentary procedure may care to conduct their meetings and appointment of committees, etc., in a more erudite fashion. For instance, you may prefer to adopt the following rule: Elect your officers in the usual manner, but instead of having the president appoint committees, allow the vice-president (whose duties are comparatively few) to become the president and organizer of all committees. This procedure is carried out with splendid results by many of the foremost clubs in the country. The success of any club depends upon the strategy it employs to execute its rulings and uphold its morale. The *Executive Council* is the answer to this problem.

The "Executive Committee" of the club is composed of the four officers, president, vice-president, secretary, and treasurer, (The two latter positions are frequently held by one person) and the chairman of the respective com-

(Continued on page 436)

### Here's Your Button

The illustration here-with 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 3/4 inch in diameter and is inlaid in enamel—3 colors—red, white, and blue.



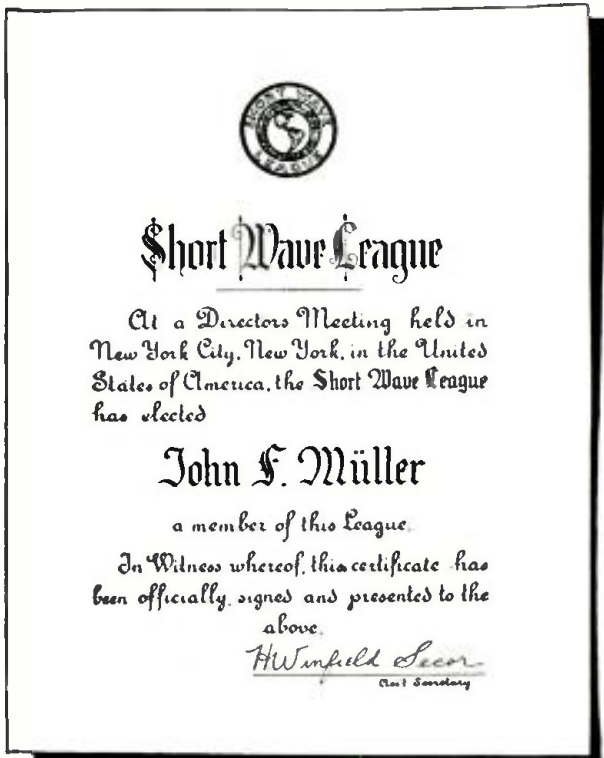
Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for \$2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.

the idea of forming a local radio club is usually born in some person's mind, who, in most cases, becomes the organizer of the club. After this potential leader has obtained the copies of the regulations and general plan of the *Short Wave League's* activities, he will next proceed to interest some of his radio friends.

The club may be either one intended as an organization of short wave fans or listeners, or it may comprise a membership made up of licensed short wave Hams.

In any event, after the organizer has ascertained the earliest date at which the other prospective members of the club can meet together, he then by telephone or by post-card announces the first meeting of the club.

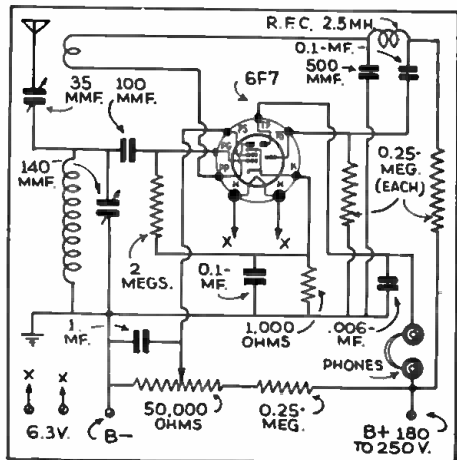
The first meeting can very well be,



This is the handsome certificate that is presented FREE to all members of the SHORT WAVE LEAGUE. The full size is 7 1/4" x 9 1/2".

See page 382 Oct. issue how to obtain certificate.

# Short Wave



Detector and amplifier with 1 tube.

## "1-TUBE=2" RECEIVER

Roy E. Calverley, Hartford, Conn.

(Q) Please publish in a future *Question Box*, a diagram of a short-wave receiver, using a single 6F7 tube. I do not need *band-spread* because I have just enough parts for a receiver using standard coils.

(A) The diagram of a 6F7 used as a pentode regenerative detector and a triode resistance coupled audio amplifier appears on this page. The grid leak of the pentode

## CONNECTIONS FOR ANTENNA TUNER

David C. Fugmann, Aurora, Ohio

(Q) Will you please advise me through your *Question Box*, how I may connect the tuned doublet antenna to a receiver only having provisions for a regular antenna and ground and what gage wire should I use for the feeders?

(A) In the article describing the antenna tuner all the information regarding the connections to a standard receiver input was given. Merely connect the two output terminals of the antenna tuner to the antenna and ground posts of the receiver. The feeder wires can be of either 12 or 16 gage solid enamelled wire.

## COIL DATA

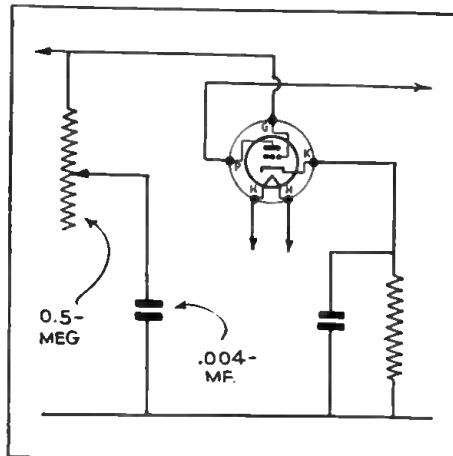
George Schneider, Sharpsburg, Pa.

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

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

## EDITED BY GEORGE

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



Connecting a tone control in the grid circuit of an audio amplifier.

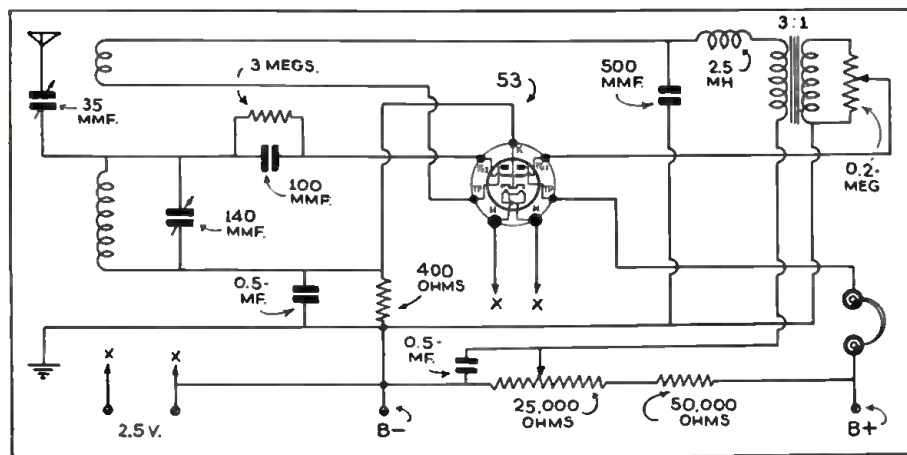
arm of the resistor approaches the grid side, the tone will be lowered and vice versa.

## USING A MAGNETIC SPEAKER ON A.C. AMPLIFIER

Stanford Winsker, Baltimore, Md.

(Q) As an interested reader of *Short Wave Craft*, I came across a question, which, although quite simple, has kept me from completing my receiver. Under what conditions may I use a magnetic speaker with an A.C. amplifier? Will you please show a suitable diagram?

(A) In most cases the plate current of the output amplifier is too great for the operation of a magnetic speaker directly in the plate circuit. It can be used, however, with the aid of an output choke or the primary of an output transformer. The speaker should be connected across this choke through a .1 mf. condenser. The condenser should have a working voltage of around 400 volts.



Mr. Worcester's famous "53 Twinplex" receiver; another circuit where one tube does the work of two.

section is connected directly between the grid and cathode. While the grid leak in the audio section is connected from the grid to the B negative. These connections are very important if proper results are to be obtained.

## COIL DATA FOR EC4

R. Tweedie, Vancouver, B.C., Canada.

(Q) Would you please give the coil data for the EC4 receiver, described in the April, 1934 issue of *Short Wave Craft*?

(A) In the April, 1935 issue of *Short Wave Craft*, we gave a complete pictorial of drawings of plug-in coils. If you refer to that issue you will find complete data. The largest coil, that is the 160 meter coil, should have the cathode tap at the second turn. The 80 meter coil should be tapped at the first turn; the 40 meter coil at 1/2 turn, and the 20 meter coil at 1/4 turn from the B negative end of the grid winding.

## THE 53 TWINPLEX DIAGRAM

Robert Mogensen, San Jose, Calif.

(Q) Would you please reprint the diagram of J. A. Worcester's *53 Twinplex Receiver*, which appeared in the October, 1933 issue of *Short Wave Craft*?

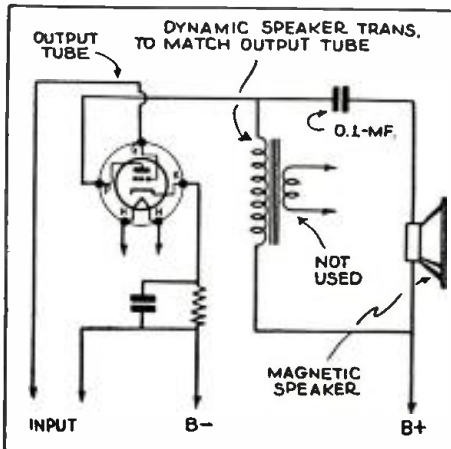
(A) We are very pleased to give herewith the diagram of Mr. Worcester's *53 Twinplex* receiver and feel sure that you will obtain excellent results with it in view of the many favorable reports received from other readers of *Short Wave Craft*.

## TONE CONTROL

F. J. Saunders, Jr., Springfield, Ill.

(Q) Please show a diagram for controlling the tone of an amplifier.

(A) The simplest and most convenient method of obtaining tone control is to connect a 1/2 meg. variable resistor in series with a .004 mf. condenser, across the grid of the final audio amplifier stage. As the



Magnetic speakers can be coupled to any A.F. amplifier.



# QUESTION BOX

## W. SHUART, W2AMN

tance 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.

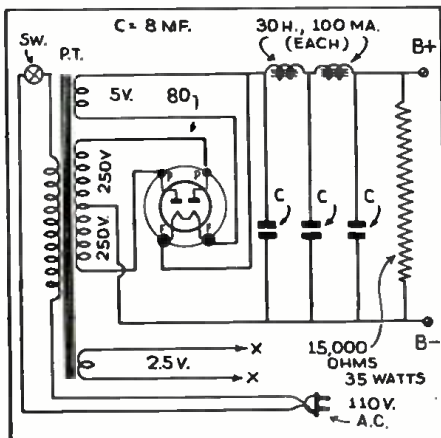
Correspondents are requested to write or print their names and addresses clearly. Hundreds of letters remain unanswered because of incomplete or illegible addresses.

## POWER SUPPLY DIAGRAM

Vincent Hansen, Willmar, Minn.

(Q) I have built a short-wave receiver and I am now in need of a good power supply. Would you be kind enough to show a diagram in your *Question Box* of a power supply which uses a type 80 tube and will deliver about 250 volts, with sufficient filtering to make it practically humless?

(A) You will find the 250 volt power supply diagram on this page, and providing your receiver is designed well, you should experience no trouble with hum. For various voltages under 250, the bleeder can be of the type having sliders, the number of sliders depending upon the different voltages required.



Power supply which can be used with any short-wave receiver.

## CORRECT COIL CONNECTIONS

Audrey Marion, St. Louis, Mo.

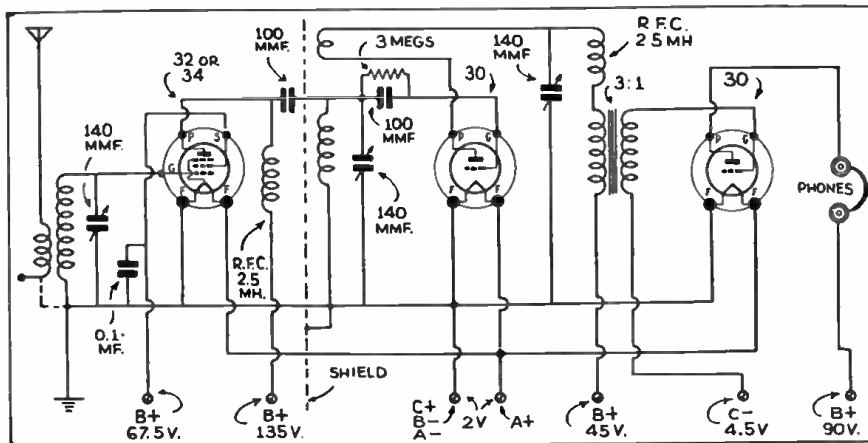
(Q) Will you kindly explain, through the aid of a diagram in the *Question Box*, the proper connections of a 3-winding plug-in coil, that is where the beginning and ending of each winding connects? I have asked several old timers and have gotten varied answers.

(A) In the diagram we have endeavored to show where each winding is connected, for instance, the top connection of the grid winding is connected to the grid of the tube. The bottom connection goes to the "B" negative; the top connection of the interwound primary connects to the plate of the R.F. tube, while the lower connection goes to the "B" plus. The lower connection of the tickler is connected to the plate of the detector and the other side of the tickler to the output load circuit.

## 3-TUBE BATTERY SET

Clifton Klenzing, Carlisle, Pa.

(Q) I would be pleased if you would print a diagram in the *Question Box* showing how to connect up three tubes (type 30) as one stage of tuned R.F., and the other two in the detector and audio stages.



3-Tube battery-operated receiver diagram.

(A) It is not advisable to attempt to use a type 30 as a tuned R.F. amplifier in a short-wave receiver. The type 32 and type 34 are designed for this purpose. The diagram shows a 32 or 34 tuned R.F. amplifier capacitively coupled to a type 30 regenerative detector, which is in turn transformer coupled to a type 30 audio amplifier. Do not forget to employ shielding, indicated by the dotted line to separate the R.F. and detector stages and thus eliminate feed-back.

but exclude all other types of transmission and reception. I would like to know if anything along these lines has been done before.

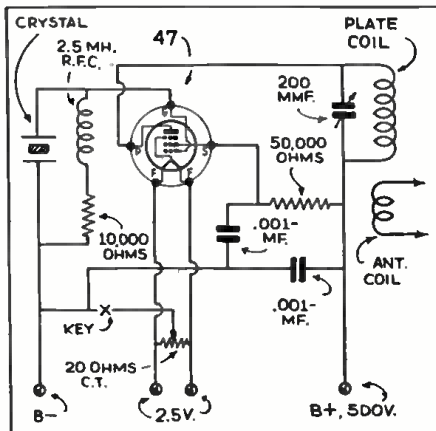
(A) We have heard much about such radio "interference blankets," but so far as we have been able to determine, there has not been any practical demonstration

## CRYSTAL OSCILLATOR

Frank Garkus, San Francisco, Calif.

(Q) Will you please print a diagram in your *Question Box* of a 1-tube crystal controlled transmitter using a 47 tube.

(A) The tube 47 is well-known for its adaptability as a crystal oscillator. In the diagram we have shown all the connections. The tuned circuit values are not given and will be dependent upon the frequency at which the transmitter is operated. The key is connected between the filament center-tapped resistor and the B negative side of the circuit.



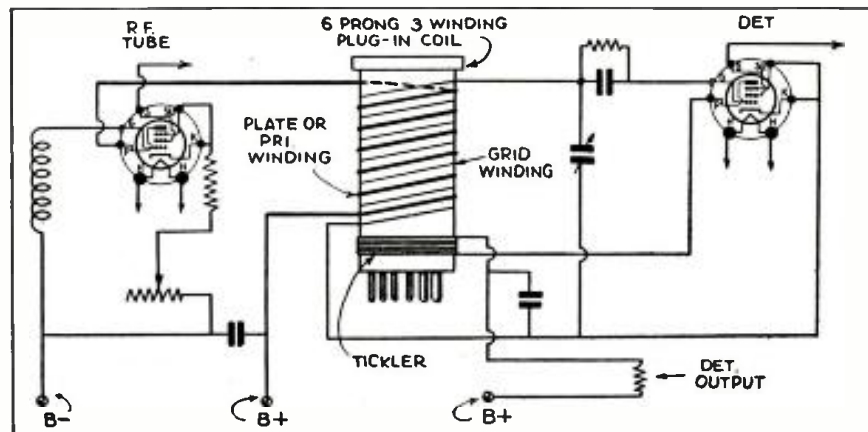
1-Tube crystal controlled transmitter, using a 47 pentode.

## HAS INVENTED A "RADIO BLANKET!"

(No name Given.) U.S.S. Texas.

(Q) I have invented a practical system whereby a blanket of radio interference can be created on all frequencies and still a special transmitting and receiving apparatus designed to penetrate this interference will make possible communication,

given. Since your stationery is marked, "U. S. S. Texas," we believe you are a Naval man and suggest that you get in touch with your superior officer, or some high official in the Navy Department.



The proper connections for a 3-winding coil when used between the R.F. and detector tubes.

# Short Wave Scout News

## "Listening in" at Freeport, Pa.

● THE two "Dutch Twins," PHI 17.77 meg. and PCJ 15.22 meg., have been heard exceptionally well, and they send out some very fine programs.

DJE 17.76 meg. has been heard nearly every day, but rarely with very good volume.

DJD 11.77 meg. has been testing afternoons till 4:30 p.m., E.S.T., for North America.

DJB 15.20 meg. has also been testing till 4:30 p.m. for North America. It is likely that one of these waves may be put into regular use.

Strange as it seems, when a program is to be rebroadcast from France, it is always sent through one of the English phone stations. This was the case on Aug. 19 when GBS, on 12.15 meg., relayed the broadcast to N.Y. from Paris.

W8XK does not use the "Star-Spangled Banner" as they were supposed to, but the "Stars and Stripes Forever" as a signature.

W2XAF and W2XAD use the "Star-Spangled Banner" as a signature number. VK2ME, 9.59 meg. has been heard very well here till 8:30 a.m. E.S.T.

CT1AA has been off their wave of 9.59 meg. sometimes being on top of 2RO, 9.64 meg.

COH, 9.43 meg. can at times be heard better on their 18.86 meg. harmonic.

ANGELO CENTANINO,  
Box 516, Freeport, Pa.

## Report from New York City "Post"

Call	Location	Time Logged	Power	Report
VE9GW	Bowmanville, Canada	Aug. 3: 3:45 p.m.	6,000†	R9-P
G8F	Davertry, England	Aug. 4: 4:00 p.m.	15,140	R9
<i>(Receiving)</i>				
W8XAL	Cincinnati, Ohio	Aug. 6: 4:01 p.m.	6,000	R9-P
G8B	Davertry, England	Aug. 6: 5:15 p.m.	9,510†	R7
W1A	Lawrenceville, N.J.	Aug. 7: 3:45 p.m.	18,340	R9
<i>(Phone test with London, England Program followed)</i>				
W1XAL	Boston, Mass.	Aug. 7: 4:30 p.m.	6,040	R9
CHFD	Havana, Cuba	Aug. 7: 10:30 p.m.	6,130†	R8
HJ4ABE	Medellin, Col.	Aug. 7: 10:35 p.m.	5,920†	R9
W8XK	Pittsburgh, Pa.	Aug. 7: 12:00 Mid.	6,140	R9-P
<i>(Identification: Stars and Stripes Forever)</i>				
W9XF-	Chicago, Ill.	Aug. 8: 12:05 p.m.	6,100	R9-P
<i>(Call and Log. announced many times in Diff. Languages)</i>				
HJ4ABL	Manizales, Col.	Aug. 8: 12:10 a.m.	6,103	R8
<i>(Phoning gone station)</i>				
W2XDG	New York, N.Y.	Aug. 8: 4:07 p.m.	41,000†	R9-P
<i>(Exp. station. Test BC. Signed off at above time)</i>				
G8D	Davertry, England	Aug. 10: 1:00 a.m.	11,760†	R9-P
<i>(Coo Coo Noodle Club)</i>				
RNE	Moscow, U.S.S.R.	Aug. 11: 6:50 p.m.	12,000†	R6-F
DJD	Zeesen, Germany	Aug. 11: 7:30 p.m.	11,770	R9-P
G8C	Davertry, England	Aug. 11: 7:45 p.m.	9,580	R9
DJN	Zeesen, Germany	Aug. 11: 10:30 p.m.	9,540	R9
DJC	Zeesen, Germany	Aug. 11: 10:45 p.m.	6,920	R9
<i>(DJD DJN and DJC signed off at 10:45 p.m. Identification: Chicago at beginning and end of transmission)</i>				
EAQ	Madrid, Spain	Aug. 12: 7:00 p.m.	9,500†	R8-F
<i>(Their power is 30 kw.)</i>				
W1XE	New York, N.Y.	Aug. 12: 10:00 p.m.	6,120	R7-F
CJRO	Whitby, Canada	Aug. 12: 10:30 p.m.	6,150†	R8
CJRX	Whitby, Canada	Aug. 12: 10:45 p.m.	11,200†	R8
W8XK	Pittsburgh, Pa.	Aug. 13: 1:00 p.m.	15,210	R9-P
W9XE	Chicago, Ill.	Aug. 13: 1:00 p.m.	6,140	R9-P
<i>(Comes on at 12:00 Mid. E.S.T. while W8XK (6140 kc.) leaves the air at the time)</i>				

† Frequency or Wavelength announced by station.  
F—Bal. Ending.  
Type of receiver used: Lafayette, All-Wave Superhet., 550 kc. to 23 mc., 6 tubes, AVC. Antenna; 132 ft., inverted "L."  
KEN L. SARGENT,  
302 W. 51 St.,  
New York City.

## Report from Puerto Rico

● HERE is my first report about S-W listening conditions during the month of August 1935:

The 49-meter band has been very bad; noisy and too much interference between stations. The only constants are: COC-YV2RC with its new transmitter coming in "R9" all the time—Voz de Cucuta R7—and very clear YV5RMO-ALMA TICA and HIJ during every evening.

YV6RV and HJ1ABB always good (R8-9).

TIRCC good after HI4D ends their program at 7:30 p.m.

HI4CB on 36 meters is R6-7 every evening. (QSA4).

XECR is very bad, heard on Sundays; too much static and C.W. interference.

HAT4 comes in very good (QSA5-R8).

W2XAF-DJN-DJA-GSC-2RO-PRF5-EAQ and W3XAU on 31 meters, always good and clear. The 31-meter is at its best at this time of the year.

LSX made a perfect and beautiful experimental transmission on the evening of Aug. 7, QSA5-R8-9.

The 25-meter band is excellent also, during the first hours of the night: W8XK-

## Lucky Juan Storer—He Won Two Silver Trophies!



Above we have a picture of Juan Cloquell Storer of Arecibo, Porto Rico, with the *Short Wave Scout* "Silver Trophy," which is seen directly in front of him, and at the extreme right of the picture, observe the handsome Silver Trophy awarded to Mr. Storer for his fine short-wave "Listening Post" photo which was awarded the prize in a recent number of the *Short Wave Listener* magazine. The radio set shown is the very latest model General Electric short-wave and broadcast receiver, awarded to him by the manufacturers for his extraordinary fine work in logging S-W stations from all over the world.

Come on, you S-W listeners in the cooler climates—for you must remember that Mr. Storer rolled up his very fine log of short-wave stations under severe static conditions which obtain in his locality.

W1XAL-DJD-GSD-Radio Colonial—and HJ4ABA are heard QSA5-R9.

HJ5ABE on 22 meters is transmitting at noontime and during the evenings. Heard in both QSA4-R7.

Amateurs on 20 meters have been heard this month from Argentina, Barbados, Trinidad, Mexico, England, Belgium, France, and Costa Rica. Also from Cuba, as the Cuban government has prohibited them to use the 40-meter band.

For those interested in logging amateurs

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

of Latin America and Spain, I recommend to listen for them on 40 meters on Saturday evenings at 10 p.m. forming what they call the RUEDA DEL OESTE (Western Association) on which they gather around 15 amateurs and talk between themselves.

There are several new stations broadcasting as follows:

COCD on 48.60 meters of Havana, Cuba, during night.

YV10RC—La Voz de Tachira, Caracas, on 5500 kc.

La Voz de San Ramon, Costa Rica, on 40 meters.

La Voz del Plata on 5450 kc.

I have received a letter with verification from ZP3AC, from Asuncion, Paraguay, and he states that he does broadcasting every evening from 8 to 10 p.m. using the call letters of ZP10 on 8210 kc. Uses only 15 watts power. Sends the *most beautiful* "Veri" I have ever seen.

I shall be very pleased to answer any letter from radio fans writing me and will send views of Puerto Rico, the "Isle of Enchantment."

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

## O. L. P. Report from Dr. Smith, Chester, Vt.

● AGAIN I would like to call your attention to the *Quixote Radio Club* of Hendersonville, N.C. This club has a weekly newspaper, the *Short Wave Reporter*, which brings to the short-wave fan, up-to-the-minute news of short-wave stations. It often happens that news of a new station is printed in this paper within a week after it is first heard on the air. Subscribers to the paper are automatically members of the *Quixote Radio Club*. Just write to P. O. Box 73, Hendersonville, N.C.

Here is my report for the past month: YV2RC, Caracas, Venezuela, S.A., 6,112 kc. evidently has its new transmitter in operation, using 1 kilowatt power, as they have been heard with *excellent volume* very early in the evening.

HJ4ABC, Pereira, has been heard with good volume on a new frequency, near 6,080 kc.

HJ5ABC, Cali, has verified reception on their new frequency of 6,150 kc.

YVQ, Maracay, has a Saturday evening program, on 6,672 kc. They state that the station is the property of the Ministry of Communications. The time is from 8-9 p.m.

T15HH, San Ramon, Costa Rica, on a frequency of 5,520 kc. has been heard several nights.

CEC, Santiago, Chile, S.A., is heard Sunday evenings with the RCA-Victor program. The frequency is 10,670 kc, and the time 8:30-9.

OPM, Leopoldville, Belgian Congo, on a frequency of 10,140 kc., has been heard several Saturday afternoons, from 3-4. These broadcasts are in keeping with an exposition there, so it is not known how long they will last.

PLE, on 18,830 kc., and PMA, 19,345 kc., both at Bandoeng, Java, were heard two Saturday mornings in succession, first PLE, then PMA the next Saturday. The time is 10-10:30 a.m. and they call Amsterdam both before and after the broadcasts.

HAT-4 at Budapest, on 9,125 kc., has been heard the last two Sunday evenings with good volume and clearness, from 6-7 p.m.

HBH and HBJ at Geneva, on 18,480 and 14,700 kc., respectively were heard one Sunday at 1 p.m. relaying a program from Salzburg.

The usual European and South American stations have been heard, most of the  
*(Continued on page 437)*



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**Radio Amateur Course**

(Continued from page 409)

corresponds to releasing the compressed spring and heaving off the weight.

Another analogy is the flywheel. The inertia of the wheel opposes any force to set it in motion; once in motion, the energy tied up in the wheel tends to keep it going, if any effort is made to stop it.

Let us consider for a moment now the next phase of the action taking place when the circuit is opened or when the *second half* of the alternation of an applied A.C. is taking place. Now the magnetic field around the wire or turns of wire comprising the coil is contracting and while this occurs, the lines of magnetic force are cutting the wire in the opposite direction and a current of opposite sign is induced in the wire, this current being in the same direction as the applied (exciting) current which is flowing around the wire and creating the magnetic field.

In other words, the self-induced e.m.f. is in the opposite direction, while the field is *expanding* about the wire, and tends to oppose it while the opposite is the case when the field is *contracting* and the current is then in the same direction or aids the inducing current and acts to prevent its decay.

It will be apparent, of course, that while the current is varying in strength or let us say increasing, the field about the coil is expanding, and the lines of magnetic force expanding out from the coil composed of a number of turns, will induce a current by *induction* in a second coil, placed near or adjacent to the first or exciting coil.

If we term the exciting coil No. 1, and the adjacent *unconnected* coil as No. 2, coil 2 is said to have a current induced in it by *electro-magnetic induction*. As the magnetic field in coil No. 1 subsides, the magnetic lines of force surrounding coil No. 2 also subsides. At the same time these lines of force cut across the turns in coil No. 1 and induce therein an e.m.f. or voltage (also a current) and thus we have a third e.m.f. set up by induction.

To begin with, we have the original exciting e.m.f. in coil 1; secondly we find an induced e.m.f. in coil 2; and thirdly, there is a *reinduced* e.m.f. in coil 1, due to the reaction of the magnetic field surrounding coil 2, and this effect is what is known as *mutual induction*.

The usual radio tuned circuit consists of a coil and a condenser, namely: *inductance and capacity*. Coils or inductances have what is known as inductive reactance, while condensers have capacity reactance. When the capacity reactance minus the inductive reactance equals zero, at some certain frequency, the circuit is said to be in *resonance*.

When the condition known as *Resonance* has been established in any given circuit, whether a series or parallel type circuit, then we know that the inductive and capacitive reactance are equal, and that they balance each other. When this condition has been achieved their reactive effect upon the circuit is zero. Under these conditions, or when the circuit has been made resonant, (by the proper adjustment of the capacity and the inductance of the circuit) any current flowing in the circuit due to an applied e.m.f. will be that due simply to the ohmic or direct current resistance in the circuit. Expressed another way, the current passing through such a resonant circuit will be given by the expression:  $I = E \div R$ .

The difference between the capacitive and inductive reactance of a circuit at some frequency is called the impedance. However, at resonance, this is always zero, and the losses in the circuit are due only to the usual D.C. resistance of the circuit, through which the currents are flowing.

In Fig. 4 we see a hydraulic analogy of current flowing into a condenser. When the piston is moved forward, the elastic partition will bend or become curved but will not allow the liquid to be transferred from one side to the other.

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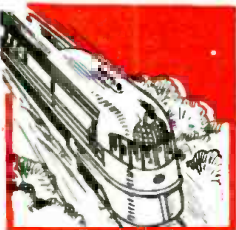
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- Dealer
- Jobber
- Experimenter
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**AVOID DELAY.** The catalogs and booklets listed are now in stock and will be sent promptly as long as the supply lasts. Only the items listed are available. Please make your selection from the current issue of *Short Wave Craft*.

● THE catalogs, booklets, and folders listed in this department contain a wealth of information and data which will help you in your short-wave work.

These catalogs, booklets, and folders may be obtained by *Short Wave Craft* readers (without the trouble and expense usually involved in writing individual letters to the various organizations which publish them) through arrangements which have been made by *Short Wave Craft* magazine with the publishers of the literature listed.

To obtain any of the material listed in this department, simply draw a circle around each Booklet Number on the coupon, corresponding to the numbers of the items you would like to have, fill in the rest of the coupon and mail it to the *Short Wave Craft Data Service*.

A complete stock of these catalogs and other literature is kept on hand and will be sent to you promptly, as long as the supply lasts. There is no limitation on the number of items you may ask for, but to avoid waste, please do not ask for material in which you are not interested or of which you already have a copy.

Only the literature listed in this issue is available. Please do not ask for catalogs which are not listed. Do not include letters asking for information from other departments with your request for catalogs as that will cause delay in answering your inquiries.

2. HAMMARLUND 1936 CATALOG. Short wave fans and set builders will find a flock of

new low-loss parts such as variable condensers, coil forms, sockets, transformers, chokes, shields, and other precision products especially designed for short-wave and ultra-short-wave work described in this catalog. Information on short-wave sets is included.

3. THE HAMMARLUND SHORT-WAVE MANUAL. No short-wave fan who is interested in short-wave set design should be without this 16-page manual, which contains constructional details, wiring diagrams and lists of parts of 12 of the most popular short-wave receivers of the day. A circular giving a description and list of contents of this manual is available free of charge to *Short Wave Craft* readers.

4. THE HAMMARLUND "COMET PRO" SHORT-WAVE SUPERHETERODYNE. This receiver is still holding its own as one of the leading short-wave receivers available for professional operators and advanced amateurs, for work on 15- to 250-meter code and phone reception. It is especially adapted for laboratory, press, police, airport and steamship use.

5. ELECTRAD 1936 VOLUME CONTROL AND RESISTOR CATALOG. No short-wave set can function properly unless the volume controls and resistors are of the best. This catalog of resistors features the latest developments in the resistor art. Fundamental volume and tone control circuit diagrams are given.

25. LYNCH NOISE-REDUCING ANTENNA SYSTEMS. No use trying to get world-wide short-wave reception if your aerial picks up more noise than signals. This folder, by Arthur H. Lynch, gives complete instructions on how to build noise-reducing antenna systems for short-wave reception and contains a special supplement covering Ham Antenna Design for transmitting and receiving on the amateur bands as well as the ultra-high frequencies.

28. LYNCH SUPER-FILTASTATS FOR AUTO RADIO INSTALLATIONS. It isn't necessary to put up with ignition noise in auto radio installations. The new Lynch Super-Filtastats eliminate ignition noise without the necessity of using the conventional suppressors.

57. RIBBON MICROPHONES AND HOW TO USE THEM. How do your phone signals sound to the fellow at the receiving end? If they sound as though you're talking with a bunch of marbles in your mouth, the chances are a good microphone, properly hooked up, would help "to beat the band." This folder describes the Amperite Velocity Ribbon Microphone and gives information and circuit diagrams on how to connect up the microphone.

72. HALLICRAFTERS' SKYRIDER SHORT-WAVE RECEIVERS. If you don't want to bother building your own short-wave receiver, but want to be sure of having a set that has all the new wrinkles, the Hallcrafters' Sky rider Short-Wave Receivers should fit the bill. These receivers have such features as a range of 13 to 200 meters with broadcast or 10-meter band as an extra, built-in feature, automatic wave-change switch, continuous bandspread, high-fidelity audio and lots of other features.

74. SPRAGUE ELECTROLYTIC AND PAPER CONDENSER CATALOG. You can't very well build a short-wave set without fixed condensers for filtering and by-passing. You'll find complete specifications of all the condensers you'll need for building or improving your short-wave set in this catalog. A description of the Sprague Capacity Indicator, for making tests on condensers, is included.

75. SPRAGUE TEL-U-HOW CONDENSER GUIDE. If you are ever puzzled regarding the proper kind, capacity and voltage of condenser to use in any given place, you should have a copy of this free chart which gives data on just that very subject. This folder also gives valuable hints on how to locate radio troubles due to defective condensers and includes helpful data on condenser calculations.

76. FACTS YOU SHOULD KNOW ABOUT CONDENSERS. If you have any wrong ideas or notions as to the effect of certain condenser characteristics on the filtering efficiency or suitability of a condenser for a given application, this little folder will straighten you out.

Please mention SHORT WAVE CRAFT when writing advertisers



## 56 Mile Commercial Link on 1.3 Meters!

(Continued from page 391)

unaffected by automobile ignition interference. By elevating the directive antennas 30 to 40 feet above the ground, all noises from this source were overcome. These ultra high frequency signals are also remarkable in another aspect, in that they are not affected by nearby wireless telegraph signals.

For the 220-230 megacycle circuit spanning the 56-mile link between these two islands, the transmitting antennas originally tried and used until recently consisted of half-wave doublets which were placed at the focus of quarter-wave parabolic reflectors. These reflectors were mounted on towers at an elevation of 50 feet above the ground.

Special transmission or feeder lines carried the current from the transmitting apparatus to the antennas within the reflectors. The transmitters used in this case comprised a modulated oscillator, which employed two 800 type tubes in push-pull, the input being about 50 watts. Accurate frequency control was obtained by the use of long resonant grid lines which have proven very satisfactory at these high frequencies.

Several different types of ultra short-wave receivers have been tried in connection with this Hawaiian Island radio phone link and receivers of the super-regenerative as well as the super-heterodyne type have been employed. At the present time very good results are being obtained with a super-regenerative receiver employing the new 955 Acorn tubes. Strange as it might seem to those not familiar with the great strength of signals which can be laid down at a distance of 40 to 50 miles by a concentrated beam such as used in this case, the strength of signal obtained 56 miles from the transmitter is so strong that the receivers do not have to be very sensitive.

At the present time greater attention has been given to obtaining a stable signal, with the greatest amount of noise suppression. In operating these ultra short-wave stations the frequencies are checked by means of harmonics obtained from the standard frequency transmission of the U.S. Bureau of Standards.

The successful ultra short-wave results obtained in the Hawaiian Island network are due to researches and field work by engineers of the Radio Corporation of America and those interested in a complete study of the Hawaiian Radio Telephone System will find a very valuable article on the subject in the August number of *Electrical Engineering*, the official organ of the *American Institute of Electrical Engineers*. One of the accompanying sketches shows a very interesting type of directive antenna used on the lower frequencies in the Hawaiian Island Radio Telephone Network, the frequency ranging from 36 to 52 megacycles.

This antenna consists of four wires as shown, each of them being several wavelengths long, and the four wires are mounted in a single vertical plane, the wires being inter-connected so as to cause a practically uni-directional beam to be radiated. This form of antenna causes a beam to be radiated which is about 16 times as strong in intensity as would be obtained ordinarily with the same amount of power radiated from a simple type aerial.

The engineers found that for receiving purposes, this four-wire directive aerial also gave an equivalent gain in power. When this type of antenna is used at both the transmitting and receiving stations, the gain is approximately 250 to 1. By using more of these antennas in parallel or by broadsiding them, proportionately greater gains may be obtained.

As we go to press, we have just learned that the latest apparatus used for the 230 megacycle link includes the use of small multiple dipoles without the benefit of the parabolic reflectors.

## AN AMAZING RECEIVER The New 1936 "ROYAL PR-SIX"

REASONABLY PRICED—  
YET IT HAS EVERYTHING YOU COULD WANT IN A MODERN COMMUNICATION TYPE RECEIVER!!

✓ CHECK THESE FEATURES—

- SIX ALL METAL TUBES  
6K7 Tuned Screen-grid RF  
6C5 Regenerator  
6K7 Tuned Detector  
6C6 High Gain Audio  
6F6 Power Pentode Output  
5Z4 Rectifier
- Real Continuous Bandspread
- Separate Regeneration Tube
- FIVE Tuning Sections
- "Twin Master" Control
- Doublet or Standard Antenna Input
- 480 Kc to 31 Mc. Full Range (625 to 9¾ Meters)
- Large Dynamic Speaker
- Calibrated Volume and Regeneration Controls
- Triple-wound Inductors
- Self-contained Humless Power Supply
- Positive Triple Shielding
- Works on 115 to 240 Volts, 25 to 133 Cycle AC Current
- Sturdy Battleship Construction
- Phone Jack on Front Panel with Automatic Speaker Cutoff
- Stand-by Switch
- Full 3 Watts of Undistorted Output
- Bi-color Dial Illumination Indicating Frequency Trend
- Smart Professional Appearance
- Unconditional Guarantee
- FREE FIVE DAY TRIAL



Utilizing to the fullest extent the tremendous advantages of the new All METAL Tubes—using a sensational new circuit—and incorporating scores of remarkable features—the NEW 1936 "ROYAL PROFESSIONAL RECEIVER SIX" definitely outstrips all other receivers in performance, dependability, and downright honest value! Check over the features, one by one. Each is a definite step toward the ultimate in radio reception! Many are exclusive with ROYAL. No other set offers them all!

Continuous Bandspread that is really b-a-n-d-s-p-r-e-a-d! Not just a trick dial pointer. Selectivity that only a tuned radio frequency stage can give. Sensitivity that only a tuned detector, freed from the restrictions of self-regeneration and operating under optimum conditions, can produce. Smoothness of control obtained only by the use of a separate regenerator tube. Power that comes from SIX full sized metal tubes, operating at high voltage. Quietness that metal tubes, positive shielding, massive power filter, and low background noise, alone can give. Added to this is the highest quality of workmanship and the genius of engineering design that is synonymous with the name of ROYAL.

THIS IS THE "PR-SIX"—The finest receiver today.—and tomorrow—for Amateur or Short Wave Fan—"Oldtimer" or Beginner!

### CONVINCE YOURSELF!

We know you've read the advertisements of other sets. Each claims to be the best. Each offers everything but hot and cold running water! Each is "guaranteed" to do everything but put the cat out! But you don't want words! You rightly expect PERFORMANCE and FULL VALUE for your money! And the only way to convince yourself that you are getting it is by a trial in your own home, under your actual operating conditions.

So confident are we that the "PR-SIX" will win your enthusiastic approval that we have arranged a FREE TRIAL OFFER. Order a Royal "PR-SIX". Tune in foreign stations—try it in the crowded Ham bands—listen to its full rich tone—turn up the volume and feel its dynamic power—in fact—give it every conceivable test to satisfy yourself that here is the finest in radio! Really remarkable value! Try it for five days. If, for any reason, you are not entirely satisfied—do not hesitate to ship the set back to us! We don't want you to keep it!! We will immediately return your full purchase price without any deductions what-so-ever. FAIR ENOUGH?

ORDER TODAY!—You'll never regret it!

The new Royal "PR-SIX" Receiver, with built-in universal power supply and large Dynamic Speaker. Laboratory wired and tested..... **\$19.75**

### ROYAL "PR-SIX" INDUCTORS

Accurately wound on ribbed low-loss forms. Available in the following wavelength coverage ranges—

TYPE	RANGE	PRICE PER PAIR
PS A	9¾ to 18 Meters.....	\$1.75
PS B	17 to 38 Meters.....	1.75
PS C	36 to 78 Meters.....	1.75
PS D	74 to 158 Meters.....	1.75
PS E	148 to 350 Meters.....	2.00
PS F	300 to 625 Meters.....	2.25

Six matched, set tested, real all metal tubes.....\$5.95  
Attractive, heavy metal cabinet..... 2.90



Complete "PR-SIX" Receiver **\$31.45**  
with tubes, cabinet, and all twelve coils. NOTHING ELSE TO BUY!  
Ready to plug in and operate.....

### OTHER SHORT WAVE LEADERS

#### THE FULTONE V AC-DC FIVE-IN-THREE—12A7-6F7-76

This justly famous all electric receiver is one of our best sellers. Its low cost, compactness, and outstanding performance have won unstinted praise from thousands! Complete kit of all parts, with chassis and panel, and all coils for 15 to 200 meters. Price—\$7.45.

COMBINATION OFFER of Kit, tubes, cabinet, built-in speaker, and extra broadcast band coils—\$12.75.  
Kits Wired and Tested—\$1.50 extra.

SEND FOR LITERATURE

#### THE HARRISON "MULTI-KIT" 17 SETS IN ONE

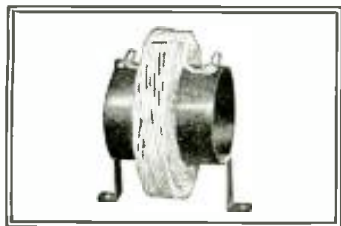
A boon to the experimenter who likes to "roll his own." With the Harrison "Multi-Kit" as a foundation, over 17 different receivers (Battery, AC Power Pack, and All Electric AC-DC models) may be made. The complete Foundation Kit is priced at \$3.45.

Build-Up Units which complete the different models range from 1 to \$2.35. For a practical Radio Course—Order your "MULTI-KIT" NOW!

HARRISON RADIO CO. Dept. C-11 New York City  
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★ ★ THE HOME OF FOUR STAR SERVICE ★ ★

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## Miller Offers Complete FREEDOM from Line NOISE with New Filter Chokes



### Miller Line Filter Chokes

No. 7825 (up to 2 amps.) Your Cost.....	<b>\$0.60</b>
No. 7826 (up to 5 amps.) Your Cost.....	<b>\$1.50</b>
No. 7827 (up to 10 amps.) Your Cost.....	<b>\$1.95</b>
No. 7828 (up to 20 amps.) Your Cost.....	<b>\$2.40</b>

- Duo-lateral wound for minimum distributive capacity.
- Makes radio receiver more selective by by-passing the station signals picked up through the electric wiring.
- Used with transmitter, it keeps signal in the antenna and out of the a.c. line.
- May be used for receivers, transmitters, vibrating and rotating machinery, mercury arc, mercury rectifiers and wherever it is desired to eliminate interference from either a.c. or d.c. supply lines.

### J. W. MILLER COMPANY

5917 South Main St., Los Angeles, Calif.  
Largest Radio Parts Plant of Its Kind West of Chicago

## Baby Walrus' Diet Prescribed by Short Waves

(Continued from page 391)

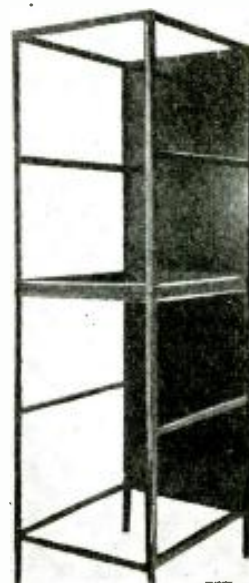
The operating desk contains the switches and pilot lights for the control of the transmitter. The antenna is a full-wave doublet for 14 mc. and is made throughout of quarter-inch copper tubing, the flat-top having a steel cable running through the tubing to support its weight. The end of the "Y" section of the doublet is located at the window of the "shack," so that no feeders are used. The receiver is a National AGSX, with two additional stages of RF, independently tuned, added. All the full coverage and amateur band coils are at hand, some of which are located in the rack above the receiver. The panel to the left of the desk contains a frequency meter of the electron-coupled type. The transmitter may be changed over from one band to another in three minutes and the 20, 40 and 80 meter bands are used. It is hoped that 10 meters may be worked shortly.

Mr. Secor's letter was interesting to me because I purchased the parts of my first ham station back in 1908 from Mr. Gernsback, when he had a store on Greenwich Street. For that reason I consider him and his publications old friends, and wish him still greater success, writes Mr. Preston.

### Transmitter Rack

● ESSENTIALLY this transmitter Tri-Dot rack consists of four vertical angles 30 inches in height, with face angles and flats to give adequate support and rigidity. Panel space has been designed to accommodate a standard 19-inch panel. Maximum panel height in a single rack is 30 inches. Drilled holes are placed in the front supports to accommodate panels that have been drilled with a standard spacing of holes. However, it is not essential that a given spacing be employed and the amateur may readily arrange his panel to fit the rack with a minimum of effort. Rack depth is 20 inches, which provides a cubical content of approximately six and one-half cubic feet. This is adequate for most amateur sending and receiving apparatus.

In many cases it is found necessary to build shelving within the rack. To provide for this contingency the designers have located a cross angle midway between the top and bottom angles along each side of the rack upon which may be bolted a full shelf or, if such is not needed, a part shelf may be installed. The shelf angles are drilled with sufficient holes to allow easy mounting (No. 326).



# FREE!

## SPECIAL BARGAIN BULLETIN

For Radio Servicemen, Dealers, Experimenters and Short-Wave Fans. Supplement circular No. 30, 1935.

Lowest Prices—This Circular Will Save You Money Large Tabloid Size—Two Colors—Profusely Illustrated

Contains metal-tube receivers at unbeatable prices. Complete Public Address Systems from 6 watts up to 40 watt—all high quality, guaranteed systems—at prices which will amaze you. Latest type all-metal and glass tube testers and other equipment. Complete information on the famous 5-Tube Doerle DeLuxe A.C. Short-Wave Receiver and many other interesting short-wave equipment. This bulletin carries a large array of modern radio equipment of interest to all classes of radio servicemen, experimenters and fans.

Read about our gigantic 5c sale on guaranteed tubes—tubes guaranteed for three months. A truly special bargain bulletin which will save you money by buying at prices which are unbeatably low.

You can increase the value of your dollar by buying at the low prices contained in this buying guide. This bargain bulletin will show you how to save money by buying economically. Why not start saving now? Don't delay. Write today for your free copy. You are not obligated in any way.

WRITE TODAY—send postcard or letter. Buying guide sent by return mail. IT'S ABSOLUTELY FREE.

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THE NEW HUDSON  
**3-BAND, 6-TUBE SUPER**  
With All-Metal Tubes  
10 TO 80 METERS  
Here They Are! — THE NEW ALL-METAL TUBES

**\$24.95** (List Price, \$28.95)  
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THE NEW HUDSON  
**5-BAND, 8-TUBE SUPERMET.**  
With 10 Metal Tubes  
10 TO 80 METERS  
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**NEW! DEPENDABLE TUBE TESTER**  
TESTS ALL METAL GLASS TUBES  
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**RADIO TRADING CO.**  
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See pages 432 and 446 for our other "Ads"

**DURABLE AS A BATTLESHIP**

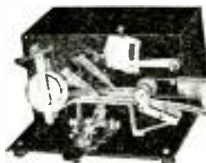
**NEW INSULATED Metallized RESISTORS**

**IRC**

Radio's most important resistor development! Insulated against shorting—humidity—sparks—breakage. Famous Metallized resistance principle. See them at your jobbers. Write for catalog.

**INTERNATIONAL RESISTANCE CO.**  
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## LEARN CODE



the way you'll be using it  
**BY SOUND**

There is only one way to learn to read code and that is by listening to code. There is only one way to learn to send code and that is by hearing your own sending repeated back to you. With the Master Telex Code Teaching Machine you learn code the natural, easy, fascinating way. Only instrument ever produced which records your sending in visible dots and dashes (on copper tapes)—then SENDS BACK your own key work at any speed you desire. We furnish complete course, lend you the New Improved Master Telex. Give your personal instruction with a MONEY BACK GUARANTEE—all at a surprisingly low cost per month. Write today for FREE catalog S-35. No obligation.

### TELEPLEX COMPANY

76 Cortlandt Street New York, N. Y.  
"MASTER TELEPLEX—The choice of those who know"



## EILEN HG-36 SW RECEIVER

**BIGGER AND MORE POWERFUL THAN EVER!** EILEN HG-36 kit comes to you complete with stage shields and all holes accurately drilled and fitted, and with simple, easy to follow instructions. Can be completed in a single evening.

Uses 6D6-6C6-76-12-81 high gain tubes as **TUNED RF** amplifier, **TUNED** screen-grid regenerative detector, triode audio amplifier, output power pentode amplifier, high voltage rectifier and complete built-in power supply. Operates from 110 volt AC house lighting current. Completely self-contained. No external accessories required.

The receiver is completely shielded, thereby eliminating



all hand-capacity and feedback effects. The regeneration control is extremely smooth, noiseless, free from fringe howl effects, and once set is consistent over an entire band. **HG-36** uses **2 TUNED STAGES**—single dial control. Not merely a screen-grid RF amplifier of doubtful value—but a scientifically engineered receiver with a tuned RF circuit that provides a high gain over the entire SW spectrum. Selectivity is increased without tuning complications. The RF stage really **TUNES**. With this receiver you can readily separate those stations in the foreign SW or crowded amateur bands. Broadcast interference on short waves is eliminated. Either a doublet or single wire antenna may be used.

**BAND-SPREAD** station trimmer—volume control—beautiful, large, illuminated, high ratio vernier airplane type tuning control—powerful 2 stage audio amplifier delivering as high as 3 watts of audio frequency power to the built-in high fidelity dynamic speaker—Hum-free power supply—automatic headphone jack—selectivity, sensitivity, and tonal qualities found only in high priced receivers all combine to make **HG-36** so effective that the veteran SW fan as well as the beginner cannot afford to be without it.

**IF METAL TUBES** are desired (6K7-6K7-6C5-6F6-5Z4), add \$1.00 to tube price.

Letters in our files from proud owners indicate reception from GSA, GSB, GSC, D1A, D1D, D1N, 12R0, EAQ, FYA, and numerous other foreign stations with enormous speaker volume. Under fair conditions you can do the same. **TRY ONE AND SEE FOR YOURSELF! SOLD ON A MONEY BACK GUARANTEE. YOU MUST BE SATISFIED.**

Chassis and cabinet are of heavy steel, finished in durable, black shirvel lacquer. An extremely **ATTRACTIVE** SW kit that you can be proud to own. Complete set of RF and detector plug-in coils for 10-200 meters furnished with detailed instructions.

**HG-36B**—Battery model of HG-36. Uses 31-32-30-30-33 tubes. Subtract \$1.00 from price of HG-36.

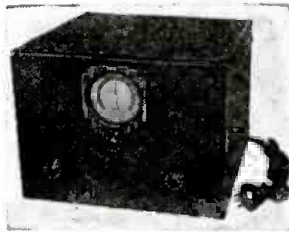
**HG-36 KIT**, including all necessary parts, coils for 10-200 meters, and instructions..... **\$14.95**  
 Beautiful black finish cabinet..... **\$ 2.00**  
 Set of matched Raytheon tubes..... **2.85**  
**SPECIAL:** Complete kit, cabinet and tube..... **\$18.95**  
 2 broadcast band coils, extra..... **\$ 1.25**  
**LABOR FOR WIRING & TESTING**..... **2.00**  
 EXTRA.....

**AMATEURS:** Model **HG-36-AB**, communications receiver, has same specifications as HG-36 except that it is designed solely for use on the 20-40-80-160 M amateur bands. Special tuning circuit and adjustable padding condensers allow each band to be spread over 60 to 80% of dial scale. Equipped with plate-voltage cut-off switch for use in transmitting periods. Coils included. Same price as HG-36.

\*See editorial article p. 343 Oct. issue SWC.

The finest, low-priced, SW receiver kit on the market. The sensitivity, volume, unusual beauty, and hum-free reception obtainable from this set make it an outstanding value. Uses 6D6-6C6-76-12A7 (twin 2 in 1) tubes as RF amplifier, screen-grid regenerative detector, triode amplifier, power pentode amplifier, rectifier and built-in power supply, 5 single type tube performance. Works entirely on 110 V. AC or DC house lighting system.

## EILEN 5A RECEIVER



Dozens of unsolicited letters of praise on this model in our files. For example, read what Mr. Ernest Reunink, 218 Lafayette Ave., Swarthmore, Pa. says: "I purchased one of your Eilen 5A receivers and am very much satisfied with it. My station log up to date includes EAQ, FYA, GSB, GSC, D1A, D1D, D1N, 12R0, and others. **ALL ON MY MAGNETIC SPEAKER!**"

Heavy steel chassis and cabinet, finished in beautiful durable, black shirvel lacquer. Coils for 10-200 meters, and instructions included. An excellent receiver for the DX SW fan. **TRY ONE AND BE CONVINCED. MONEY BACK GUARANTEE.**

**KIT** of all parts, and instructions..... **\$7.95**  
 Matched Raytheon tubes..... **\$2.85**  
 Beautiful cabinet..... **\$ 1.25**  
**SPECIAL:** Complete kit, cabinet, tubes, & BC coil..... **12.45**  
**LABOR FOR WIRING & TESTING**, extra..... **1.50**  
 Magnetic speaker, extra..... **1.35**

**IF METAL TUBES** are desired (6K7-6K7-6C5-12A7), add \$1.00 to tube price.

- ★ Illuminated, vernier, airplane dial.
- ★ **BAND-SPREAD** station trimmer.
- ★ Great volume—easily operates a magnetic speaker.
- ★ Large 3 winding low-loss coils covering 10-600 meter range.
- ★ So simple that even a beginner can build it.

**EILEN 5B**—Battery model of the 5A. Uses 31-32-30-33 tubes. Subtract \$1.00 from price of 5A.

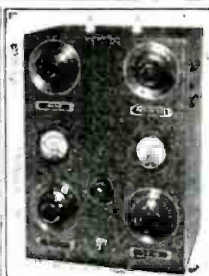
**AMATEURS:** Model **EILEN 5A-AB** has same specifications as the 5A except that it has special coils for 20-40-80-160 M amateur bands. Special tuning circuit enables these bands to be spread over 60 to 80% of dial scale. Add \$1.00 to price of 5A.



**MODEL AM-3 POWER AMPLIFIER**  
 A powerful 2 stage audio frequency amplifier using 76-13-12Z3 tubes as triode audio ampl., power pentode output amplifier, rectifier and built-in power supply. Will deliver enormous speaker volume when connected to any 1-2 or 3 tube SW receiver. Beautiful black shirvel finish metal chassis and cabinet. Dynamic speaker built into cabinet.

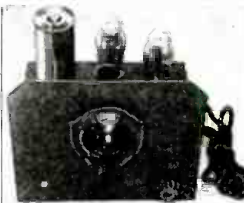
**KIT** of parts..... **\$5.95**  
 Cabinet..... 1.25  
 Raytheon tubes..... 2.25

**LABOR** for wiring, extra..... 1.50  
**SPECIAL:** KIT, cabinet, and tubes..... 8.95



**EILEN HF-35 SW TRANSMITTER KIT**  
 At last! A powerful, well engineered, amateur SW transmitter of great beauty and efficiency at a price within the amateur's reach. Crystal control—Triplet oscillator—doubler—Class C RF power amplifier—Triplet meters—EILEN transmitting dials—built-in antenna tuning system—**35 WATTS CW** output on 20-40-80-160 M bands. Requires power supply delivering 450 V at 160 MA and 2 KV, at 3 amp. Beautiful black shirvel metal chassis and cabinet. **MONEY BACK GUARANTEE.**

**KIT** of parts, including coils for any 1 band Raytheon 59-46-46 tubes extra..... **\$2.15**  
 EILEN quartz crystal (60 or 100 M) 2.45 or 40 M band..... **3.45**  
 100 EILEN crystal holder..... **1.00**



**ALL-ELECTRIC RECEIVER**  
 The original Eilen All-Electric receiver using 6F7 (2 in 1), 76, and 12Z3 tubes as screen-grid reg. det., 2 stage audio amp., rectifier and built-in power supply. Owners report reception of as high as 35 foreign countries with this model. Excellent volume. Operates from 110 V. AC or DC. Beautiful black metal chassis and panel.

**KIT** of parts..... **\$5.95**  
 Raytheon tubes..... **\$2.25**  
 Labor for wiring, extra..... **1.50**

Cabinet..... **\$1.25**  
 BC coils (2)..... **1.25**  
**SPECIAL:** KIT, cabinet, tubes & BC coil..... **\$9.65**

**EILEN RADIO LABORATORIES,**

**Dept. SC 11,**

**136 Liberty St., New York, N. Y.**

(The standard of quality)

# This Super-Regenerator Does Not Hiss!

most anywhere; the dimensions are given in the drawings. The left forward compartment is for the T.R.F. stage and the right one for the detector. The rear compartment is used for the A.F. and I.F. tubes. There is a separate dial for each stage, although they could have been ganged—providing a trimmer was connected across the R.F. coil.

### Hints on Adjustment

After the set is completely wired and tested the next adjustments are the 35 mmf. R.F. coupling condenser and the tap on the detector coil; they should be adjusted for smoothest oscillation.

The values for the detector and interruption frequency oscillator have been very carefully worked out and they should be followed exactly.

When operating the receiver the regeneration control should be advanced until a slight hissing sound is heard and then the T.R.F. stage should be tuned until the rush takes a slight dip. This indicates resonance between the two stages. They will track very nearly perfect with no more than three divisions difference in

(Continued from page 397)

the dial readings. As the set is tuned over the band and stations tuned in it will be found that the regeneration control can be set at a point where no hiss is heard even when no station is tuned in. The set operates on a principle where the detector is in a non-oscillating condition, and as a station is tuned in the carrier of the station triggers the detector into oscillation. As the dial is swung back and forth across a station, a swishing sound is heard the same as with a superhet. *No hiss will appear on either side of the station!* Even the very weak stations which ordinarily kill no rush in a regular super-regenerator, will show signs of having quite a carrier on this receiver. If you are working a station and the operator shuts off his carrier, the receiver will go "dead," except for general background noise, whereas on the other receivers the rush will come up and nearly knock you off the chair!

This set has been operated whole evenings without a single sign of hiss and those hearing it immediately were under the impression that it was a superhet.

With a detector operating just on the verge of oscillation as this one does, auto ignition interference is more noticeable than on other receivers. However the added sensitivity and complete absence of that infernal rushing noise heard on other sets of this type makes it one of the best super-regenerators we have ever operated. The gain in the T.R.F. stage is much more noticeable with this kind of detector than with one which is oscillating very strongly.

An example of its effectiveness can be found in receiving stations which kill no "rush" in the average receiver, but the audio comes through quite well. These stations come in on this set with the same, if not more audio, *minus the loud hiss!* This alone makes 5-meter operation more pleasant. Of course if the regeneration control is advanced, the hiss will be present, but the sensitivity will then be below the other types of receivers. This is easily proven by experiment.

So there you have what might be called a *hiss-less hisser*—a set we have played with for over two years and have at last perfected, although there will undoubtedly be further improvements made and we hope to present them to our readers.

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## ROLAND'S 100% BANDSPREAD RECEIVER

Our Engineering Dept. has now perfected our short wave receiver to provide 100% band-spreading on all bands from 15-200 meters. This has been accomplished with the new dual ratio airplane dial with its 125-1 ratio band-spread pointer.

You may now use this receiver for your daily communication work and log your stations accurately for repeat tuning. For the short wave fan these new features will aid in separation of the foreign and domestic stations on all congested bands.

Phone jacks with speaker cutout switch are mounted on front panel for easy accessibility. Complete shielding of all stages to eliminate R.F. and audio feedback. A highly sensitive regenerative circuit using a tuned R.F. stage with a newly perfected system for equalizing both stages, makes this an ideal short wave receiver for both ham and short wave fan. Tubes employed are the newly developed 6.3 volt types: 6D6, 6F7, 76, 42 and 80. Set is mounted on a black wrinkled heavy steel chassis. Chassis wired and tested with coils

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MODEL R 1000  
**\$ 11<sup>75</sup>**

## New Band-Spread Communications Receiver

(Continued from page 406)

is the detector and separate regenerator action which has been explained. The detector is followed by two audio stages. The first a triode and the second a power pentode tube, providing three watts of undistorted output power.

A special new design "twin dial" is incorporated for tuning both the tank condensers and the band-spread condensers. Both pointers rest on the same large scale, thus making for easy tuning and simplified permanent logging as well as a decidedly modern and attractive appearance. Each section of this control has a high tuning ratio and incorporates a smooth and noiseless drive.

### Calibrated Regeneration and Volume

An important advancement is the calibrated regeneration and volume. So sure and so positive in action are the regeneration and sensitivity controls that they may be calibrated. To this end, each of these controls has an individual calibration plate and professional bar type indicator, allowing exact logging.

The "stand-by" switch located in the center of the front panel cuts off the set when thrown to the left, but leaves the heaters connected. When thrown to the right the desired signal immediately comes through.

A phone jack is also provided and is located under the speaker, when used it cuts off the speaker and last audio stage completely and connects the phones to the first audio stage.

No effort has been spared in the design of the "Pro-Six." All parts have been carefully spaced and circuits isolated. A large triple-section shield is used above the chassis to separate and shield the components. In addition, the shield extends through the center of both variable condensers, thus placing each condenser section in its correct compartment and further increasing the efficiency of the circuit. Besides this, due to the construction of the new metal tubes, each tube has its own individual shield from the R.F. stage to the output tube.

The large dynamic speaker and the power supply are both built into the set, thus making the receiver entirely self-contained. The power supply, in addition to numerous by-pass and buffer circuits, contains a large double choke and three high-voltage filter condensers. The last trace of hum has been entirely eliminated, making reception with this set a decided pleasure. No units or any parts are needed outside the set.

### Continuous Band-Spread

Despite its large range of 9 3/4 meters up to 625 meters, the narrow, but very important ham bands and foreign bands are spread across the entire tuning dial sufficiently to satisfy the most unskilled beginner and the experienced commercial operator as well. In no case does any band occupy less than 50 degrees on the dial and usually 75 or 100.

Due to its unusual range the oft-neglected 10-meter band and all the way up to the 600-meter ship stations are received with this model in six steps.

COIL RANGES:

9 3/4—18 meters.
17—38 meters.
36—78 meters.
74—158 meters.
148—350 meters.
300—625 meters.

## 2-Stage A.F. Amplifier

(Continued from page 406)

The entire amplifier, including dynamic speaker, is mounted upon a heavy metal chassis and cabinet finished in black shrivel lacquer.

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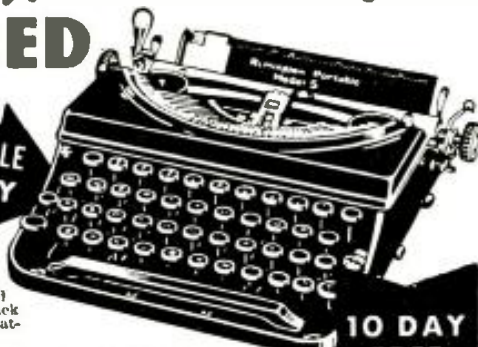
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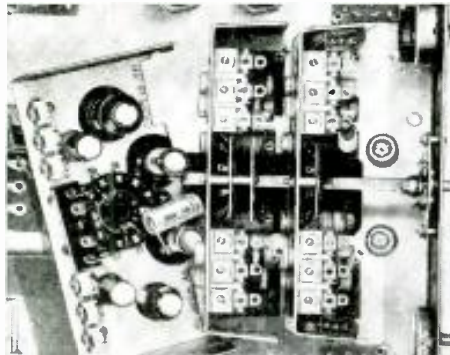
## What's New in Short-Wave Apparatus

(Continued from page 405)

is designed so that very strong signals nearly put the light out and even very weak signals dim the light more than enough to be detected by the eye.

**Six Bands**—This receiver offers you a choice of six different bands, which cover completely without any gaps the tremendous range of frequencies from 125 kilocycles to 67 megacycles (i.e., 125,000 cycles to 67,000,000 cycles). The bands are lettered E—European Broadcast Band, A—American Broadcast, L—Low Frequency Short Wave Band, M—Medium Frequency Short Wave Band, H—High Frequency Short Wave Band, U—Ultra High Frequency Short Wave Band. The "Five Meter Amateurs" are found on the U Band.

The new triple calibrated dial takes the guesswork out of tuning! It assures easy, accurate, and rapid location of all stations. All six bands are calibrated clearly and to a large scale by *Frequency*. All six bands



Top—Close-up of dial and controls. Below—View of hand-changing switches.

are calibrated by *groups*, to avoid wasting time looking for stations in the wrong place. All short wave bands are calibrated in *wavelength in meters* because many stations still give their location by wavelength, instead of frequency. Hence, you do not have to remember the mathematical relation between frequency and wavelength and interpolate from one to another.

Never are you in doubt about what band you are on because there are *two* band indicators. For your convenience, one is on the *frequency* calibrated part of the dial, and the other is on the *meter* calibrated part.

Ninety-eight call letters of the most powerful stations in the United States, Canada, and Mexico are illuminated on the meter calibrated part of the dial, when you are using the American Broadcast Band (A band). Turn the dial until the Call Letter Indicator points to a station you wish to hear—and in it comes!

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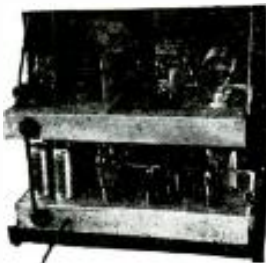
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Moving to whichever band you select, this indicator shows what wavelength the receiver is on. On the American Broadcast band it shows you what station your set is bringing in.

There is a combined switch and volume control, because the first two operations in tuning a radio are turning on the switch and adjusting the volume control. The volume can be adjusted to any desired value, and yet the tone will remain perfect.

**Tone Control:** The unique tone control is especially designed so as to have no stops (i.e., it can be turned completely around as many times as desired). This feature adds much to the ease with which this control can be handled. Its wide range makes it possible for you to find the tone which suits you every mood.

The Six-Band Selector on the new Midwest receiver is noiseless and positive in operation. It automatically moves the Tun-A-Lite and both Band Indicators to whichever band is selected.

**Silent Tuning Push-Button Control:** A new and very helpful tuning aid adopted this year is the Silent Tuning Push-Button Control. Push this button and instantly the receiver becomes silent. Thus, phone calls may be received, conversation carried on or annoying announcements eliminated without disturbing any other adjustments of the receiver. Removing the pressure on the push-button will immediately restore your program at its previous volume and tone conditions. All noise may be avoided when tuning from one station to another by pushing this button.

The Beat Frequency Oscillator is a great aid when you are tuning in short-wave programs. Most people unfamiliar with tuning on short-wave bands tune so rapidly that they miss many stations. If you push the button the beat frequency oscillator will whistle as you approach or leave a station and is quiet when you are tuned exactly on the station. This quiet spot is called the point of "zero beat." In laboratory tests, even men who were experts in tuning in short-wave stations were able to locate many more stations when they used the beat frequency oscillator.

A further improvement in tuning controls involves two concentric metal knobs; each of which is fastened with 2 set-screws instead of the usual one set-screw. The large knob is used for fast tuning, especially on short-wave bands and has a tuning ratio of 25-1.

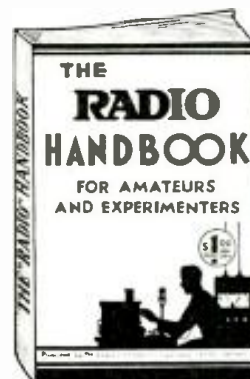
## Girl Operators, Attention!

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

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● THE editors are looking for "new" receiving circuits—from 1 to 5 tubes preferably. A \$20.00 monthly prize will be awarded to the best short-wave receiver submitted. The closing date for each contest is 75 days preceding date of issue (Oct. 15 for the January issue, etc.). In the event of a tie, an equal prize will be given to each contestant so tying. The judges will be the editors of SHORT WAVE CRAFT, and Clifford E. Denton. Address all entries or diagrams and synopses to: Editor, SHORT WAVE CRAFT, 99 Hudson St., New York City.

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## When to Listen In

By M. Harvey Gernsback

(All Schedules in Eastern Standard Time)

### JAVA

YDA at Bandoeng, on 6120 kc. has not been operating since July 1. In its place, PLP, one of the commercial phone stations, also at Bandoeng, has been carrying on during the same hours as YDA (5:30-11 a.m.). The wavelength is 27.27 meters (11,000 kc.). On Sundays PMN on 29.24 meters (10,260 kc.) relays the same items as PLP. PMN opens up at about 6:30 a.m. on Sundays. PLE, another commercial station at Bandoeng, now broadcasts every Tuesday, Thursday, and Saturday from 10-10:30 a.m. Announcements are in English. The wave used is 15.93 meters (18,830 kc.) This transmission is sometimes broadcast simultaneously on PLV, 31.87 meters (9,415 kc.).

### NEW ZEALAND

ZLT the commercial phone station at Wellington on 27.3 meters (10,990 kc.) is reported broadcasting on Sundays from 9-10 a.m.

### JAPAN

The English program from Japan occurring daily from 12 m.-1 a.m. has been heard recently on JVN 10,660 kc., instead of JVH 14,600 kc. Whether this change is permanent is not known.

### MALAYA

ZHJ at Penang, Malaya, has abandoned the 49-meter band and is now working on 39.32 meters (7,630 kc.).

### SIBERIA

RV15 at Khabarovsk, Siberia, on 4,273 kc. is being relayed by an unknown station operating near 96 meters.

### BOMBAY

VUB on 31.36 meters is reported as being quite active in the hours from 6-8 a.m.

### ICELAND

The new station at Reykjavik, mentioned last month is now operating. Normally it is used in phone service but it has already relayed several programs from the Iceland Broadcasting Co. Three waves are used: TFJ, 12,235 kc., TFK, 9,060 kc. and TFL, 5,000 kc.

### HOLLAND

By the time this is being read PHI at Huizen will probably have changed over to its winter wave of 25.57 meters (11,730 kc.). The winter schedule, 8:30-10:30 a.m. except Tuesday and Wednesdays and Sundays 8:30-11:30 a.m., will also be in effect.

### FRANCE

Radio Coloniale at Paris now operates as follows: On 15,245 kc. 7-11 a.m.; on 11,890 kc. from 11:50 a.m.-6 p.m.; and on 11,715 kc. from 7-10:10 p.m. and 11 p.m.-1 a.m. A special Australian program is broadcast irregularly on 11,715 kc. from 5-6:10 a.m.

### GERMANY

DJA, 9,560 kc. is now operating from 8-11:30 a.m. daily with a beam for East Asia in addition to its other hours of operation. It is hoped to have a regular daytime broadcast sent out on either DJB or DJQ (19-meter band) with a beam antenna for North America within the near future (possibly by Oct. 1). This program would occur from 12 n.-4:30 p.m.

### GUIANA

VP3MR, an amateur station at Georgetown, British Guiana, in South America, has been broadcasting music on 42.49 meters (7080 kc.) irregularly from 7-8:50 p.m.

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1711 Roscoe Street Chicago, Ill., U. S. A.

### VENEZUELA

YV2RC at Caracas on 6,112 kc. is planning to broadcast special programs for the various short-wave clubs of the world. These take place each Tuesday evening from 8:30-9 p.m. On Oct. 29 at 8:30 p.m. there will be a program dedicated to the SHORT-WAVE LEAGUE.

YVQ at Maracay is now broadcasting each Saturday evening from 8-9 p.m. on 6,672 kc. New Venezuelans soon to be heard are YV7RMO at Maracaibo at 5,810 kc., YV8RV at Barquisemeto, "La Voz de Lara" on 5,880 kc., YV9RC at Caracas on 6,400 kc., and YV10RC, La Voz de Tachira on 5,720 kc.

### GENEVA

The League of Nations station at Geneva, Switzerland, has been testing on HBO, 11,385 kc. and HBJ, 11,715 kc. in the early morning (1-4 a.m.) with programs for Australia.

### AFRICA

Two Rhodesian stations are testing. They are: Salisbury on 6,000 kc. and Bulawayo on 9,677 kc. The schedule for both is: Tuesday 1:15-3:15 p.m. and Friday 10-11 a.m. No call letters are used.

### LATE NEWS

VE9GW at Bowmanville, Canada, is now known as CRXC and has moved to Toronto. The power of this station has been raised to 1000 watts. The new schedule is daily from 6 p.m. to midnight and Sundays from 12 noon to midnight.

W4XB on 6040 kilocycles at Miami Beach, Fla., is back on the air and operates daily from 12 noon to 2 p.m. and 5:30 p.m. to 12 midnight. COC, Havana, Cuba is now called COCO. CO9JQ, 8665 kc., at Camaguey, Cuba is testing irregularly from 5:30-6:30 and 8-10 p.m. T12PG formerly on 6550 kc. is now on 6410 kc. HJ4ABC is now on 6135 kc.

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a new ELECTROSTATIC Microphone! For amateurs, public address, Broadcast stations and others where low radio frequency pickup is essential to perfect results. New dielectric diaphragm renders this microphone immune to short circuits. LIFETIME ELECTROSTATIC has no inherent noise, is immune to temperature and atmospheric changes, has a high impedance—direct to grid—no matching transformer to pick up hum. LIST \$20.00. SPECIAL INTRODUCTORY PRICE TO DEALERS, AMATEURS, \$9.95 P. A. MEN

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Radio Div. 512 Market St., Phila.

## New Beat Frequency Oscillator

● THE Beat Frequency Oscillator is an important auxiliary to short-wave superheterodyne receiving sets and serves the purpose of enabling the listener to obtain code messages and other continuous wave broadcasts. It may also be used in locating regular broadcast or other modulated forms of transmission by the "birdie" method and its value in this field will be most evident in cases where the signal strength is very low or the carrier is not modulated continuously.

This Beat Oscillator is of the electron-coupled type, known to afford excellent frequency stability and the complete unit as shown consists of the coil assembly, tube, socket, switch, control rod and terminal board, with the necessary tube, coil, and other shields, leads and connectors, all assembled complete on a metal base ready for attachment in the receiver cabinet or other desired location. It's overall dimensions are 7 inches wide, 2 3/4 inches deep and 7 inches high.

The oscillator tube is not supplied and the type selected will be in accordance with heater or filament voltage as follows:

For 2.5 volts use RCA-58 tube.

For 6.3 volts use RCA-6D6 tube.

The coil assembly includes the coil and two variable capacitors, as well as other capacitors and resistors.



New Beat Frequency Oscillator (No. 325)

## A Dandy 9-Tube All-Around Receiver with Pre-Selection

(Continued from page 407)

cuit parts. Incidentally it should be pointed out that when receiving exactly on the I.F. frequency, 525 K.C. in this case, the H.F. oscillator is on 1050, and that no matter how high a wavelength is being received the oscillator never quite gets to 525 K.C. For example if the set were receiving 15,000 meters, 20 K.C., the h.f. oscillator would be on 545 K.C. If the oscillator should ever have to cross the I.F., reception would be impossible at that frequency because it would be impossible to completely isolate this amount of power and prevent some of it reaching the I.F. amplifier and paralyzing it. However, such a situation never can occur, hence it is only necessary to isolate the power of the incoming signal—usually a matter of a relatively few microvolts. This can be done with proper design.

In the Next Issue! Don't Miss the "Midget A.C.-D.C. Loudspeaker Receiver" by H. G. Cisin, M.E.

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One of the most popular members of the Doerle Set family. Employs but two tubes, yet gives the performance of a set having three tubes. Uses a type 30 as regenerative detector and a type 19 twin triode (actually 2 tubes in one) as two stages of resistance-coupled audio. The world-famous reputation of the entire Doerle line, is behind this remarkable set. Requires two No. 6 dry cells and two 45 volt "B" batteries for operation. All parts and workmanship fully guaranteed. Employs a set of four 5-prong ribbed plug-in coils. These coils are interchangeable with the new 5-prong bandspread coils. Ship. wt., 10 lbs. List Price \$15.75.

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KIT  
Less Tubes and Batteries

No. 5009-K Doerle 2-tube Battery Receiver Kit, including Coils but less Tubes and Batteries. <b>YOUR PRICE</b> .....	<b>\$7.67</b>
Set of Matched Tubes.....	\$1.00
Metal Cabinet for above.....	.90
Set of Bandspread Coils.....	2.35
No. 5006-K Doerle 3-tube Battery Receiver Kit with 8 Coils and Metal Cabinet, but less Tubes and Batteries. Ship. wt., 10 lbs. List Price—\$25.75.....	<b>\$12.44</b>
<b>YOUR PRICE</b> .....	\$1.80
Set of Matched Tubes.....	\$1.80
We will wire and test any of these kits at an additional charge of \$1.50.	
125 to 1 Bandspread Dial for the 3-tube set \$1.75 extra	

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List price with screen and goggles, \$10.00 less 40 & 10% or net. F.O.B. **\$5.40** New York

**WONDERFUL VALUE!**

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also brand new transmitter circuits never used before for the generation of these very short waves had to be developed.

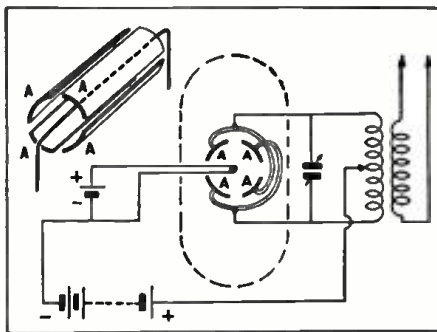
To produce these ultra high frequencies the so called "Haban-Roehre" (Haban tube) was used in Germany. This tube invented by the German radio engineer, Dr. Haban, is often called in England and America the *split magnetron*.

As to the construction of such a magnetron tube let us note that this tube has an "inside" system, consisting only of a single cathode surrounded by an anode cylinder, but it possesses no grid. The anode cylinder (often called *plate cylinder*) consists of two main parts. Each of these main parts is further divided into two separate sectors, which are arranged opposite each other in the tube system. The cathode is therefore surrounded, as Fig. 1 shows, by a cylinder which actually consists of four different parts. Each pair of the oppositely positioned parts are electrically connected by means of small pieces of wire. An electro-magnet arranged outside of the glass bulb of the magnetron tube, produces a powerful electro-magnetic field which influences the tube in the direction of the cathode axis.

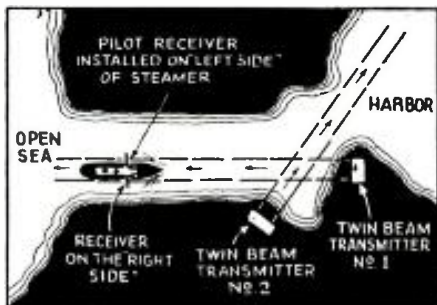
In addition to the magnetrons very small triodes are used for the reception of the decimeter waves. These tubes bring to mind the American "Acorn" tubes and are of tiny dimensions. The system of construction is greatly concentrated so as to make the time of the electrons' transit practically zero. Another type of receiving tube also used for decimeter wave reception is the so-called "diode" type. These diode tubes, similar in their design to the diodes as applied in ordinary "broadcast" receivers, are of much smaller dimensions and are used as detectors. Experiments with these diodes have proved that they are well fitted for the reception of waves down to 40 centimeter in length.

## Decimeter Waves—The Future of Radio

(Continued from page 390)



Schematic diagram of decimeter wave transmitter, operating with a split Magnetron tube.



How decimeter waves guide boat along course.

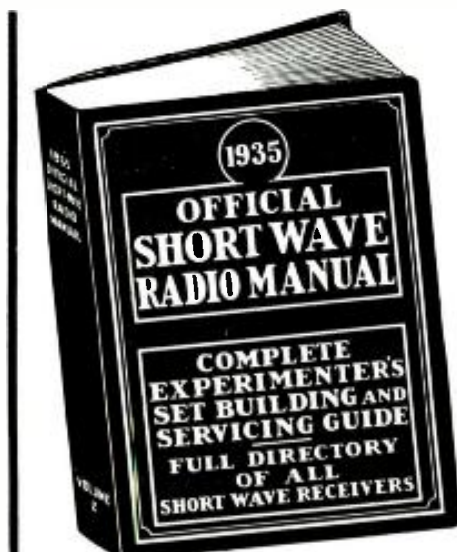
### Used for Guiding Ships in Fog

The practical application of the decimeter wave qualities for piloting of ships into foggy harbors was then demonstrated upon a large lake near Berlin, upon the so-called *Mueggelsee*. On the shore of this lake a transmitter was kept in operation radiating a *twin-beam* of decimeter waves. To demonstrate the useful effect of these waves, a small steamer had been equipped with two decimeter wave receivers. The steamer cruised about on the lake, until the two receivers installed aboard picked up both beam signals with about equal strength, and the ship then proceeded in a direction toward the transmitters on shore; directed only by a pilot instrument installed in front of the man at the wheel. This pilot instrument gave the wheelsman an exact indication as to how far the steamer had shifted outside of the "invisibly marked" lane. The accuracy of this piloting method was so great that it showed a strong indication on the piloting instrument when the steamer was only a few miles off the focal line of the twin-beam transmitter. Even in case the deviation was about 0.1 degree only the indicating instrument marked not only the shift but also the side toward which the ship has shifted.

This has been further demonstrated during the experiments upon the *Mueggelsee* near Berlin. Two receivers operating on the same wavelength, and installed pretty close to each other, could be separately received without interference. The receiver could be turned in any desired direction. By turning this receiver in one or the other direction, either one or the other of the transmitters could be received, without being in danger of the slightest trace of interference from the transmitter not wanted.

Here's the new-Big

# 1935 OFFICIAL SHORT WAVE RADIO MANUAL



We take great pleasure in announcing the 1935 OFFICIAL SHORT WAVE RADIO MANUAL.

There has been tremendous progress and a great boom in short waves in the past year, and the art has made such rapid progress that no single book, up to now, has been able to keep up with this progress. The 1935 OFFICIAL SHORT WAVE RADIO MANUAL fills this need, and it fills it completely. All the progress made in short waves, whether it is in set building, whether it is in radio servicing, whether it is in new models, whether it is in new short wave discoveries, all are faithfully reported and chronicled in this great 1935 volume.

Similar to last year's volume, the new book has been edited by Hugo Gernsback, Editor of SHORT WAVE CRAFT and H. W. Secor, Managing Editor.

Here are the star features of the book:

### 29 ★ FEATURES

- ★ 1—Short-Wave Beginners' Section—Dozens of new simplified circuits for 1-2 and 3 tube receivers, including famous "Doerle" and "Oscillodyne," etc.
- ★ 2—Short-Wave Receivers—All types discussed with diagrams and pictures—The best types only, which have "stood the test" of actual operating service. Full details for constructing them, etc., "Band-Spreading" the Doerle, 5-tube T.R.F. Receiver, etc.
- ★ 3—Battery Short-Wave Receivers—1-2, & 3 tube sets—all the way up to special 5-tube superheterodyne, designed especially for battery operation.
- ★ 4—"5-Meter" Department—All the latest "dope"—including newest transmitters, "Long Line" oscillators, improved "high sensitivity" receivers, 5-meter transceivers, book-ups, etc.
- ★ 5—Short-Wave "Artificial Fever" Apparatus—also new-est therapeutic and other allied applications of ultra short waves.
- ★ 6—Short-Wave Experimenters' Section—filled with Short-Wave Kinks, Short-cuts, etc., of interest to every experimenter.
- ★ 7—Ultra Short Waves—Newest circuits, apparatus, and results obtained in this field.
- ★ 8—Commercial "Short-Wave" and "All-Wave" Receivers—Full Service Data for "set-builders" and "Service-men."
- ★ 9—How to build "Power Supply" Units for Short-Wave Receivers.
- ★ 10—Latest Short-Wave Converters—With servicing data on Commercial Models.
- ★ 11—The Short-Wave Antennas—Including latest "Noise-Reducing" types, Transposed Lead-in systems, shielded cable, Double-Doulet, etc.
- ★ 12—Short-Wave Superheterodynes—From 3 to 11 tube—Latest descriptions and diagrams including commercial all-wave superhets.
- ★ 13—Phone Transmitters for Amateur Stations—How to build same.
- ★ 14—"Skip" Distance—Heaviside layer, etc.—explained, physics of Short Waves.
- ★ 15—Super-Regenerative Short-Wave Receivers—Latest circuits, etc.
- ★ 16—Recording "Foreign" and "Domestic" Short-Wave programs. All systems in use.
- ★ 17—"High Fidelity"—How to obtain it in Short-Wave Receivers.
- ★ 18—The best Short-Wave Questions and answers of the year.
- ★ 19—The best Short-Wave "Kinks" of the year.
- ★ 20—Foreign Short-Wave Review—Novel circuits, apparatus, etc.
- ★ 21—Tubes for Short-Wave purposes—Including tables of latest tubes for Short-Wave transmitters and receivers.
- ★ 22—Short-Wave Transmitters—All about the new "Long Lines" Oscillators and others.
- ★ 23—Multi-Purpose Tubes—How to use them on Short Wave—Sets in which 2 tubes equal 4, etc.
- ★ 24—"Audio Amplifiers" for Short-Wave Receivers. Circuits, etc.
- ★ 25—"Band-Spread"—How to spread the stations over the dial for easier tuning.
- ★ 26 Plug-less "Mono-Coil" Receivers—How to build a better switch-type coil to eliminate plug-in coils; "Clip-Off" Receivers, etc.
- ★ 27—Boosters, Pre-amplifiers and Beat Oscillators—How they work, with constructional data, diagrams, etc.
- ★ 28—Portable Short-Wave Receivers and Transmitters—Transmitter Power supply from Ford Coils, etc.

#### AND FOR SERVICE MEN

★ 29—Every short-wave diagram, every short-wave set, whether it is a battery set, whether it is an all-wave set, EVERYTHING, in other words, that has been manufactured in the commercial set line, will be found in this special enlarged section.

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As has been customary with us in the past, we give our readers the opportunity to order the book before it comes off press and save money. The price of the new 1935 OFFICIAL SHORT WAVE RADIO MANUAL will be \$2.50 as soon as it comes off the press. No reduction in price will be made later. To you, who order this book before publication, the price is \$2.00. As soon as the OFFICIAL SHORT WAVE RADIO MANUAL is published, the Pre-Publication price will be immediately withdrawn. It is, therefore, to your advantage to order your copy today.

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 Resident Courses—Write for Booklet  
**NEW YORK YMCA SCHOOLS** 6 W. 64th St. N. Y. City

**Hi-Power Phone-CW Amplifier**

(Continued from page 411)

the plate current should not exceed 175 milliamperes—the screen current should be between 40 and 50 mills and the D.C. grid current not greater than 15 or 20 mills. (M.A.) If the grid current is much greater than this value, the excitation should be reduced and the amplifier retuned.

For phone operation it is only necessary to apply a negative voltage of about 135 volts to the suppressor and couple the modulator to it. When talking into the microphone the antenna current as indicated by the R.F. meter should increase about 22 per cent. If this does not occur a slight readjustment of the excitation will right things. The screen and plate current will be lower when "phone" is used. The screen voltage should preferably be obtained through a voltage dropping resistor directly from the plate supply; the proper value of the resistor is given in the drawing.

No antenna coupling is shown, as this will depend upon the type of antenna used. These new tubes provide a real "break" for the Ham and we expect to see plenty of them in use.

**Parts List for Phone-CW Amplifier**

- 1—1 mf. by-pass condenser (500 volts) Sprague
- 1—.01 mf. by-pass condenser (1500 volts) Sprague
- 2—.002 mf. by-pass condensers (1500 volts) Sprague
- 1—.001 mf. mica condenser (5000 volt) Aero-vox
- 1—.0005 mf. mica condenser (5000 volts) Aero-vox.
- 1—150 mmf. variable receiving type condenser, National
- 1—.0001 mf. variable transmitting condenser (6000 volt), National
- 1—100 ohm center-tapped resistor
- 1—27,000 ohm, 100 watt, wire-wound resistor, I.R.C. (choose nearest value with slider)
- 1—XP11 National coil form (For coil data see table)
- 1—Jumbo isolantite socket, National
- 1—R.F. transmitting choke, National
- 1—0—250 MA. meter, Triplett
- 1—8x12x3/32 inch Electroly panel, I.C.A.
- 1—8 inch square by 1/8 inch Electroly subpanel, I.C.A.
- 1—Large National grid clip
- 1—Transmitting pentode RK28 or RCA803

**Coil Data**

Band	Grid (See Text)	Turns
80		20
40		8
20		5

Close wound on 2" form, No. 16 D.C.C. Wire

Band	Plate (See Text)	Turns
80		34 turns No. 12 wire on 3" form
40		12T 1/4" Tubing 2" diameter
20		7T 1/4" Tubing 2" diameter

Spaced to be 5 1/2" long.

**Short Waves and Long Waves**

(Continued from page 402)

Course and get right into it, as it is such interesting work and covers such a broad field.

J. D. Ellerington, Carberry, Man., Canada.

(We are glad, J. D. E., that you like our "Radio Amateur Course," and we trust that you will find the forthcoming lessons of value and interest. It gives us considerable pleasure to note that you received your introduction to radio and short waves through the medium of Short Wave Craft.—Editor)

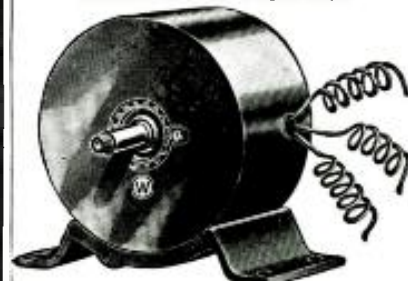
Sun-Spots—their effect on Short-Wave Transmission—In the Next Issue!

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**SPECIFICATIONS**

HOUSING—Aluminum (Diameter 6 1/4 in., Length—5 1/4 in.). SHAFT—2 3/16 in. (driving end). Diameter 9/16 in. (the end is threaded for a distance of 3/4 in.). BASE—Cast Iron (Length—7 1/4 in., Height 1 9/16 in., Width 4 3/4 in.). OUTPUT—200 Watt 110 Volt AC (speed 4500 R.P.M.). STATORS—Two pairs (two North and two South). ROTOR—12 tooth inductor. Built-in commutator. Rotor turns in ball bearings. 1/4 to 1/2 H.P. needed to run generator.

**FREE** With each generator, we supply a set of diagram-blue prints and instructions showing twenty-five different uses, technical information, electrical hook-ups and installing explanations. We also include a set of four replacement carbon brushes.

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Send \$2.00 deposit balance C.O.D. Shipping weight 18 lbs. (Replacement carbon brushes bought separate \$1.50 per set of four. Set of instructions bought separate \$1.00.) MONEY-BACK GUARANTEE DO NOT WRITE FOR CATALOG  
**WELLWORTH TRADING COMPANY** SW-11-35  
 560 W. Washington Blvd., Chicago, Ill.  
 Enclosed you will find my remittance of \_\_\_\_\_ for which please send me  
 Westinghouse Power Generator by Express collect  
 or balance C.O.D.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_

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## Superhet for 2.5, 5 and 10 Meters

(Continued from page 412)

satisfactorily. Upon removing the 70 kc. plate inductance the receiver performed 100 percent as far as "selectivity" was concerned. All stations that were understandable on a super-regenerative receiver were fully understandable on the superhet. However, the superhet possessed a much greater degree of selectivity.

The problem of sensitivity now became grave. Several methods of mixing were tried but none helped materially. The translation gain was poor at these ultra-high frequencies. Finally a variation of a stunt that was used in a broadcast superhet was tried. It worked excellently. The 76 oscillator was removed and the 6D6 was used as an *autodyne* first detector-oscillator. The 6D6 was substituted by a 6C6 with somewhat better results. The suppressor and screen-grids are both used with a positive potential controlled by a potentiometer arrangement. This gave smoother oscillation control.

There is no overloading on strong carriers as the A.V.C. tube biases the I.F. amplifiers to as much as 25 volts negative. The triode portion of the 85 is used as first audio amplifier and is diode biased. A pentode second audio stage delivers ample loudspeaker volume.

Ungrounded doublets or single wire antennas may be used.

A single circuit closed jack removes the audio from the pentode when phones are used. If phones are used at all times the pentode output tube is not necessary, and may be removed.

## "Universal 2" Covers 5-Meter and Broadcast Bands

(Continued from page 393)

necessary, this self-quenching detector being quite stable and of good sensitivity.

The regular wave section should have a good antenna, preferably as long and as high as possible. (A long 5-meter aerial could serve for both.)

One actually gets a "kick" out of operating it and it is a real pleasure to hop from five meters up to the international short wave "broadcast" bands.

### Parts List—"Universal Two"

- C1—Hammarlund MEX Midget trimmers 30 mmf. max. (2)
- C2—140 mmf. Hammarlund midget variable
- C3—35 mmf. Hammarlund midget variable
- C4—100 mmf. or 140 mmf. midget variable
- C5—.0001 mf. fixed mica condensers, (2) Aerovox
- C6—.002 mf. fixed mica condenser, Aerovox
- C7—.004 mf. fixed mica condenser, Aerovox
- C8—.001 mf. fixed mica condenser, Aerovox
- C9—.5 mf. tubular paper condenser, Aerovox
- R1—2 meg. 1/2-watt resistor, I.R.C.
- R2—50,000-ohm 1/2-watt resistor, I.R.C.
- R3—500-ohm 1-watt resistor, I.R.C.
- RFC1—Hammarlund CH-X choke; 2.1 mf.
- T1—audio transformer
- L4—Interruption frequency coils; Gen-Win.
- S—S.P.D.T. Panel switch
- 1—type 6A6 tube
- 1—type 41 tube
- 4—Hammarlund isolantite sockets.

### Coils

Band	A	B	C
L2	5	11	24
L3	3	7	14

All wound with No. 30 DCC wire with a space of approximately 1/8 to 3/16 inch between L2 and L3.

### Na-ald Plug-in Coil Data

Meters	Grid coil turns	Tickler turns	Distance between 2 coils
200-80	52 T. No. 28 En. Wound	19 T. No. 30 En. Close wound (CW)	3/8"
80-40	32 T. per inch. 23 T. No. 28 En. Wound	11 T. No. 30 En. C. W.	3/8"
40-20	16 T. per inch. 11 T. No. 28 En. 3-32" between turns	9 T. No. 30 En. C. W.	3/8"
20-10	5 T. No. 28 En. 3-16" between turns	7 T. No. 30 En. C. W.	3/8"

Coilform—2 3/4" long by 1 1/4" dia. 4-pin base.

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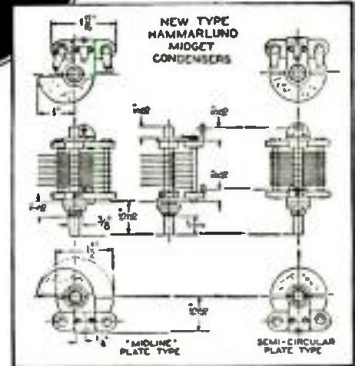


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# How to Form "Short Wave League" Clubs

(Continued from page 417)

mittees. Experience has proven that practically all real "live" radio clubs have a strong executive council, and it is recommended that the executive council hold meetings of their own at least once a month at the home of one of the members, or at the club's headquarters, if they possess such, in order to thoroughly discuss the future plans and activities of the club.

One of the first important questions to be taken up is the formation of the constitution and by-laws of the club. The committee appointed to draw up this important document will first usually decide on what fees of membership shall be and also what qualifications a prospective member shall have. With regard to drawing up the constitution and by-laws this may be carried out at a special meeting of the club's charter members, if it is a small club. But if the club should start off at the first meeting with twenty or more members present, it will usually prove the most expedient to appoint a special committee for this purpose, as otherwise too much time will be lost in discussions and counter-discussions. The committee for this work may comprise as many as six or even nine members. A committee of this size should present a very good cross-section of the whole group.

One of the first requisites of the newly organized radio club, and assuming that the club is going to become a member organization of the Short Wave League, is to obtain a supply of Official Short Wave League letterheads, lapel buttons, seals, Q S L cards, etc. The club should also procure a good-size globe, a large map of the world, and one of the Official Short Wave League Automatic Time Converter Maps of the World.

Regarding quarters in which the club can meet regularly, not less than once a month and probably twice a month, as the members so desire, such rooms can frequently be had for the asking. In many cases our correspondents have told us that, for example, local lodges, newspapers, schools, churches, etc., have been only too glad to permit the radio club or chapter to meet in a hall designated by them for such purposes.

While the club is still small, most of the meetings can be held at one of the member's homes progressively, so that the serving of refreshments (one of the strong factors in all "live" organizations) will not devolve on one member month after month.

In the next article, we shall consider the code classes in the club; the presentation of technical and popular papers or lectures, how to procure apparatus for the club's transmitter and receiver, etc.

(To be Continued.)

# Short Wave Scout Trophy Contest

(Continued from page 395)

test are excluded all employees and their families of SHORT WAVE CRAFT magazine. Address all entries to SHORT WAVE SCOUT AWARD, 99-101 Hudson St., New York City.

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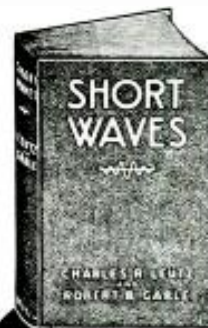
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## Short Wave Scout News

(Continued from page 420)

time with excellent volume and clearness. VIZ-3, the Australian phone on 11,485 kc., has verified a report on their tests in April.

ALAN E. SMITH, M.D.,  
Chester, Vt.

### Wade Chambers, Tulsa, Okla., Reports

● OWING to extreme hot weather here, (108 to 111 in the shade), not much work was done in August. However, some "listening in" brought results. All the foreign locals were heard, such as the "G" stations from Daventry, the "D" stations from Germany. 2RO, Rome, on Monday, Wednesday, and Friday on 9.64 mc. The broadcasts on these days are called the "American Hour" and are broadcast at 6:00 p.m., E.S.T. up until the evening. EAQ, the old stand-by, is always heard on the advertised schedule. FYA, Paris, seems very irregular lately on the 11 mc. frequencies.

### AFRICA

OPM, Belgium Congo, heard on 10.14 mc. 1:40 a.m., E.S.T.

### AUSTRALIA

VK3LR, heard on 9.58 mc. around 3:00 a.m., E.S.T.—VK2ME heard on 9.59 mc. on schedule.—VLK heard on 10.52 mc. 1:00 a.m.—VIZ-3, Fiskville, Victoria, Australia, heard irregularly, testing with CJA4. Canada on 11.56 mc. This station is owned by the Amalgamated Wireless Co., Ltd., of Australia, P.O. Box 2516 B.B., G. P. O., Sydney, Australia.

### ASIA

JVH—14.61 mc. heard at 4:30 p.m. on broadcast. Also heard at 12:30 a.m., E.S.T. JVM—10.74 mc. at 1:45 a.m., E.S.T. JVE—15.64 mc. phone to Manila, P.I. (KTO) JVF—15.61 mc. heard at 4:25 p.m., E.S.T. KTO—16.24 mc. phone to Nazaki, Japan, 2:00 a.m., E.S.T. PLE—18.83 mc. heard irregularly at present.

### SOUTH AMERICA

LSX—10.65 mc. heard Aug. 1, testing. A number of other South American stations and also Central American heard on from 42 to 52 meters, 7.2 mc. to around 5.85 mc. The stations on the frequencies just mentioned are usually loaded with noise, as they are every year at this season. With the coming of next month (September) these stations will begin to come in good.

### ALASKA

WXV on about 8.66 mc. Fairbanks, Alaska. Verifications received this month are: TI2RC—OCJ-2—GBB—GSD—HAS—DJD—XEBT—VIZ-3—FZR. Wade Chambers, General Delivery, Tulsa, Okla.

### O. L. P. Report from Brecksville, Ohio

● SINCE the continuous rainstorms have ceased, short-wave reception has greatly improved. Reception has been rather good at all hours.

Verifications have been received from PHI and PCJ and these two stations have been operating simultaneously on Sunday mornings.

"Veri" also received from HBJ and they state that within the next few weeks they will have a new card for their listeners.

A new pair of coils were wound on the new Hammarlund XP53 forms and these coils seem to be more efficient than the previous set and they are also very light-weight.

I am enclosing a detailed log for this period.

EDWARD M. HEISER,  
Route 2, Box 124,  
Brecksville, Ohio.

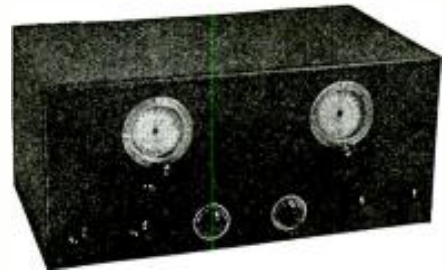
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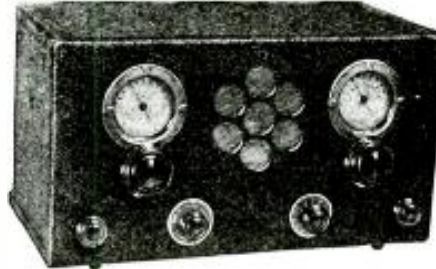
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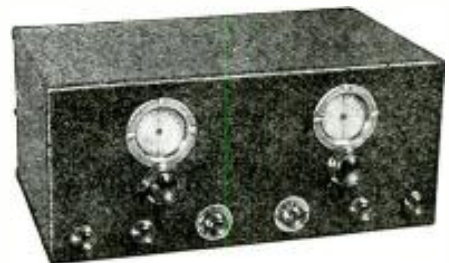
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Date	Time	Call	K.C.	Location	Remarks
July 20	7:05 p.m.	EAQ	9,860	Spain	Very loud and clear
July 20	7:10 p.m.	GD19	11,750	England	Extra loud and clear
July 20	7:15 p.m.	DJD	11,770	Germany	Louder than GSD
July 20	7:50 p.m.	GSC	9,590	England	Very loud
July 20	8:05 p.m.	COH	9,428	Cuba	Very loud and clear
July 20	8:10 p.m.	W1XK	9,570	U.S.	Loud, but faded fast
July 20	8:15 p.m.	ZHO	9,658	Italy	Loud, but noisy
July 20	8:20 p.m.	FYA	11,720	France	Very loud, steady and clear
July 20	8:25 p.m.	DJN	9,540	Germany	Very, very loud
July 21	9:20 a.m.	PIH1	17,755	Holland	Came in fine
July 21	11:15 a.m.	GAA	20,368	England	Very loud, working N.Y.C.
July 26	7:15 p.m.	2RO	9,635	Italy	Fair
July 31	7:10 p.m.	2HO	9,485	Italy	Loud, but choppy
July 31	7:05 p.m.	EAQ	9,860	Spain	Weak, but steady
July 31	7:10 p.m.	FYA	11,720	France	Very, very loud and clear
July 31	7:15 p.m.	GD19	11,750	Germany	Very loud
July 31	7:20 p.m.	DJH	11,720	Germany	Very loud
Aug. 4	9:30 a.m.	PIH1	17,755	Holland	Fair
Aug. 4	9:50 a.m.	WNC	15,055	U.S.	Very loud, working RFP
Aug. 4	10:00 a.m.	IJUB	14,950	Colombia, S.A.	Very loud working WXC
Aug. 4	10:30 a.m.	GSF	15,140	England	Loud, faded some
Aug. 4	10:40 a.m.	PCJ	15,220	Holland	Very loud, sign off at 10:45
Aug. 4	11:05 a.m.	GSG	17,790	England	Loud, but faded
Aug. 4	3:15 p.m.	FTA	11,940	France	Loud, calling "Isle De France"
Aug. 4	3:25 p.m.	FYA	11,575	France	Just understandable
Aug. 4	3:30 p.m.	DJD	11,770	Germany	Very loud, (Relaying to N.Y.)
Aug. 7	7:30 p.m.	GRD	11,750	England	Very loud fading
Aug. 7	7:45 p.m.	DJD	11,770	Germany	Very loud
Aug. 11	9:30 a.m.	PIH1	17,755	Holland	Very fine
Aug. 11	9:40 a.m.	HFP	14,485	Panama	Fine, working WNC
Aug. 11	1:40 p.m.	FTA	11,910	France	Fair
Aug. 11	6:45 p.m.	GSC	9,590	England	Very, very loud, clear
Aug. 11	8:55 p.m.	EAQ	9,860	Spain	Spot for some time
Aug. 11	7:50 p.m.	GSH	11,770	Germany	Very loud and clear
Aug. 11	7:10 p.m.	GD19	11,750	Germany	Very, very loud
Aug. 11	7:15 p.m.	FYA	11,708	France	Very loud and clear
Aug. 17	4:30 p.m.	GSF	15,140	England	Very loud and clear
Aug. 17	4:40 p.m.	FYA	11,575	France	Very loud and steady
Aug. 17	4:50 p.m.	ZHO	9,658	Italy	Loud and clear, steady
Aug. 17	4:55 p.m.	COH	9,428	Cuba	Fair
Aug. 17	5:05 p.m.	PHPS	8,500	Brazil	Very fine, clear
Aug. 17	5:10 p.m.	GSH	9,510	England	Weak
Aug. 17	5:45 p.m.	WNC	15,055	U.S.	Working YNA
Aug. 18	8:50 a.m.	GAA	20,368	England	Very, very loud
Aug. 18	9:45 a.m.	HAS3	15,370	Hungary	Whole program understood
Aug. 18	10:00 a.m.			Station just under GAA Relaying Salzburg, but could not get call	

Listening Post Report from the "Waves of Lake Erie"

● GLAD to be of service to you and Short Wave Craft with my report, hoping you have the kindness to print it in your next issue of S.W.C. My log of stations received and listed with dates follows:

W10XFN—Card of thanks received.  
2RO—Schedule M.W.F. to S.A. 31.13 mts.—7:45-9:15 p.m. Everyday; 2:30 to 5 p.m.—31.13 mts. 6-7:30 p.m. M.W.F.—31.13 mts.  
TIRCC—Card received signed "Cespedes."  
W1XK—Card.  
COH—Card.  
HC2RL—Card.  
W8XK—6.14 mc. card.  
HJ1ABE—Card received; P. O. Box 31. 49.05 meters, 6115 kc, signed "Fuentes."  
W3XAL—  
W2XAF—New card signed "Dordyot." Photo of W2XAF. On address side it read, "GES," 1051 B, 4-35-2M.  
HP5B—Card received.  
COC—Maine Ex. Memorial card received.  
YV2RC—Card received—"Le Habla a la Nacion"—very good! Hi!  
XECR—Card received with photo.  
CJRX—CJRO—7 to 11 p.m., C.S.T. Card gives this information.  
YV6RV—Card received 6520 kc.—12 to 1 p.m. 6 to 10 p.m.  
HCJB—36½ meters.  
HJ3ABH—PCJ—DJD—VK3ME—France.  
Also H5ABE—21.25 meters—14 megacycles; "Veri" card received, signed "Gerente," apartado 50.  
CEC—Sundays.

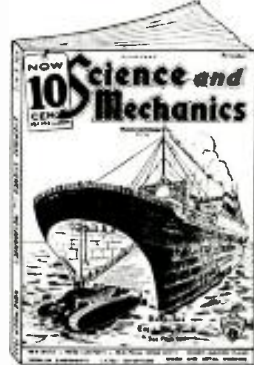
A. E. EMERSON,  
Cleveland, Ohio.

"Radio-Reykjavik Now on the Air" Reports Geo. D. Sallade, Sinking Springs, Pa.

● RADIO-REYKJAVIK, the elusive station from Iceland, was heard testing with GBC on numerous occasions, during the past month. The call letters which are also used in addition to the above-mentioned identification are TFJ. The frequency used was 12,230 kc. The best time to tune for this station is between 5:00 and 10:00 a.m., E.S.T. Their signal varied from R4 to R9 in the course of five hours' testing. H1Z, located in Santo Domingo, D.R., was heard several times with an R9 signal. One time they were heard testing at 1:00 a.m., E.S.T. The frequency used was 6320 kc.

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Chile now boasts of one short-wave transmitter in CEC. They are on the air with an altered schedule, broadcasting only on Sunday evenings from 8:30 to 9:00 p.m., E.S.T. This station will be found on 10,670 kc.

A new signal emanates from the Cuban city, Havana. COCD, relaying the programs of CMCD, can be heard nightly after W2XE leaves the air. The frequency of this transmitter is 6130 kc.

Confirmations received include PMA, whose reception was reported in this column several months ago, and COCD. Incidentally, the addresses of these stations are: PMA, Post-Telegraaf-en Telefoon dienst, Bedrijf der Radiostations op Java, Bandoeng, Java, and of COCD, "La Voz del Aire, S.A." 25 y G. Vedade, Habana, Cuba. Both verifications were cards suitable for mounting.

GEO. D. SALLADE,  
Sinking Spring, Pa.

**Official Listening Post Report from Illinois**

● THIS month there is indeed much to report. There are many DX stations pouring in from all over the world. It seems at present the base of excitement is the 14.00-meg. amateur phone band. This band indeed provides more thrills than the commercial stations. Since these amateurs use low power and live such a great distance it is a REAL thrill to hear them. The best time to hear the amateurs is from 5-7 p.m., E.S.T. Some of the best heard at this post are F8GR-ON4FE-HB9J-EA4AO-VP3BR - VK2EP - VK2QN-VK2YW - K6KKP - TI2RC - HC1FG - PY2BN - LU9PA—many British amateurs. This band is really the DX spot. Try for them for some real thrills.

This post has for the past 15 days heard VPD. Suva, Fiji Islands, on a frequency of 13.07 megs. from 12:30 a.m. till 1:30 a.m., E.S.T. They broadcast American recordings that can be identified very easily and speak very distinct English—announcing as "VPD-Radio Suva, Fiji." Anybody with a halfway good set will experience no difficulty in hearing this station. Now is the time as they are coming in very loud. Try for them!

The most thrilling experience this "Post" has had for many months was when station OPM, Leopoldville, Belgian Congo, was "speared" at 2:15 a.m., E.S.T., phoning Belgium, on a frequency of 10.14 megs. Then on July 13, 1935, they broadcast a musical program between 3:00 and 4:00 p.m., E.S.T. They were very loud and clear! The station engineers connected the microphone in the jungle and let the natives beat their drums and dance. Some thrill, indeed! Imagine "The Congo speaks." They are heard quite regularly on Saturday afternoons and early mornings.

The Javanese stations are creating a sensation. Station PMA, on 19.35 megs., has been heard at least once a week. Try for them at 10:00 a.m., E.S.T., for a week straight and you will get them. They broadcast very nice programs, and announce frequently in English. Many times stations PLE-PMA are linked together in one broadcast. Station PLE operates on 18.83 megs. and has a very powerful signal. Their address is Government Post and Telegraph, Bandoeng, Java, Dutch East Indies, care of Mr. Van Der Veen. Station PLV, 9.43 megs., is heard quite frequently phoning Japan in the early mornings, from 4:00-6:00 a.m., E.S.T.

A new station heard is IRG, Manuaa, Eritrea, Africa. They phone Japan in the early mornings daily at 5:00 a.m., E.S.T., on a frequency of 14.735 megs. This station is heard very, very loudly and here is a chance for that elusive African "veri." Their address is above.

Although it has been reported that CNR, Rabat, Morocco, has left the air, this station is heard in the early mornings phoning France on a wave of 12.83 megs. Their signal is very strong and is on for



Illustrations shows Tri-Dot racks set side-by-side for table mounting. Racks are drilled to meet any set-up condition. Panels shown are not included in price of rack.

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The Japanese stations are being received with tremendous volume at this post. Station JVM, the best of all, is coming through until 7:00 a.m., E.S.T., daily, on 10.74 megs. and announce in English and often read the news in English. No difficulty should be experienced in logging this station.

A new station which is creating quite a sensation in the East is station ZBW, Hongkong, China. They operate on 8.75 megs. and are on the air every Monday and Thursday morning from 3:00 to 7:00 a.m., E.S.T. They broadcast in English and announce in English frequently. They play many American selections and announce: "This is ZBW, the Hongkong Broadcasting station calling you." Their address is Radio Station ZBW, Post Office Box 200, Hongkong, China. They are being heard quite well and will no doubt improve in time.

Station VVY, Poona, India, quite a rare station is now being heard at 8:00 a.m., E.S.T., daily phoning London, on a frequency of 17.53 megs. They announce when calling London. They have a very loud signal and cannot be missed. Try for them and hear a "real treat."

Verifications received this month are too numerous to mention, nine having been received in one day. In one week verifications were received from all continents. They total approximately 37 for the past six weeks, in all.

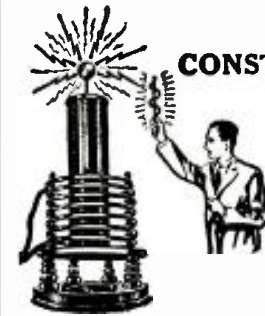
Edward Schmeichel,  
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**Television Stations**

(Continued from page 416)

- 2000-2100 kc.
- VE9AU—London, Ont., Can.
- VE9DS—Montreal, Que.
- W2XDR—Long Island City, N.Y.
- W8XAN—Jackson, Mich.
- W9XX—Iowa City, Ia.
- W9XAK—Manhattan, Kans.
- W9XAO—Chicago, Ill.
- W6XAH—Bakersfield, Calif.
- 2750-2850 kc.
- W3XAK—Portable
- W9XAP—Chicago, Ill.
- W2XBS—Bellmore, N.Y.
- W9XAL—Kansas City, Mo.
- W9XG—W. Lafayette, Ind.
- W2XAB—New York, N.Y.
- VE9AR—Saskatoon, Sask., Can.
- VE9ED—Mt. Joli, Que., Can.
- 42000-56000, 60000-86000 kc.
- W2XAX—New York, N. Y.
- W6XAO—Los Angeles, Calif.
- W9XD—Milwaukee, Wis.
- W2XBT—Portable
- W2XF—New York, N.Y.
- W3XE—Philadelphia, Pa.
- W3XAD—Camden, N.J.
- W10XX—Portable & Mobile (Vicinity of Camden)
- W2XDR—Long Island City, N.Y.
- W8XAN—Jackson, Mich.
- W9XAT—Portable
- W2XD—New York, N.Y.
- W2XAG—Portable
- W1XG—Boston, Mass.
- W9XX—Iowa City, Ia.
- VE9BZ—Vancouver, B.C., Can.
- VE9DS—Montreal, Que., Can.
- VE9AU—London, Ont., Can.
- VE9RC—Quebec, Que., Can.
- VE9AG—Walkerville, Ont., Can.

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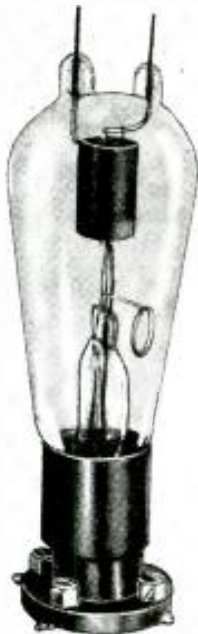
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By C. E. FAY

Vacuum Tube Development, Bell Telephone Laboratories



● In the past few years, considerable attention has been devoted to the development of radio communication at the ul-

Fig. 2—The Western Electric 304A vacuum tube—designed for frequencies from thirty to three hundred megacycles

tra-high frequencies. As the available channels in the lower frequency range become assigned, this high-frequency portion of the radio spectrum, including fre-

quencies higher than thirty megacycles, offers an abundant supply of additional channels. Developments have not progressed sufficiently, however, to give knowledge of the full possibilities of these higher frequencies. To be able to carry on studies of communication systems that may employ them, it has been necessary to develop vacuum tubes that will oscillate and amplify in this ultra-high frequency region.

Difficulties have been encountered in operating the conventional vacuum tubes at these higher frequencies. One of these is a reduction in efficiency as the operating frequency is increased. For ordinary tubes, the efficiency does not decrease to any great extent for frequencies below fifteen megacycles. At frequencies somewhat above thirty megacycles, however, it begins to fall off rapidly, until a point is finally reached where the maximum allowable energy must be dissipated in the tube elements to produce any detectable output power. This is known as the frequency limit of the tube.

One of the causes of this decrease in efficiency with increasing frequency is that the charging currents to the inter-electrode capacitances increase in proportion to the frequency. Since these charging currents must flow through the tube leads, which are not ordinarily designed to carry heavy currents, a considerable energy loss results which decreases the useful output. These capacitances and charging currents are indicated by the dotted lines of Figure 1.

Besides its reduction caused by excessive charging current, the efficiency of a vacuum tube falls off very rapidly as the time of a period of oscillation approaches the time required for electrons to travel from the cathode to the anode. Reduction in efficiency due to this effect begins to be noticeable for most tubes at frequencies between thirty and sixty megacycles. Its most obvious cause is a lagging in phase of the plate current with respect to the plate voltage, although other and more in-

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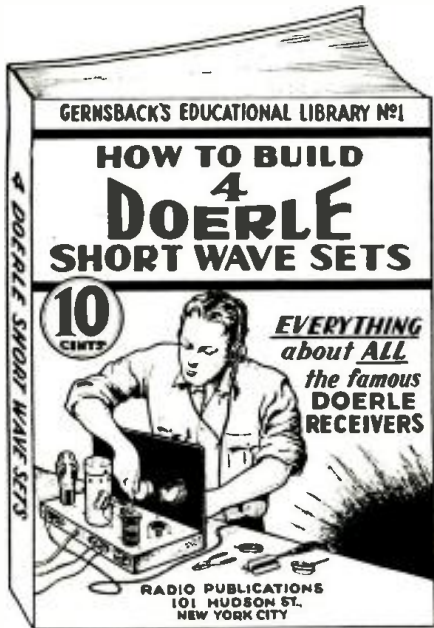
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volved effects are present. Still another difficulty in the operation of the ordinary tubes at very high frequencies is the magnitudes of the inductances and capacitances within the tube relative to the external tuning reactances. The capacitances and inductances within the tube itself are fixed in magnitude, but at ordinary frequencies are very small compared to the external reactances, such as  $L_0$  and  $C_0$  of Fig. 1. To tune the circuit to a higher operating frequency, however,  $L_0$  and  $C_0$  must be made smaller, and a frequency is ultimately reached at which they become small compared to the inductances and capacitances of the tube. In extreme cases the tube reactances themselves control the oscillating frequency.

To avoid these difficulties that arise when ordinary tubes are operated at ultra-high frequencies, a tube has been recently developed in which these frequency limitations have been eliminated to such an extent that the tube is suitable for operation in the range from thirty to three hundred megacycles. This tube, known as the Western Electric 304A, and shown in Figure 2, is a low-power triode suitable either as an oscillator or an amplifier. Its characteristics and rating are given in the tabulation of Figure 4. At frequencies up to one hundred megacycles it may be operated at full rating, but with higher frequencies the output is gradually reduced. The power output and efficiency of this tube in the range from fifty to four hundred megacycles is shown by the characteristic curves plotted in Figure 3.

Several modifications have been incor-

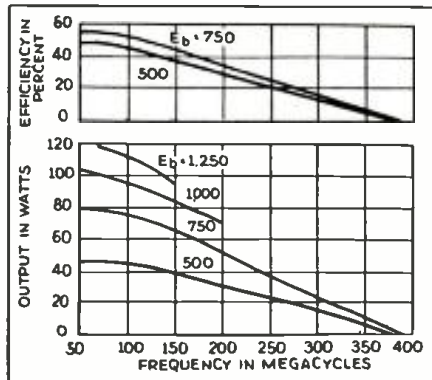


Fig. 3—Output and efficiency characteristics of 304A tube at various plate potentials.

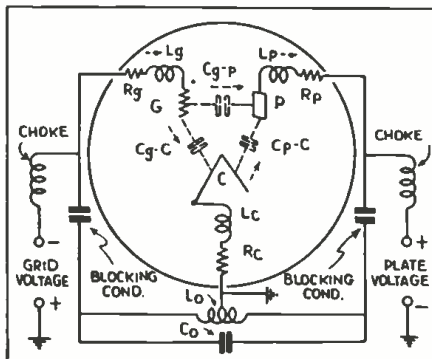
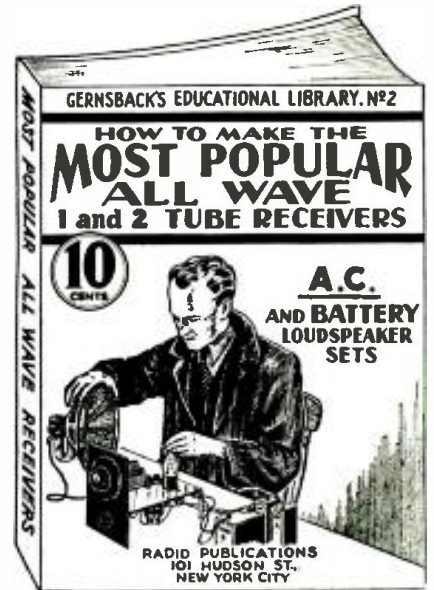


Fig. 1—Diagrammatic arrangement of vacuum tubes showing external and internal reactance.

porated in this new tube to make it suitable for operation at the higher frequencies. Dissipation of energy in the leads due to excessive charging current is avoided both by decreasing the interelectrode capacitances and by decreasing the resist-

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- How To Make a 1-Tube Loudspeaker Set, by W. P. Chesney.
- How To Make a Simple 1-Tube All-Wave Electric Set, by W. Green.
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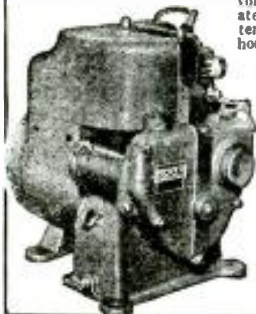
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ance of the leads. The grid and plate electrodes are supported by short heavy wires which pass through the top of the hard glass envelope. These serve both as supports and lead-in wires, and provide a construction giving the low inductance and resistance essential to the operation of the tube at ultra-high frequencies. This construction has the further advantage of eliminating any solid dielectric other than the glass envelope. In a high-frequency field, solid dielectric absorbs energy and may break down, so that its elimination is desirable.

Besides these modifications, the charging currents themselves have been made very small by employing smaller electrodes. In general, the size of the anode is determined by the amount of heat that must be radiated, which for any given material is a function both of its operating temperature and its radiating area. By employing graphite for the anode, which is a much better radiator than molybdenum, the material commonly employed as an anode material, it has been possible to radiate the desired amount of heat with a smaller plate. The plate is cylindrical in shape, and thus a smaller surface area makes possible a smaller diameter. The smaller diameter, in turn, results in a shorter electron transit time, and thus increases the frequency at which the phase lag of the current with respect to the voltage becomes appreciable.

With these many advantages the new tube is proving highly satisfactory for a variety of ultra-short wave circuits. A typical application is the push-pull oscillator operating at sixty megacycles shown in the illustration at the end of this article.

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(Continued from page 407)

parts. If it satisfies, as it does, serious amateur ("Ham") needs, it is automatically an excellent short-wave broadcast receiver, which it also is.

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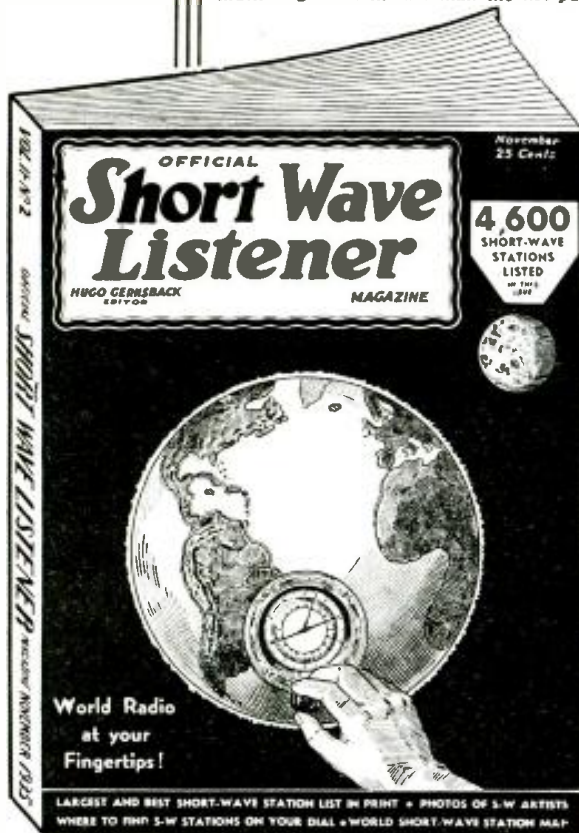
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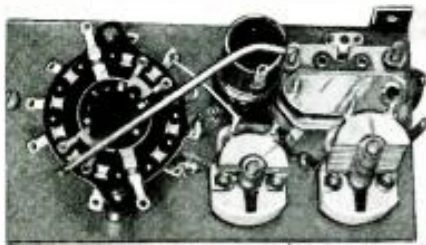
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In the photo, the knobs left to right are crystal phasing and parallel switch, beat oscillator pitch—on-off switch, audio volume control, A.V.C. on-off switch, five position (one dead for "send") wave change switch, tone control and sensitivity or manual volume control. The dial is shown 0-100—actually its outside carries four calibrated bands, and the inside 0-200 division, full circle band spread pointer scale.

Speaker new Jensen C8X, 8" (a matched 12" speaker can be had if preferred).



Typical wave change switch section and "D" band (16 to 32 mc.) inductance of the section 5D. The oscillator section is shown with the two low-frequency oscillator padding condensers, only needed for the full-wave coils.

Here is the complete parts list—all standard high quality parts of dependable makers. You can build this receiver, building as you buy, building all at once, or you can buy it as a laboratory built and tested R.C.A. licensed complete receiver. Substitution is not recommended—high frequency receiver specifications simply must not be played with, for even resistors, let alone tubes and other parts, are critical, and other equally good parts will usually vary enough to upset performance seriously.

**Model 5D Silver Parts List**

- Alladin Radio Industries, Inc.
- 2—465 k.c. Polyiron Core and Coil Assemblies Chicago Transformer Company
- 1—2067 Power Transformer 110 MA. 325 V. Sec.
- 1—2856D Filter Choke
- Crowe Name Plate & Mfg. Company
- 1—4 1/2" Two-Speed Band Spread Airplane Dial with "Radio-Silver" calibrated scale
- 1—"Radio-Silver" Control Panel Hammarlund Manufacturing Co.
- 16—APC25 Air Trimmers—Type D. 25 mmf.
- 5—APC100 Air Trimmers—Type D. 100 mmf.
- 1—MICS1000 Trimmer 1000 mmf.
- 2—SM15 Star Midgrets—15 mmf.
- Continental Carbon Company
- 4—250 ohm, 1/2-watt Resistor
- 1—500 ohm, 1-watt Resistor
- 1—6000 ohm, 1-watt Resistor
- 2—10,000 ohm, 1/2-watt Resistor
- 1—3000 ohm, 2-watt Resistor
- 1—30,000 ohm, 1-watt Resistor
- 5—5000 ohm, 1/2-watt Resistor
- 2—15,000 ohm, 1/2-watt Resistor
- 4—250,000 ohm, 1/2-watt Resistor
- 3—500,000 ohm, 1/2-watt Resistor
- Ohmite Manufacturing Company
- 1—7500 ohm "Brown Devil" 10-watt Resistor
- Readrite Meter Works
- 1—TM108, 0-7 MA Meter, arrow left, window down
- 6—1 1/4" Black Bar Pointers
- McMurdoo Silver Corporation
- 1—4 Gang 200 mmf. "Low Min." Condenser
- 1—Kit of 4 A-B-C Coils (2 R.F., 1st Det. and Osc.)
- 4 D Coils, (2 R.F., 1st Det. and Osc.)
- 1—17F B.O. Coil

(Continued on page 447)

# CLASSIFIED

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<p><b>BOOKS</b></p> <p><b>ARMY-NAVY GIVES FREE</b> radio operators' training for service on aircraft, ships. Salary, expenses paid. Information pamphlet, how to apply, 20c. Continental, Box 344, Dept. 4, Indianapolis, Ind.</p> <p><b>CALLBOOKS!</b> 70,000 AMATEURS! \$1.25. Order from W8DED, Holland, Michigan.</p> <p><b>CODE MACHINES</b></p> <p><b>OMNIGRAPH CODE LEARNER'S.</b> Get ahead quickly. Thousands satisfied. Use this everlasting automatic instrument, teach others. We tell you how. "There's money in it." Dials exchanged free. Catalog, \$2.50 to \$25.00. Easy terms. Omnigraph Mfg. Co., 819 E. 39th Street, W. Brooklyn, N.Y.</p> <p><b>ELECTRICAL SUPPLIES</b></p> <p><b>INSULATION, WIRE, VARNISHES, SUPPLIES, ETC.</b> Send 3c stamp for Bulletin Autopower, 414 S. Hoyne Ave., Chicago.</p> <p><b>GENERATORS</b></p> <p><b>TWENTY NEW PRACTICAL</b> changes for automobile generators. See our advertisement at bottom of page 437. Auto Power, Inc.</p> <p><b>"HAM" OFFERS AND WANTS</b></p> <p><b>FOR SALE—200 WATT XTAL CONTROL</b> phone transmitter complete with Super-Het receiver \$325. Write for details. W 8 H B K, 2613-109 Street, Point Place, Toledo, Ohio.</p> <p><b>SKYRIDER 5, 12-200 METERS.</b> Complete. Perfect, \$18.00. Also will buy or trade for Scott. Bill Lyon, 4151 Jackson, Chicago.</p> <p><b>34-30-30 RECEIVER, BLACK</b> crystalline finish, 15-550 meter coils, tubes and 3,000 ohm tones. \$9.75. J. Tate, 205 Simpson, Ardmore, Pa.</p> <p><b>NATIONAL SW3, 2 VOLT.</b> Complete. Write Grossman Turner, Route 1, Carrollton, Mo.</p> <p><b>200035 VARIABLE CONDENSERS</b>—3 for \$1.00. W8RW, Bluffton, Ohio.</p>	<p><b>INSTRUCTION</b></p> <p><b>RADIO ENGINEERING, BROADCASTING, AVIATION AND POLICE RADIO, SERVICING, MARINE AND MORSE TELEGRAPHY</b> taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Colt St., Valparaiso, Ind.</p> <p><b>PATENTS &amp; INVENTIONS</b></p> <p><b>HAVE YOU A SOUND, PRACTICAL</b> invention for sale, patented or unpatented? If so, write Chartered Institute of American Inventors, Dept. 92, Washington, D. C.</p> <p><b>QSL-CARDS-SWL</b></p> <p><b>SWL CARDS, VERIFICATION</b> Cards, Swl Log Systems. Stamp for Samples, W8DHS Print, Dept. L, 2156 West 80th Street, Cleveland, Ohio.</p> <p><b>QSL'S, SWL'S, FINEST QUALITY</b> Stock, Attractive. Samples (stamps). W-8-B-S-N, 1827 Cone, Toledo, Ohio.</p> <p><b>QSL CARDS, NEAT, ATTRACTIVE,</b> reasonably priced, samples free. Miller, Printer, Ambler, Pa.</p> <p><b>QSL'S—125 FOR \$1.00, W8RW,</b> Bluffton, Ohio.</p> <p><b>SHORT WAVE COMPONENTS</b></p> <p><b>RADIO BASES</b> 6x8x2 25c, 8x10x2 35c, 10x14x2 50c, 10x18x2 55c, 12x18x2 60c. 19 sizes in stock. Ham bases made to order. Radio Builders Supply Co., 337 So. Clark St., Chicago, Ill.</p> <p><b>PARTS AND KITS FOR ALL</b> sets in Short Wave Craft. Chas. Brand, 1063 Lafayette Ave., Brooklyn, N.Y.</p> <p><b>PLUG-IN COILS, WOUND TO</b> order. Noel, 728 Birch, Scranton, Pa.</p> <p><b>SHORT WAVE RECEIVERS</b></p> <p><b>THE AMATEUR DX'ER IS HOPED TO</b> go on market early 1936. Complete Plusless, AC and DC, any band from 14 to 3,000 meters. The Receiver winning International Fame. Watch your magazine. King of VK'S, Oliver Amile.</p>	<p><b>OUR TUBELESS CRYSTAL SETS</b> have received 2,100 miles. Simple Blueprint for building 18 Types—with your subscription "Setbuilders Data"—25c. Laboratories, 151-A Liberty, San Francisco.</p> <p><b>IN STOCK—SHIPPED PREPAID</b> Hammarlunds, Nationals, RM9D, Lincoln, etc. Trade-in your receiver Schwarz Radio Service, 15 Lawrence Ave., Dumont, N. J.</p> <p><b>MAKE SIMPLE LONG DISTANCE</b> pocket radio. No tubes—no batteries. Reception over hundreds of miles reported. Supersensitive Melomel Crystal and Instructions, 25c. Postpaid, Melomel, Dept. P'S, Fairmount, Kansas City, Mo.</p> <p><b>TELEVISION</b></p> <p><b>TELEVISOR COMPLETE \$13.00.</b> Arthur Pohl, 2131 Palms Ave., Detroit, Mich.</p> <p><b>TRANSMITTING EQUIPMENT</b></p> <p><b>INTRODUCTORY OFFER, ONE</b> order to an individual Send \$1.00 and call letters for 100 two color modern Q.S.L. cards and Six F.M.C. porcelain case Mica Low Loss Transmitting and Receiving Condensers. Any capacity up to .006 MFD 5% Capacity Tolerance 2,000 Volt test. Actually a \$7.50 value for \$1.00. Capacity Color Chart included. Filtermatic Mfg. Co., Dept. S, Tarrytown, Phila., Pa.</p> <p><b>NEW 1936 CATALOG, SPECIAL</b> offering on every known power supply, lowest prices with highest quality. Transmitters and special power packs built to order. Amplifiers, wavemeters, Transformers and filter chokes of every size. Everything for the transmitting station. General Engineering Corp., Charlotte, Michigan.</p> <p><b>A AMATEUR EQUIPMENT DESIGNED</b> on order. Reasonably priced. W11BY, West Hartford, Conn.</p>
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RM9D	112.50
RCA ACR-136 complete	69.50
BREITING 12 complete prepaid	93.00
SUPER PRO complete	194.06
PR-16 complete prepaid	89.70

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**R** To secure the best headphone reception the impedance of the phone should match that of the tube with which it is connected. **R**  
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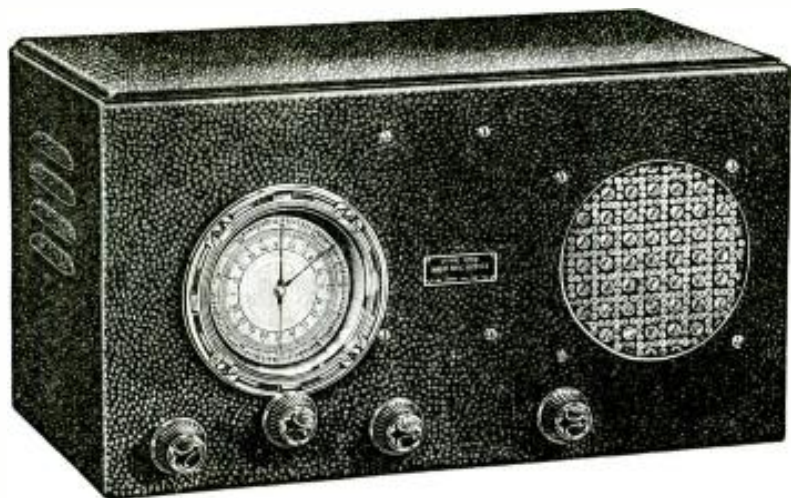
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SHORT-WAVE RECEIVER

NATION-WIDE  
TESTIMONIALS  
PRAISE THIS SET

Dear Sir:  
I want to tell you that the radio which I bought from you recently is working fine. I have received California on long-waves, and on short-waves have logged about 93 stations. Three from the greatest distance are VK3LR, VK2ME and VK3ME, all located in Australia. And I get them consistently, not just once in a great while, at great volume, on a small window-sill aerial.  
The set certainly has some "kick" to it.  
Ernest J. Orishek, 118 White St., Westfield, Mass.

Dear Sirs:  
Just a line or so to give you an idea of what my Doerle A. C. 5 hauled in during a 2 weeks listening test. All of the G and D stations were received also TIEP, W9XP, PRADO, HJ4ABE, W8XAL, W2XE, W8XK, CJRO, YU2RC, CJRX, COC, HJ4ABE, HJ1ABB, YU5RMO, YP3RC, WCRCT, CT1AA, W1XAL, W9XAA, W1XAZ, EAQ, WE9GW, HC2RL, HJ3ABD, KEJ, HJR, HP5B, HJ1ABD, WNB, YUIRC, HIZ, JYK, FYA, YU4RC, OA4AD, RNE, PHI, RKI, WNC, YNA, COH, PRF5, WON, XEBT, W2XAF, LSI, 12RO, IRM, JYS, UK3LR. All stations come in with strong carriers with a QSA4-5—R9 plus. "Hams" in 48 states and foreign countries besides practically all Police Radio Stations were received.  
Frances Kmetz, 213 Linden St., Allentown, Pa.

Gentlemen:  
The Doerle "AC-5" arrived all O.K. Had it going in about ten minutes after unpacking. It sure seems to be fine, we enjoy it very much. I am new at short-wave tuning but the bandspread dial makes tuning a real pleasure. I only have a short wire aerial so cannot give you any long list of stations received, but have received many foreign stations. I think Rio De Janeiro about the best distance at about 18 volume.  
Ralph C. Rathbun, 9 Seward Ave., Bradford, Pa.

Gentlemen  
Here is a list of Short-Wave stations I have received in a short time with my "DOERLE AC5", with a very poor aerial for short-wave work. EAQ—Madrid, Spain; W1XAZ—Springfield, Mass.; W2XAF—Schenectady, N. Y.; COH—Havana, Cuba; COC—Havana, Cuba; VE9GW—Bowmanville, Ontario, Canada; CT1AA—Lisbon, Portugal; HP5—Rio De Janeiro, Brazil; HJ1ABE—Barranquilla, Col. S. A.; PRADO—Rohamba, Ecuador, S. A.; DIC Berlin, Germany; NEPT—Mexico City, Mexico; YU5RMO—Maracaibo, Venezuela, S. A.; CRJO—Winnipeg, Canada; W2NE—New York, N. Y.; W8XK—Pittsburgh, Pa.; HP5B—Panama City, Panama; FYA—Paris, France; GSK & GSI—Davenport, England.  
EAQ—Madrid, Spain and COH—Havana, Cuba come in every night on the loud speaker regardless of weather conditions. This is the third and best receiver I have owned in the short time I have been interested in Short Waves.  
Emerald H. Debruggre, Rose-Mary Dahlia Gardens, Martins Ferry, Ohio.  
Original letters plus others may be seen at our office.

Complete Price  
**\$27.58**  
WITH TUBES  
Ready to plug into 110 Volt AC line

- ▶ Doublet Antenna Input or
- ▶ Standard Antenna input
- ▶ 8-Low Loss Bakelite Plug-in Coils
- ▶ Fully Shielded
- ▶ 15-200 Meters
- ▶ Dynamic Speaker
- ▶ Bandspread Dial
- ▶ Beautiful Cabinet
- ▶ Headset Jack

BEFORE you buy any other Short-Wave Receiver, be sure to take advantage of our FREE five day trial offer explained below. Satisfy yourself, in your own home and at your leisure that this IS one of the greatest values in radio, and that it DOES have features which are found in more expensive receivers.

A powerful 5-tube "rig" complete with its self-contained hum-free power pack and dynamic speaker; all mounted on a single chassis and contained in a large handsomely finished black crackle cabinet with patterned screen speaker grill.

Two tuned stages—regenerative detector, 3AF stages with powerful 41 pentode output and perfectly matched dynamic speaker; all these features contribute to the great power and fine performance of this Doerle short-wave receiver.

CONTINUOUS BANDSPREAD ON ALL BANDS. A special double-pointer, double-scale, airplane dial having a tuning ratio of 125 to 1 is employed.

Many fine features that you would expect to find in more expensive receivers are incorporated in this "ACE TOP-NOTCHER" of the entire Doerle line.

Either a short-wave doublet or standard antenna may be used. A new antenna-adjusting scheme permits perfect alignment of both tuned circuits without appreciably affecting the setting of the tuning dial. Provisions are made to use headphones if desired, with a switch to cut out the dynamic speaker. All parts and workmanship fully guaranteed.

LOOK AT THIS DX-QSL LIST!

During its initial test, in New York City, this receiver pulled in on its loud speaker, at good room volume, the following available log: W1XAL, W1XAZ, Boston; W3XAL, Boundbrook, N.J.; W8XAL, Cincinnati; W9XAA and W9XF, Chicago; GSK, GSD, GSE, GSF, Davenport, England; DJA, DJB, DJC, DJD, Zeosen, Germany; HBL, HBP, Geneva; VE9GW Ontario; V9DN Quebec; GEDR Montreal; VESHX Halifax; XETE Mexico City; YU1BC, YU3BC Caracas CP; Bolivia; LSN Buenos Aires; COC Havana; EAQ Madrid; WQO and WEF, testing with the Byrd Expedition and a whole flock of amateurs in practically every radio district of the United States. After that, we could no longer keep our eyes open so we "signed off" to bed.

The testimonials printed on this page testify that, in actual use, our customers are attaining even greater success. It's a simple regenerative circuit—so simple as to be entirely fool-proof. Tubes: 1—6D6, 1—6E7 (actually two tubes in one), 1—3T, 1—41 power output tube and 1—80 full-wave rectifier. Two Lang tuning condenser; single dial control; FULL-VISION ILLUMINA. ED BAND SPREAD AIRPLANE DIAL. Ship. wt. 35 lb. No. 5000. "DOERLE AC-5" Short-Wave Receiver, complete with Tubes, Speaker and 8 coils 15 to 200 meters. Completely wired and tested. (NOT SOLD IN KIT FORM) YOUR PRICE.....\$27.58  
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C.O.D. SHIPMENT. I enclose .....dollars.....cents deposit, balance of .....dollars.....cents C.O.D.  
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Address .....  
Town ..... State .....

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Up-to-the-minute catalog containing low prices which save you money. Contains radio sets, parts, public address equipment, short-wave receivers, etc. etc.

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**New Silver Receiver**

(Continued from page 445)

- 1—17G Crystal Auto. Transformer and Shield
- 6—Shield Cans
- 2—10 mh. R.F. Chokes
- 8—Tube Shields
- 1—A-A-G Binding Post Strip
- 1—Set 12 Am. Phenolic High-Q Sockets with eight tube shield bases (4-6D6, 1-6C6, 1-42, 1-6B7, 1-5Z3, 2-76, 2 5-pin blank)
- 1—AC Cord and Plug
- 1—AVC On-Off Switch
- 1—Kit of Hardware
- Sprague Products Company
- 1—475V. 16 mf. Wet Condenser
- 1—250V. 18 mf. Self-Regulating Electrolytic Condenser
- 1—300V. 12 mf. Self-Regulating Electrolytic Condenser
- 7—TC15 .05 mf. 600-volt Condensers
- 1—TC5 ½ mf. 600-volt Condensers
- 7—TC11 .01 mf. 600 volt Condensers
- 1—HC5 5 mf. 25 volt Dry Electrolytic Condenser
- 5—TC1 .1 mf. 600 volt Condensers
- Steel Box and Display Company
- 1—Radio-Silver polished chromium Pierced Chassis, Gang Condenser Shield, 4 Partitions and bottom shield
- Yaxley Division, P. R. Mallory Company
- 1—N 500,000 ohm Volume Control
- 1—O.1 megohm Tone Control
- 1—G 10,000 ohm Sensitivity Control
- 1—704A Junior Jack (4 spring, single closed circuit and single filament circuit)
- 1—SP07488 Locating Plate, 5 position, 9" flat shaft
- 5—SP07488 2 Circuit, 5 position Plates
- 8—SP07488 ½" Spacers
- 1—No. 9 Switch
- Filtermatic Manufacturing Corporation
- 3—50 mmf. Isolantite-Mica Fixed Condensers
- 5—250 mmf. Isolantite-Mica Fixed Condensers
- 1—.004 mf. Isolantite-Mica Fixed Condensers

**List of Accessories**

- Bliley Piezo Electric Company
- 1—465 kc. Type B C Mounted Crystal
- Raytheon Production Company
- 4—6D6 Tubes
  - 1—6C6 Tube
  - 1—6B7 Tube
  - 1—76 Tube
  - 1—41 Tube
  - 1—42 Tube
  - 1—5Z3 Tube
- Jensen Radio Manufacturing Company
- 1—CRX Speaker with 7000-ohm Transformer, field 495 ohms, 110 M A



Another view of the Silver Super-het.

**Complete DESIGNS of 10 PUBLIC ADDRESS AMPLIFIERS!**

A manual of circuits of Audio Amplifiers. One for every purpose. From 3 watts to 30 watts. All tried and tested designs. With complete lists of parts and their values.



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 (Near Van Buren Street)  
 Est. 1921 **CHICAGO**

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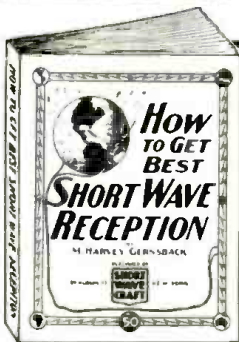
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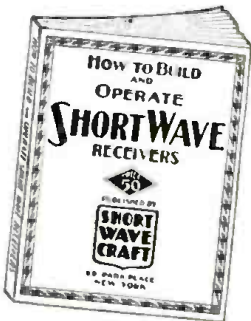
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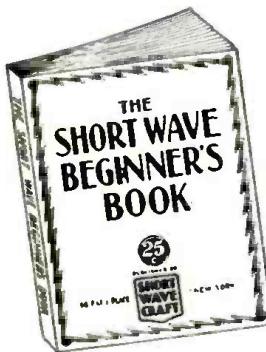
The book is profusely illustrated—it is not "technical." It has no mathematics and no technical jargon. It also gives you a tremendous amount of important information, such as time conversion tables, all about aeriels, noise elimination, all about radio tubes, data on coil winding and other subjects.

### Partial List of Contents

- Getting Started in Short Waves—the fundamentals of electricity, symbols, the Short Hand of Radio—how to read schematic diagrams. Short Wave Coils—various types and kinds in making them.
- Short Wave Aeriels—the points that determine a good aerial from an inefficient one.
- The Transistor Lead-in for receiving static.
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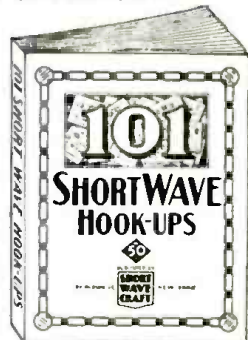
Compiled by the Editors of SHORT WAVE CRAFT

EACH and every hook-up and diagram illustrated is also accompanied by a thorough explanation of what this particular hook-up accomplishes, what parts are required, coil-winding information, values of resistors, etc. In fact, everything you want to know in order to build the set or to look up the data required.

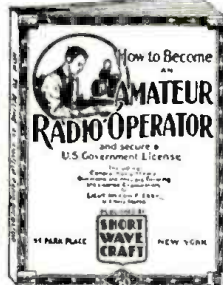
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## TEN MOST POPULAR SHORT-WAVE RECEIVERS

—HOW TO MAKE AND WORK THEM

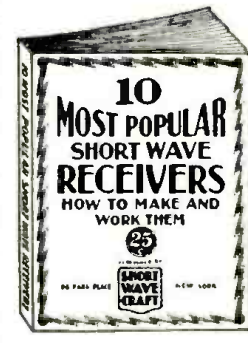
THE editors of SHORT WAVE CRAFT have selected ten outstanding short-wave receivers and these are described in the new volume. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hook-up and all working specifications. Everything from the 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.

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- 2 R.F. Pentode S-W Receiver having two stages of Tuned Radio Frequency, by Clifford E. Denton and H. W. Neer.
- My de Luxe S-W Receiver, by Edward G. Ingram.
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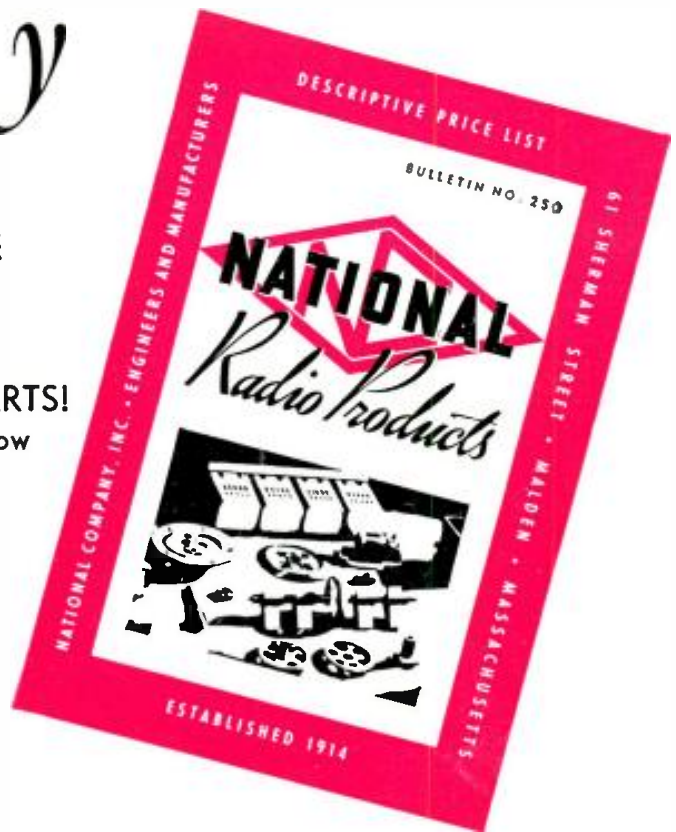
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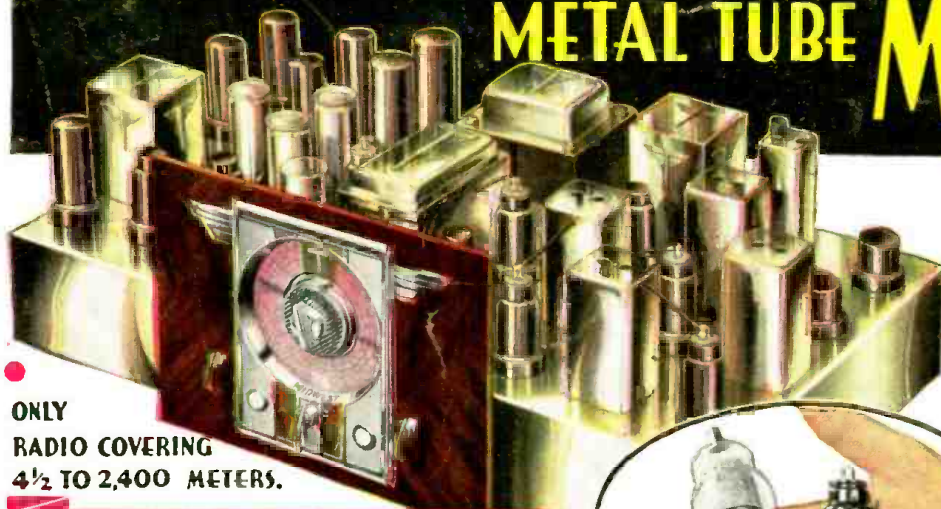
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