THE RADIO EXPERIMENTER'S MAGAZINE

HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

November 35

WORLD'S LARGEST SHORT WAVE CIRCULATION

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See Page 394

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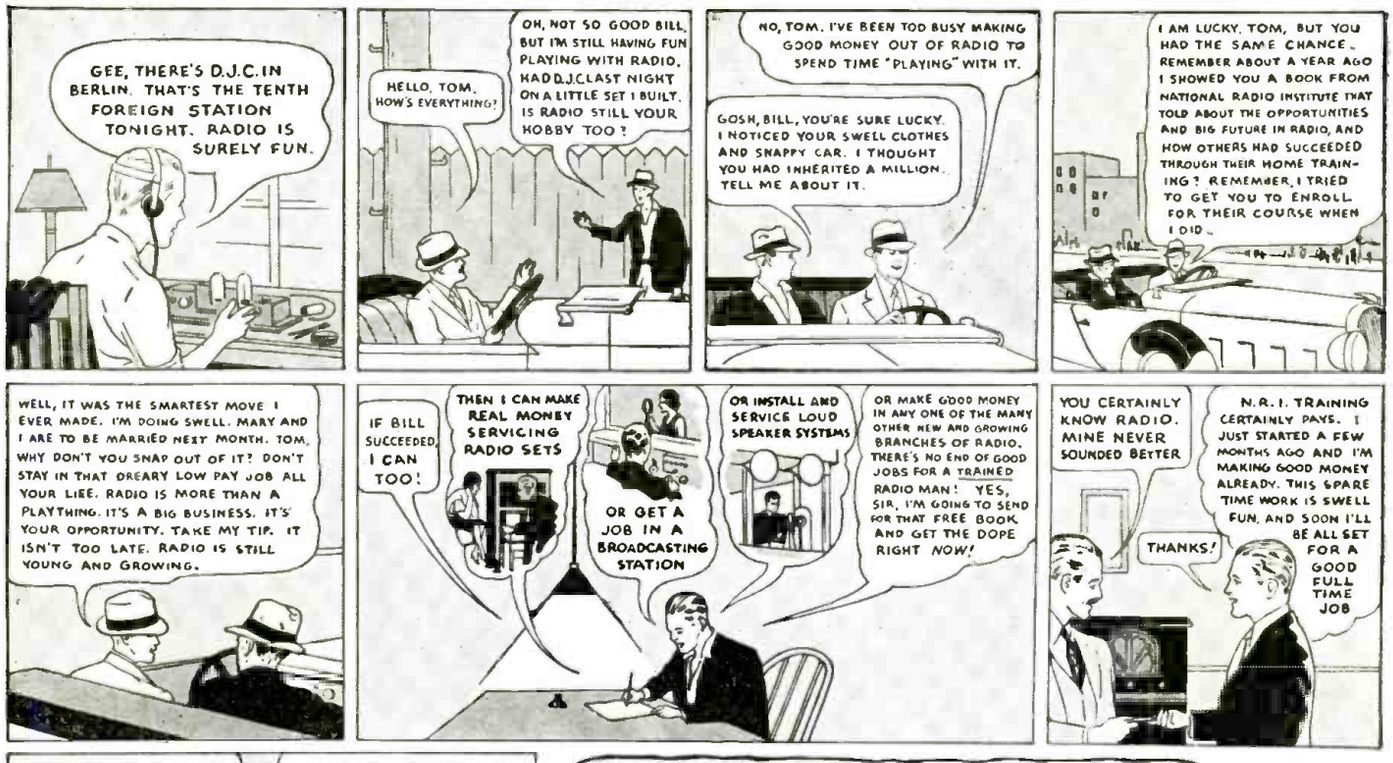

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Klein • Kahlert • Shuart • Cisin • Silver

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

GEORGE W. SHUART, W2AMN
Associate Editor

Contents for November, 1935

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Fixed Band-Spread "Ham" and "Fan" receiver, by George W. Shuart, W2AMN.

A 5-meter transceiver using new midget tubes.

The effect of Sun-Spots on short-wave transmission.

Television for theatres, by H. W. Secor.

Audio Amplifier and Power Supply for S-W Receivers.

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Published by POPULAR BOOK CORPORATION

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EMIL GROSSMAN - - - - - - - - - - - - - - - - - - Director of Advertising
Chicago Adv. Office - - - - - - L. F. McCLURE, 919 No. Michigan Ave.
Los Angeles Adv. Office - - - -J. A. Kendall, Box 176, Arcade Annex
Publication Office - - - - - - - - 404 N. Wesley Avenue, Mount Morris, Ill.
Editorial and General Offices - - - - 99-101 Hudson St., New York, N. Y.
European Agent: Gorringe's American News Agency, 9A Green St., Leicester Square, London W. C. 2
Australian Agents: McGILL'S AGENCY, 179 Elizabeth St., Melbourne

SHORT-WAVE CRAFT—Monthly. Entered as second class matter May 7, 1930, at the post office at Mount Morris, Illinois, under the act of March 3, 1879. SHORT WAVE CRAFT is published on the 1st of every month. Twelve numbers per year. Subscription price is $2.50 a year in the United States and possessions. Canada and foreign countries, $3.00 a year. Single copies 25c. Address all contributions for publication to Editor, SHORT WAVE CRAFT, 99-101 Hudson St., New York, N. Y. Publishers are not responsible for lost manuscripts. Contributions cannot be returned unless authors remit full postage. SHORT WAVE CRAFT is for sale at all principal newsstands in the United States and Canada. European agents: Brentano's, London and Paris. Printed in U. S. A. Make all subscription checks payable to Popular Book Corporation.

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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

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 outshout 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 battalion 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., ammuntion 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.

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

This is the November 1935 Issue—Vol. VI, No. 7. The Next Issue Comes Out November 1.

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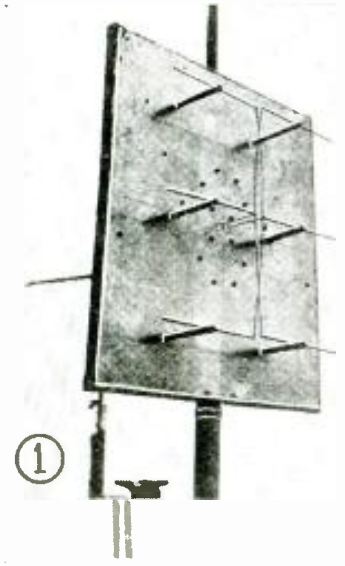
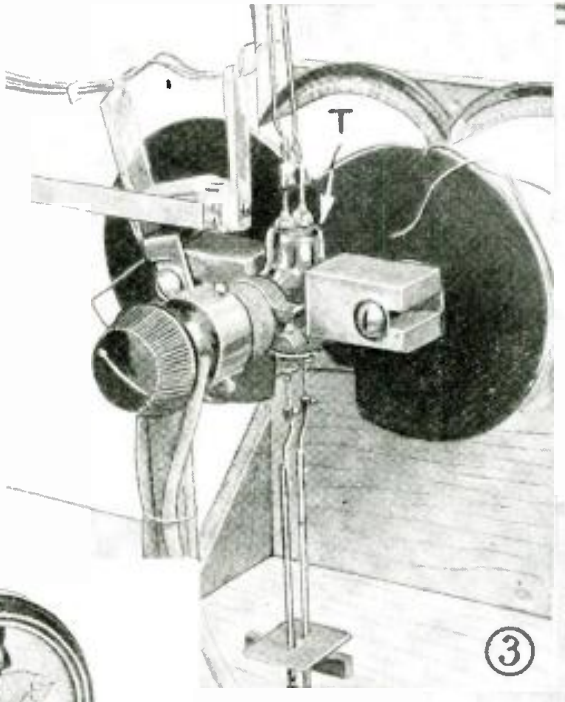
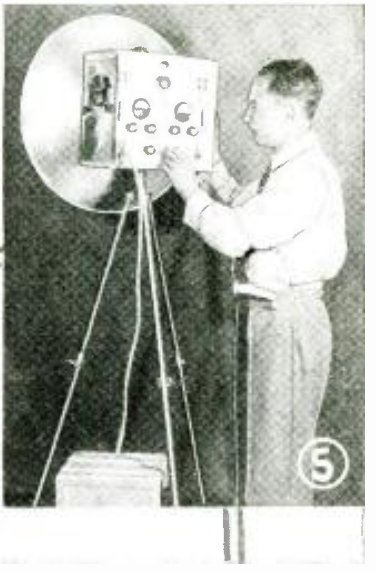
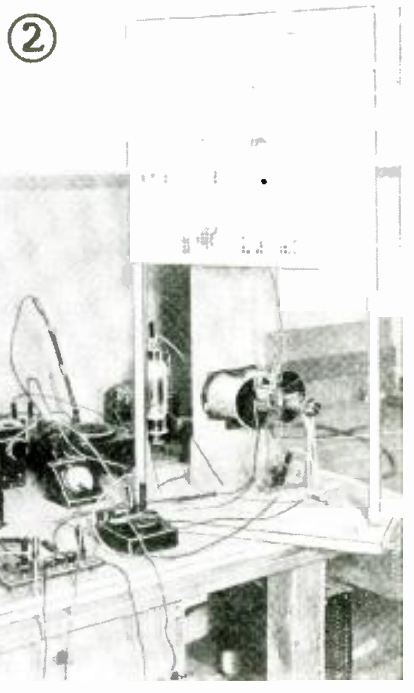
Decimeter Waves—
The Future of Radio

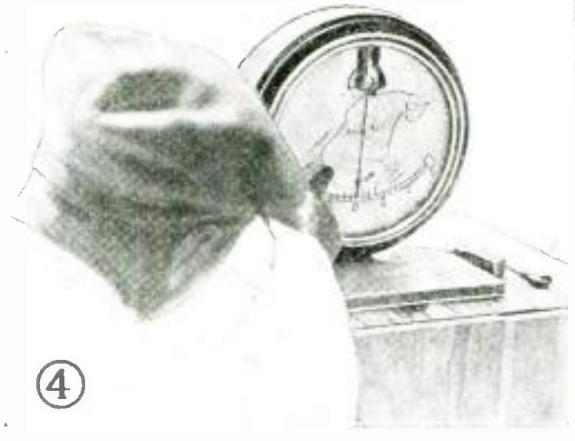
By Eckard Klein











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.

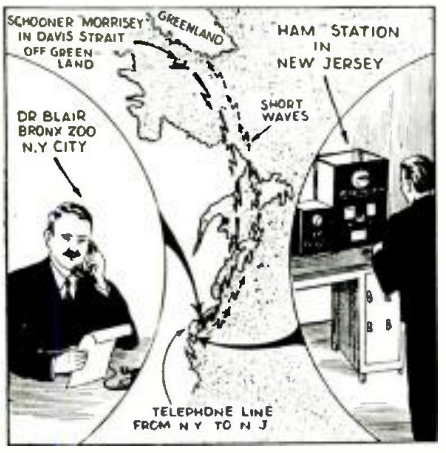
Despite the well-known fact that a great many of radio channels are unused in the decimeter* (one-tenth meter) range, no intensive research work had been carried on in Germany until about one and a half years ago. At that time the Radio Corporation of Germany (The *Telefunken Co.*) started secretly some 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.

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.

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)

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



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.

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

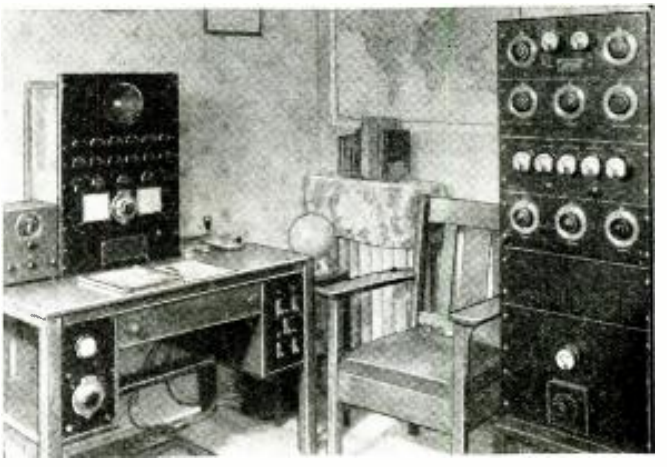
Later in the day another short-wave flash from Capt. Bob Bartlett to Mr. Preston read:—

"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)*

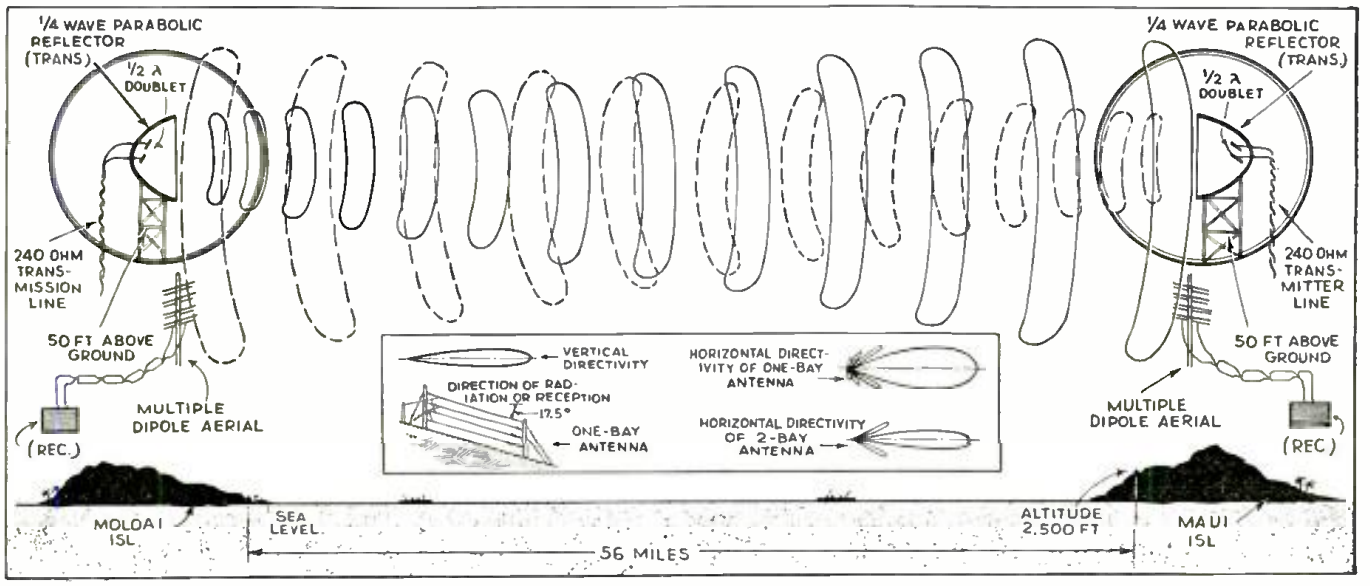


56 Mile Commercial Link on 1.3 Meters!

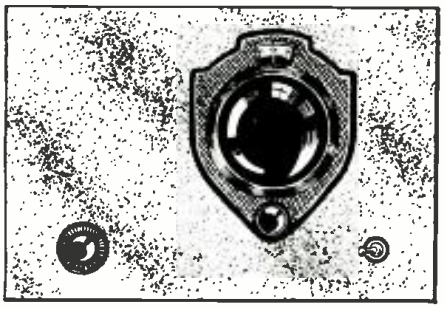
● SOME very interesting ultra short-wave communications have been carried on in the Hawaiian Islands and the accompanying illustration shows a 56-mile link between the islands of Maui and Molokai, on the surprisingly short wavelength of 1.3 meters. More, exactly, the frequency range used on this experimental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

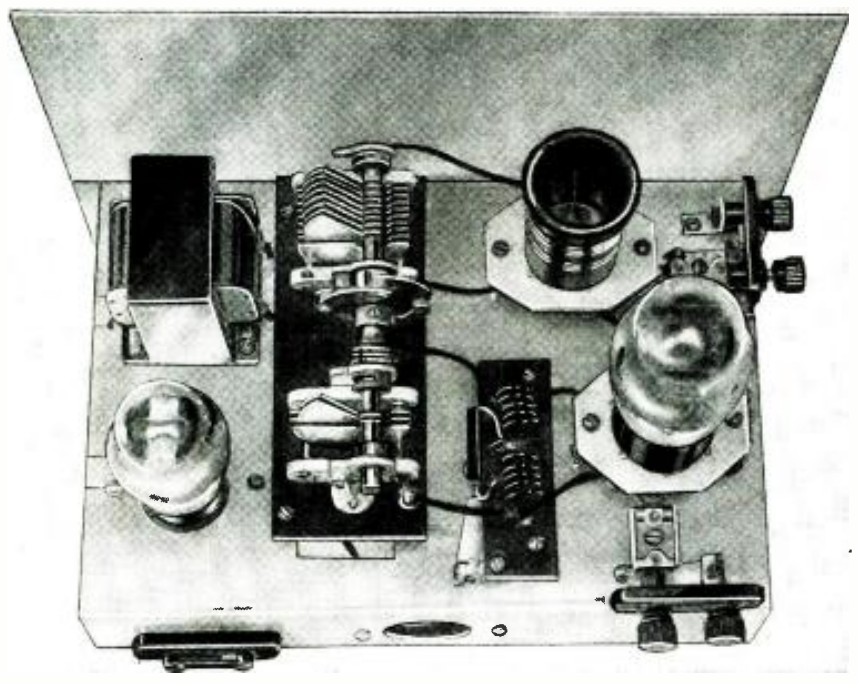


The diagram shows graphically how 1.3 meter waves are used daily to link two islands in the Hawaiian group, the distance covered being 56 miles.



Front view of the "Universal 2."

"UNIVERSAL 2"



Rear view, showing how the parts are mounted.

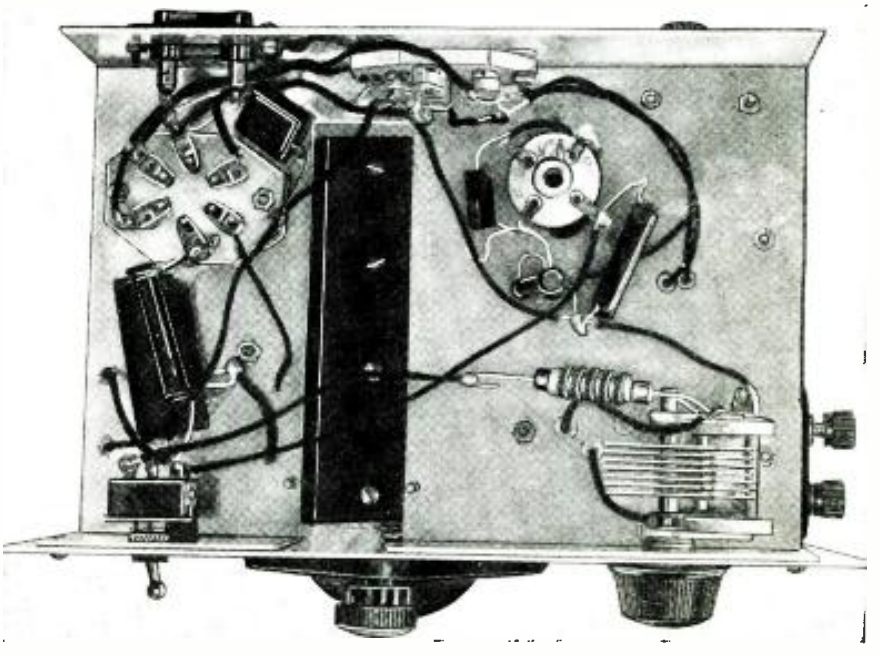
● HERE is a set that is the result of a hankering for a small receiver that would cover all the usual short-wave bands. (5 meter and short-wave broadcast bands). Many times we would like to listen to 5-meter signals and yet do not feel quite equal to making special equipment for 5 meters alone. Hundreds 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 aluminum 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.



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

Covers 5-Meter and Broadcast Bands

By Ernest Kahlert

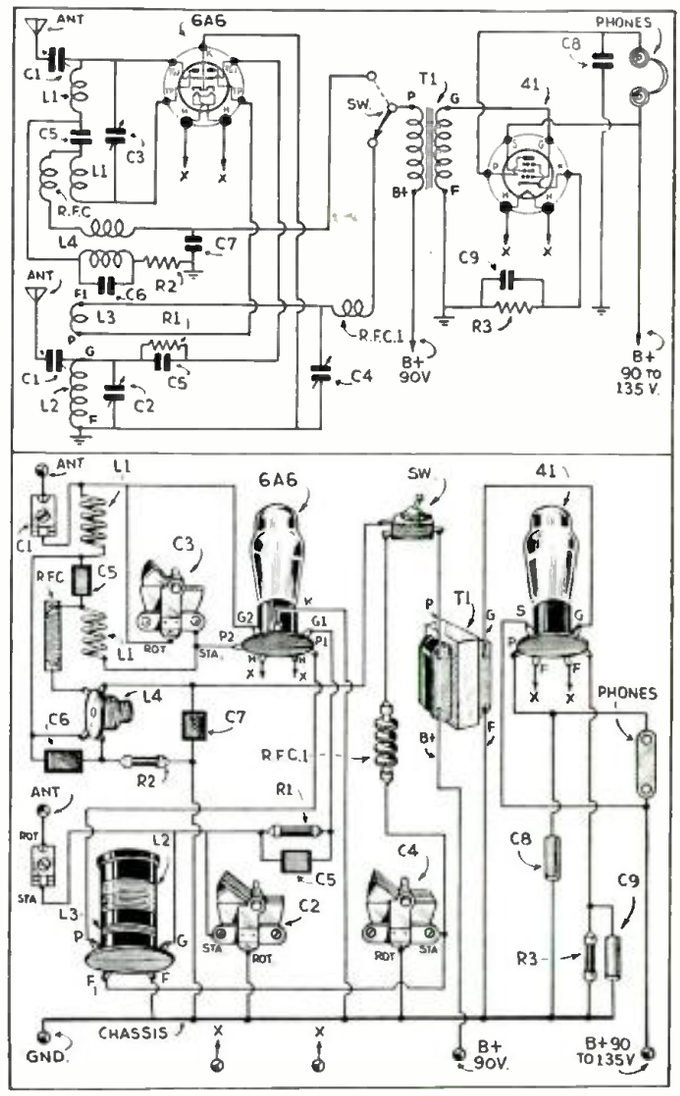
Here is a set that you have all been waiting for. It tunes in the three major short-wave "broadcast" bands (19 to 50 meters) and through the use of a dual purpose tube and clever circuit design, it will also afford reception on the 5-meter amateur band. A 6A6 is used as the "Twin Detector" and a 41 is 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.

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 ⅞-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 ⅜-inch diameter. The shank of a ⅜-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.

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 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)*



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

$200.00 Radio Set Prize

For Best Cover Title

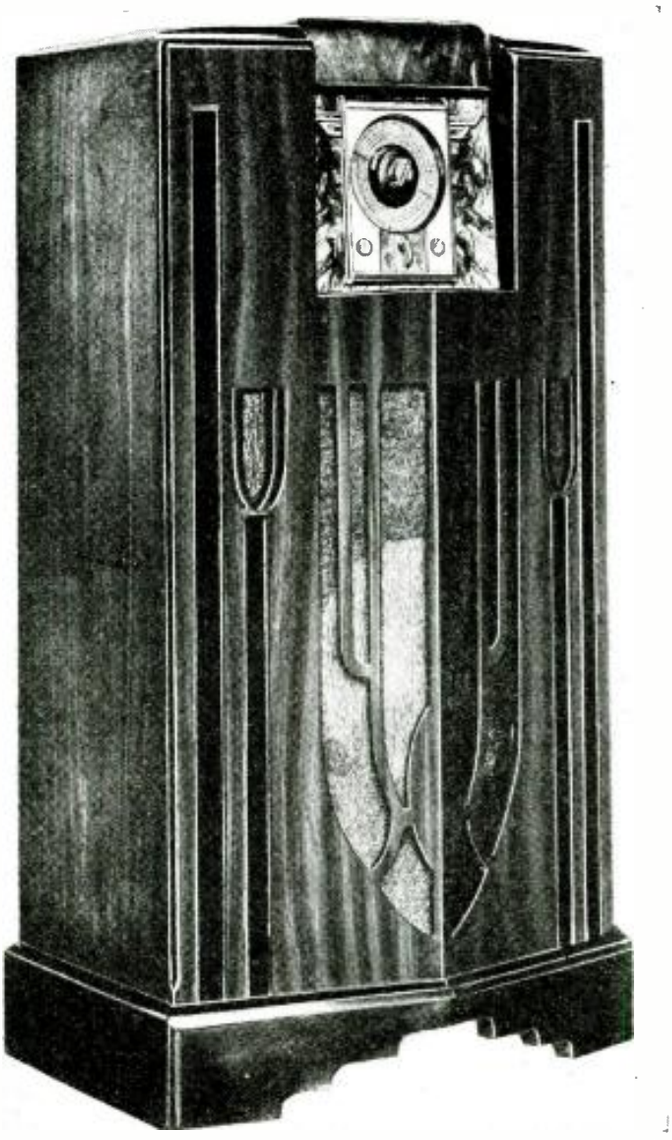
25 OTHER PRIZES

● 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.



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

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 "typewrite" 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.

SHORT WAVE SCOUTS

TWENTIETH "TROPHY CUP"

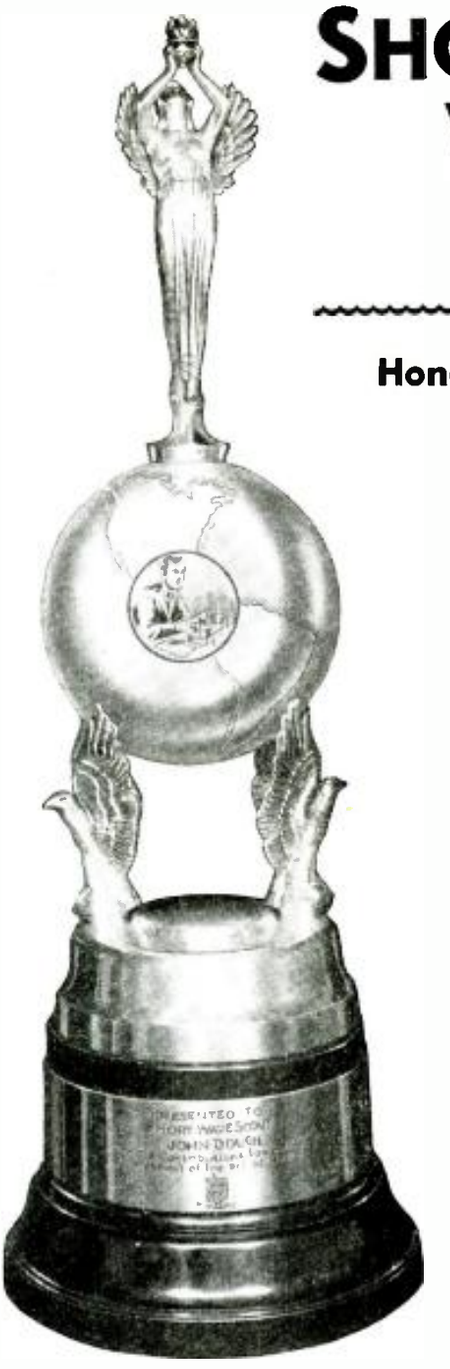
Presented to
SHORT WAVE SCOUT

ADOLPH B. RICE
RICHMOND, VA.

For his contribution toward the advancement of the art of Radio

by

SHORT WAVE CRAFT
Magazine



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.

Call	Frequency Kc	Frequency Mc.	Time On Air	City	Country
W3XAU	9590	31 28	11 00 a.m. to 6 50 p.m.	Phila., Pa.	U.S.A.
2RO	9632	31 13	M W F 6.00-7 30-7 45 9.15 p.m.	Rome	Italy
W8XAL	6060	49.50	6:30 a.m.-7:00 p.m. 10 00 p.m.-1.00 a.m.	Cincinnati	U.S.A.
ORK	10330	29 04	1:30-4 00 p.m.	Flanders	Belgium
YV6RV	6520	46 01	5 7-9-11 p.m.	Valencia	Venezuela
RV59	6000	50.00		Moscow	Russia
HP5J	9590	31 28	7 30-10 00 p.m.	Panama	Panama
W2XAF	9530	31.48	5 30-11.00 p.m.	Schenectady	N.Y.,U.S.A.
W8XK	6140	48.86	4 30 p.m.-1.00 a.m.	Pittsburgh	U.S.A.
W8XK	11870	25 27	4.30-10 00 p.m.	Pittsburgh	U.S.A.
W8XK	15210	19 72	9:00 a.m.-4.00 p.m.	Pittsburgh	U.S.A.
CJRO	6150	48 78	8.00 p.m.-12.00 m.	Winnipeg	Canada
VK2ME	9590	31 28	Irregular	Sydney	Australia
CT1AA	9600	31 25	T.T.S. 3 30.6-00 p.m.	Lisbon	Portugal
HJ1ABB	6447	46 53	11 30 a.m.-1.00-p.m.	Barranquilla	Colombia
W1XAL	6010	49 67	Irregular	Boston	U.S.A.
COC	6011	49 9	Irregular	Havana	Cuba
EAQ	9553	30 43	5 15-7 30 p.m.	Madrid	Spain
YV2RC	6112	49 08	Irregular	Caracas	Venezuela
YV5RMO	5850	51 28	5 15-9 00 p.m.	Maracaibo	Venezuela
W9XAA	6080	49 34	Irregular	Chicago	U.S.A.
W9XAA	11830	25 60	Irregular	Chicago	U.S.A.
W1XK	9550	31 33	6.00 p.m. to 12-00 m.	Boston	U.S.A.
W9XF	6140	48 18	See Card	Chicago	U.S.A.
HP5B	6030	49 75	12 N -1-00 p.m 8.00-10 30	Panama	Panama
HAT	5400	55 56	5 until 8 00-9 00 p.m.	Budapest	Hungary
HJ4ABE	5000	60 6	See Card	Medellin	Colombia
	11845	25 38	6-00-10 00 a.m.	Paris	France
	11870	25 23	11 00 a.m.-5 00 p.m.	Paris	France
	11720	25 60	6-9 p.m -10 p.m -M	Paris	France

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

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

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

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

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-tuber up to one of sixteen tubes or upwards, if they so desire.

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

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

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

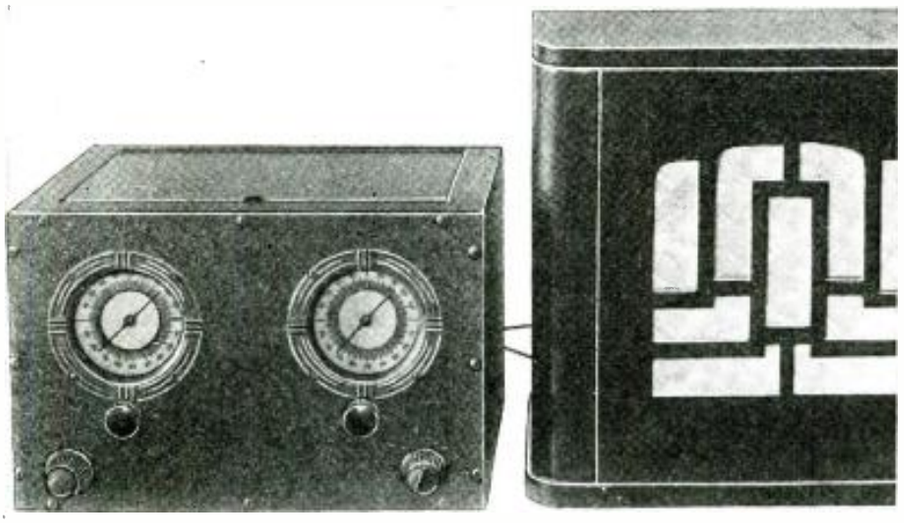
This Super-Regenerator

By George W. Shuart, W2AMN

● 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 wholehearted 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 "Hissless Super" will appear directly. This is a "Certified Seal" Set.

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



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

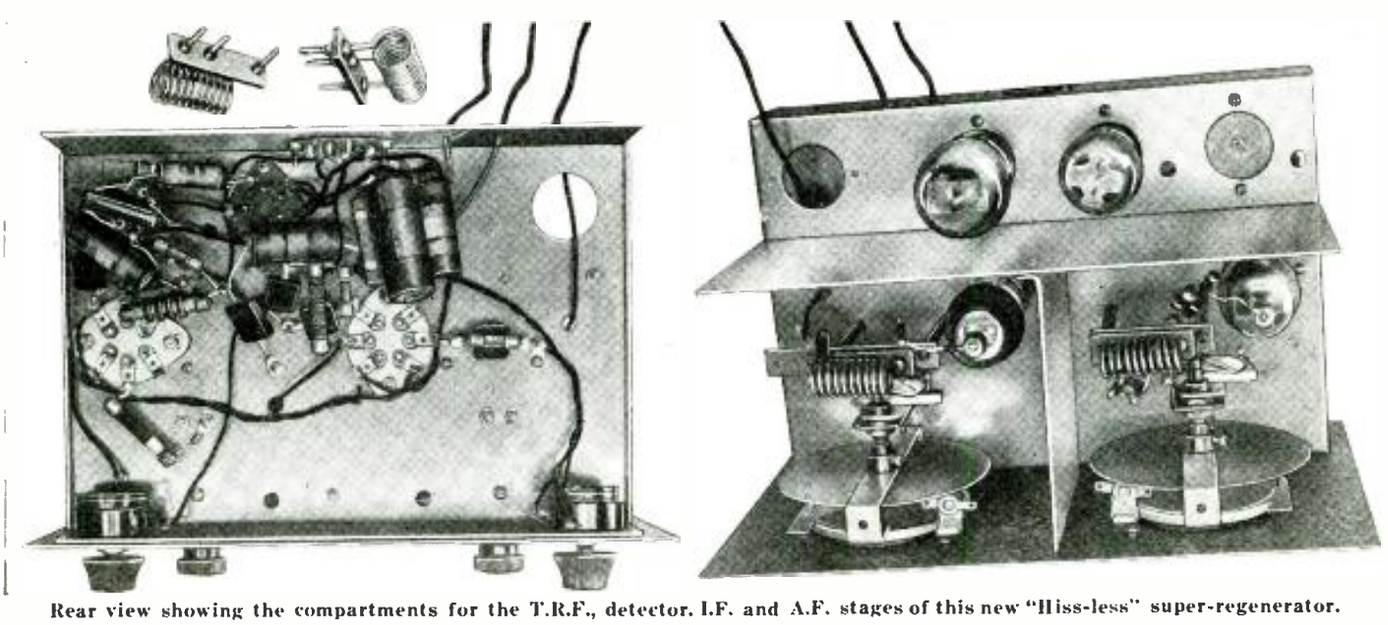
Recently some of our other short-wave friends mentioned that they would like to see a "hiss-less" super-regenerator and the writer related the long withheld story aforementioned. Immediately Frank Lester (W2AMJ), asked to be shown, and the set in the photos was built to convince him. He was immediately 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-



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. ½ watt resistor—I.R.C.
1—300-ohm ½-watt resistor—I.R.C.
1—50,000-ohm ½-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 ½-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.

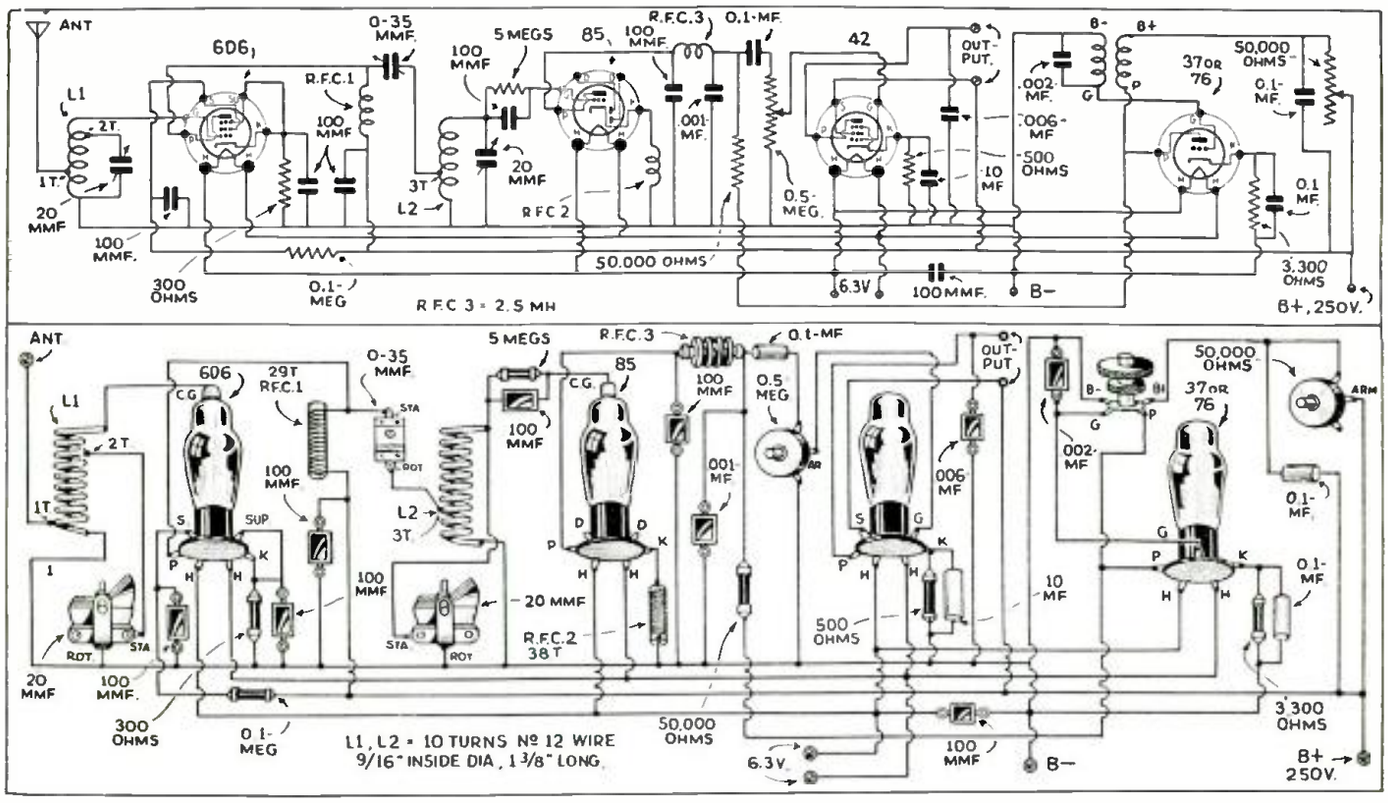


Diagram showing how the "Hiss-less Super" is wired.

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 loudspeaker 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 condenser, 8 mf. each section, C8, C9.
1—Electrad potentiometer, 75,000 ohm, R1; with switch SW1.
1—I.R.C. metalized resistor ¼ meg., ½ watt. R2.
1—I.R.C. metalized resistor, 25,000 ohm, ¼ watt, R3.
2—I.R.C. metalized resistors, 1 meg., ½ 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.

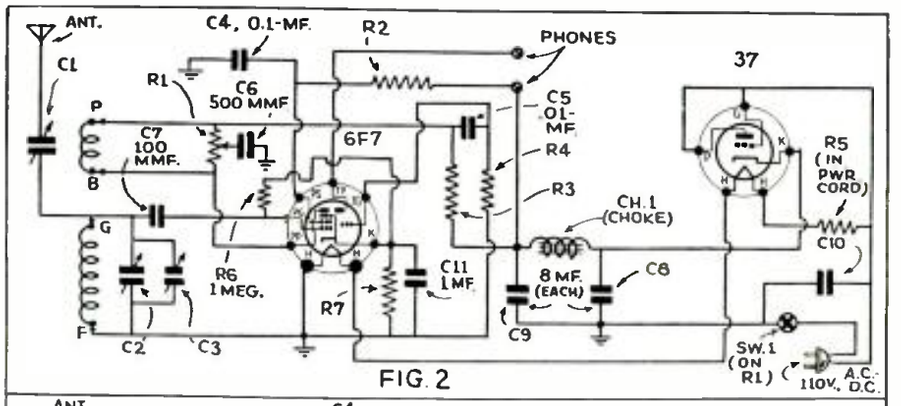


FIG. 2

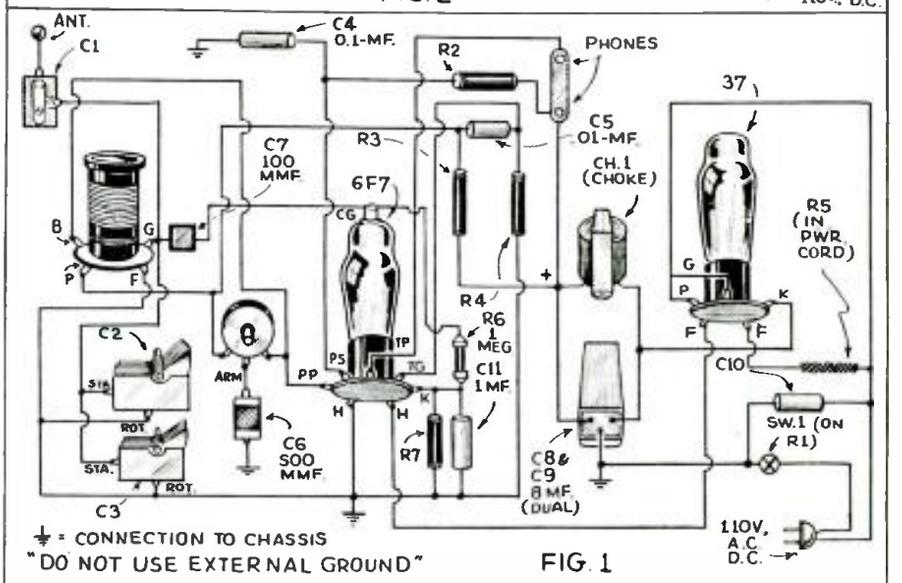


FIG. 1

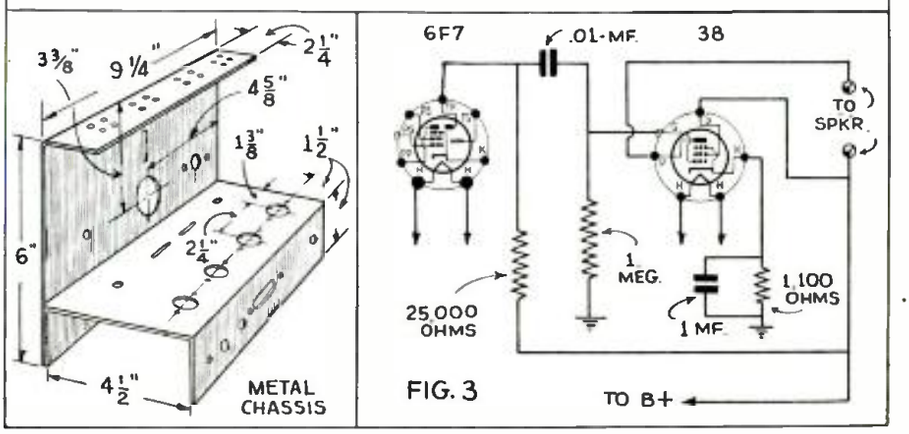
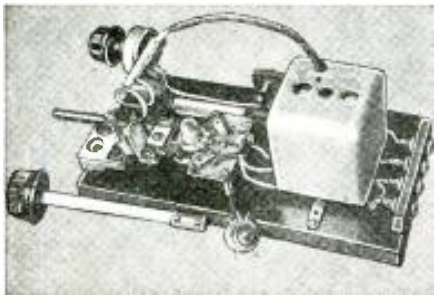


FIG. 3

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

WORLD-WIDE SHORT-



Transmitter Using Acorn Tube

Austrian ½-Meter Transmitter

● THE latest issue of *Radio Welt*, published in Vienna, contained the picture of a ½-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

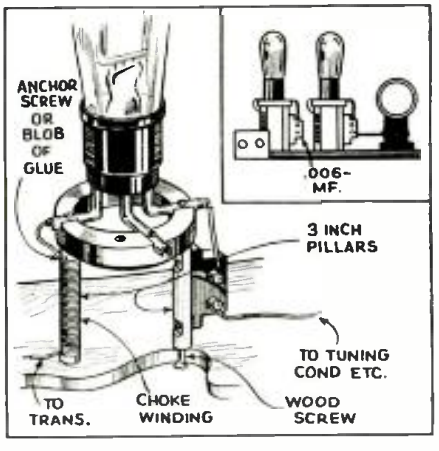
● RADIO set builders in England have made it a practice to elevate the detector tube above the chassis or baseboard in order to reduce capacity effects between the grid and plate leads and the metal parts of the set.

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 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.

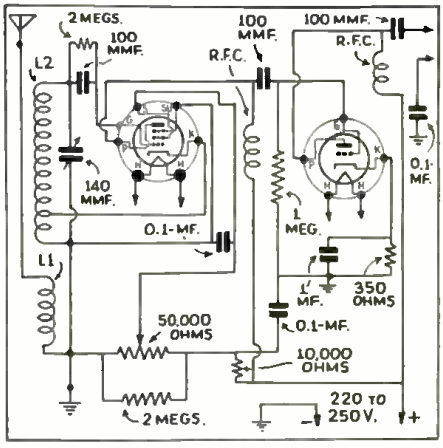
An article in *Practical and Amateur Wireless* recently, showed a circuit which permits silent operation yet uses the economy of power-operated sets. In this scheme, the detector tube is completely battery operated, since this is usually the point at which hum originates. Since the battery drain of a 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.

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



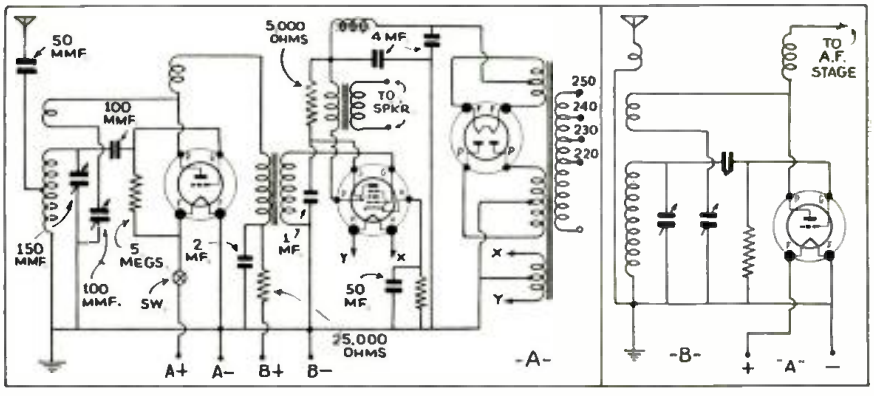
Short Wave Adapter

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 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.

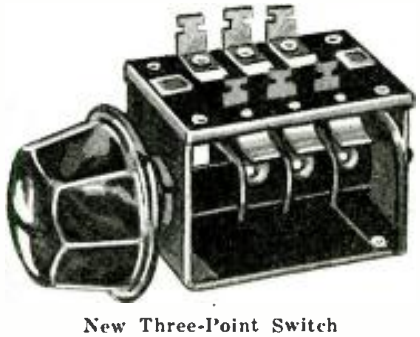
Since the autodyne principle is used, only one tuning condenser is used, which is detuned from the frequency of the incoming wave by the value of the I.F. (the frequency of the broadcast set).



Reducing Hum in S-W Sets

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

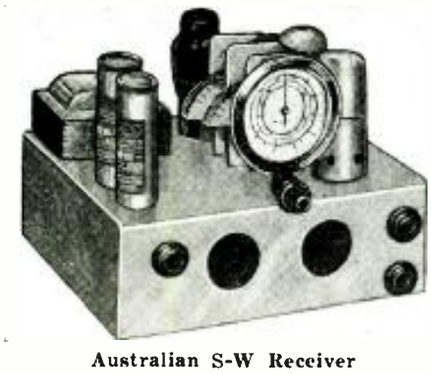
● THE Australian weekly radio magazine *Wireless Weekly* is becoming quite famous for the circuits it publishes. Some very unique arrangements have been presented in recent issues, and we have reprinted several of them on this page.

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.

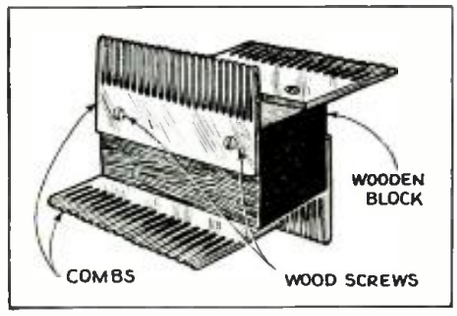
The circuit is shown here for the interest of those experimenters who might want to try it. The method of obtaining regeneration in the detector circuit is exceptionally interesting and will probably be one of attraction to experimenters who like to try "different" circuits.

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



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 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.

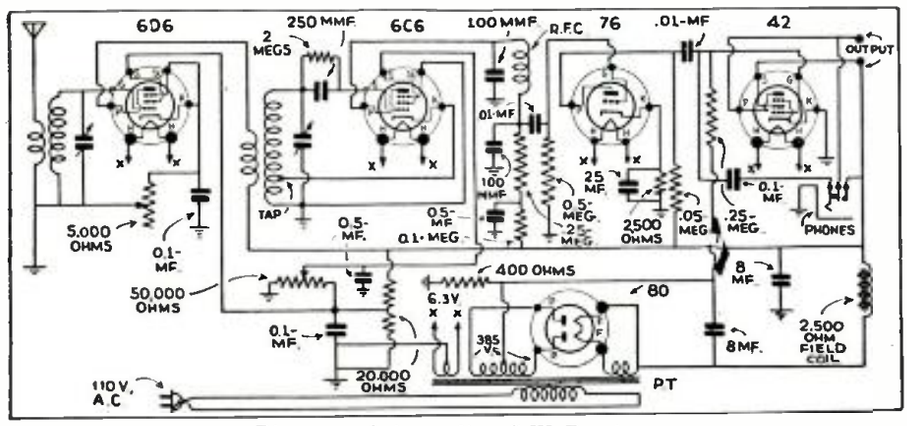


Diagram of Australian S-W Receiver

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.

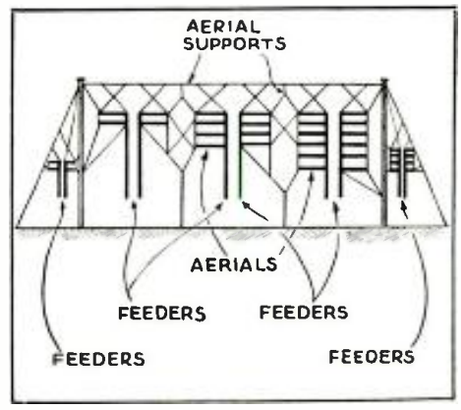
The aerial systems are completely transformed. All the original "beam" aerials, with their reflectors have been scrapped.

The aerials at present favored for the regular programs are all horizontal aerials of the dipole type, varying in length from double-wave to ½ and ¼ 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" 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 ¾-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

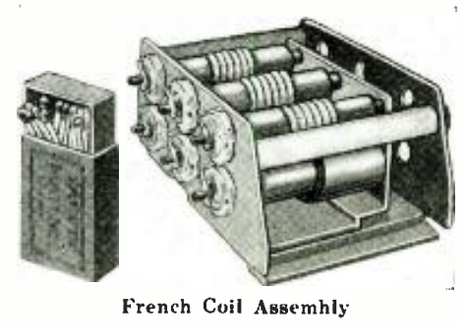
A Small Coil Assembly

● 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 at 2,000 kc. They are especially valuable for I.F. coils of superheterodynes, where unusually high gain is possible.



French Coil Assemhly

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 leaders 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.

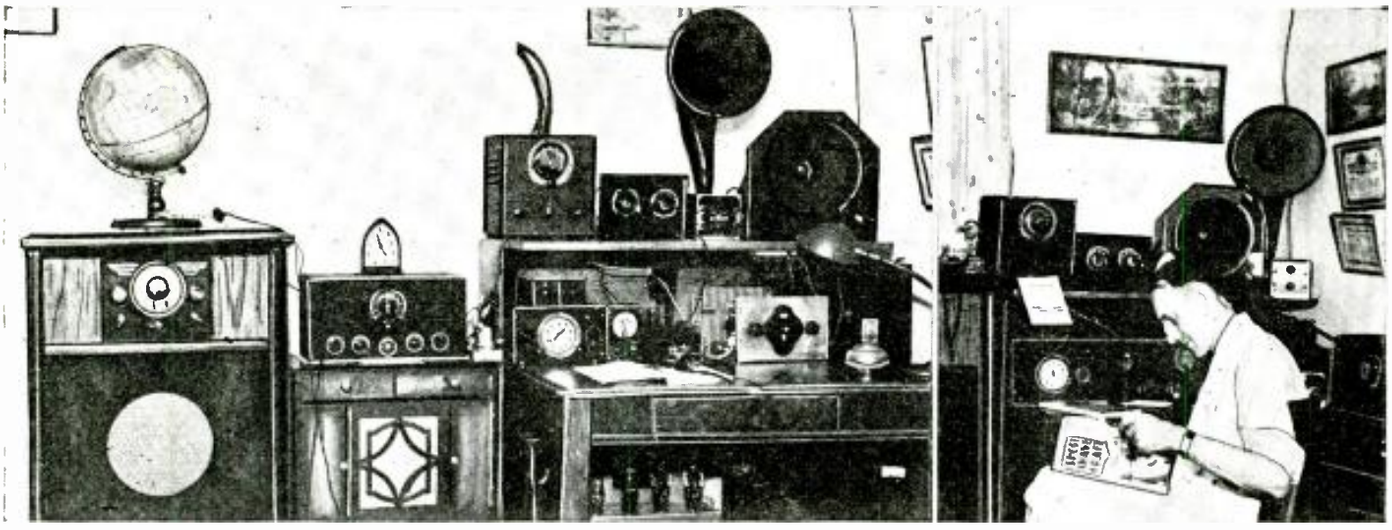
I want to wish you every success in your wonderful work and you certainly do fine work when you produce a magazine like *Short Wave Craft*. It surely is money well spent.

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 RAVES . . . 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 *forcign* 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 "foreigns." 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, PHI, HBP, HBL, 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 suprising 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)

Capt. Leidl of Prague has fine station

● 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 OK1LL, and some of our ham friends may like to give him a call. The Captain has phone as well as C. W. transmitting equipment.

$5.00 FOR BEST SHORT-WAVE KINK

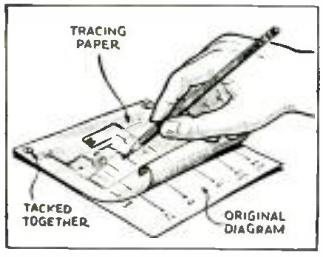
The Editor will award a five dollar prize each month for the best short-wave kink submitted by our readers. All other kinks accepted and published will be awarded eight months' subscription to SHORT WAVE CRAFT. Look over these "kinks" and they will give you some idea of what the editors are looking for.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

First Prize $5.00

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 accidently overlooked.—John C. Sherard.



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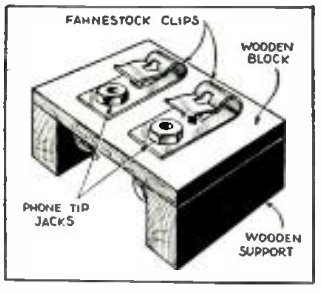
CONNECTION BLOCK FOR EXPERIMENTERS

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 tip jacks or clips ready to use. The kink described will do away with this worry.

Holes large enough for the tip jacks are drilled in the Fahnestock clips. The clips are then fastened to a small wooden platform by the jacks.—Samuel Peters.



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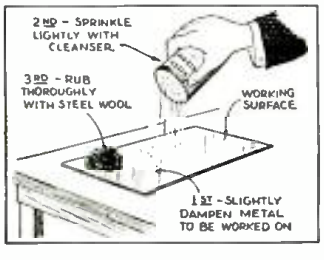
FINISHING PANELS AT HOME

Many set-builders refrain from using low-cost galvanized iron for chassis or panels because of its finish, but by following those 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 well 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 Canly, Jr.



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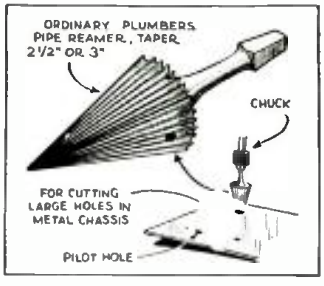
LARGE REAMER FOR WORKING CHASSIS

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 ½ inch to 2½ or 3 inches.

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



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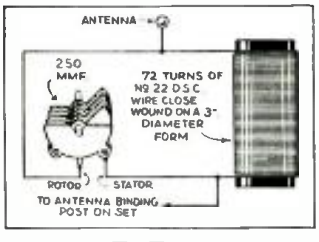
WAVE-TRAP ELIMINATES INTERFERENCE

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 under-sirable station is very close.—F. J. Spatz, Jr.



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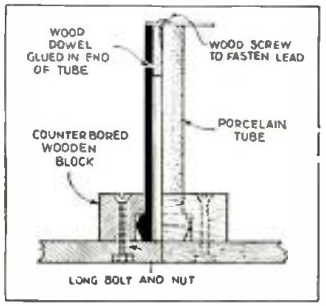
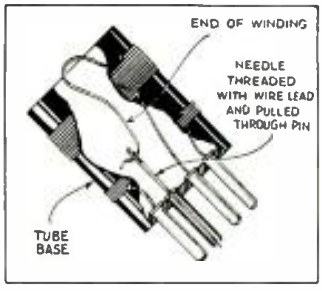
PORCELAIN TUBE STAND-OFF INSULATOR

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-sunk 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. —Chesley 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.

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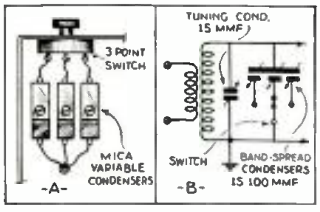

SIMPLIFIED BAND-SPREAD

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.

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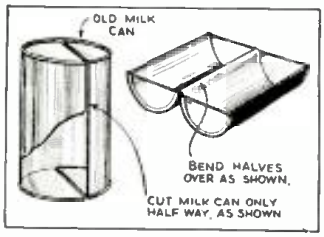

HANDY TRAY FROM OLD TIN CAN

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 on 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. Osborn.

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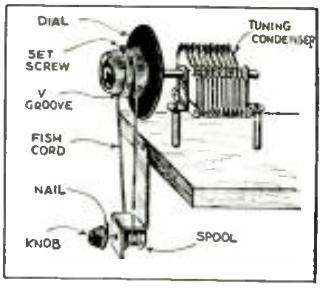
HOME-MADE VERNIER

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

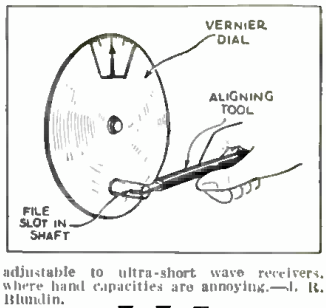


only necessary parts are an old dial, some string or fish cord, a spool, and a short length of metal strip. The knob of the regular dial should be grooved for the fish cord. The metal is formed as shown in the drawing and fastened below the mounting board on which the condenser is fastened. Another advantage 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

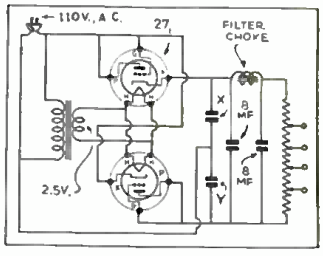


adjustable to ultra-short wave receivers, where hand capacities are annoying.—J. R. Blundin.

▼ ▼ ▼

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

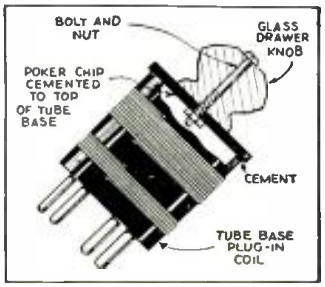


and Y, which should be from 1 to 8 mf. Although this kink is not original, I do not recall having seen it in *Short Wave Craft*. —Jerome Farmer.

▼ ▼ ▼

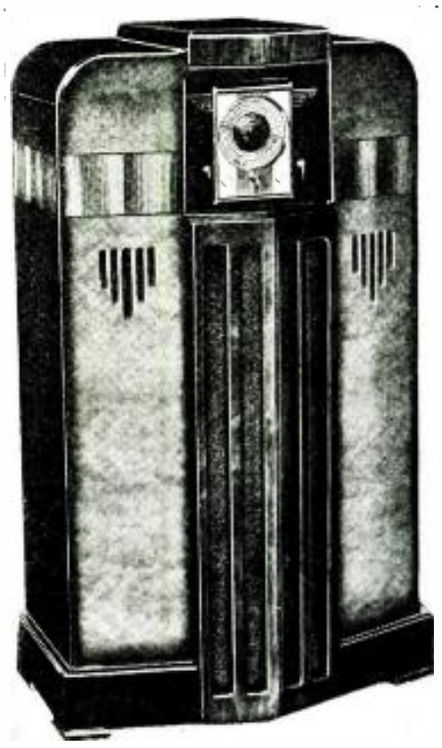
COIL HANDLE

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 In Short-Wave Apparatus

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



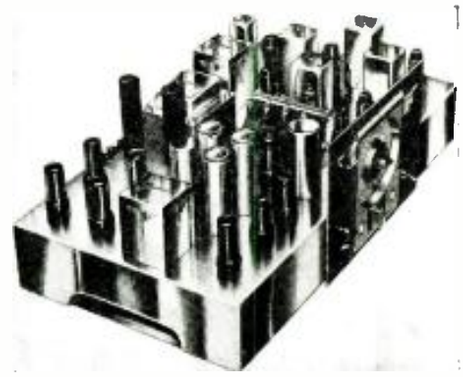
Front view of 18-tube Midwest "6-band" short-broadcast and long-wave receiver.

New 18-TUBE Receiver Has Unique Dial and Controls

● 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 advanced 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.

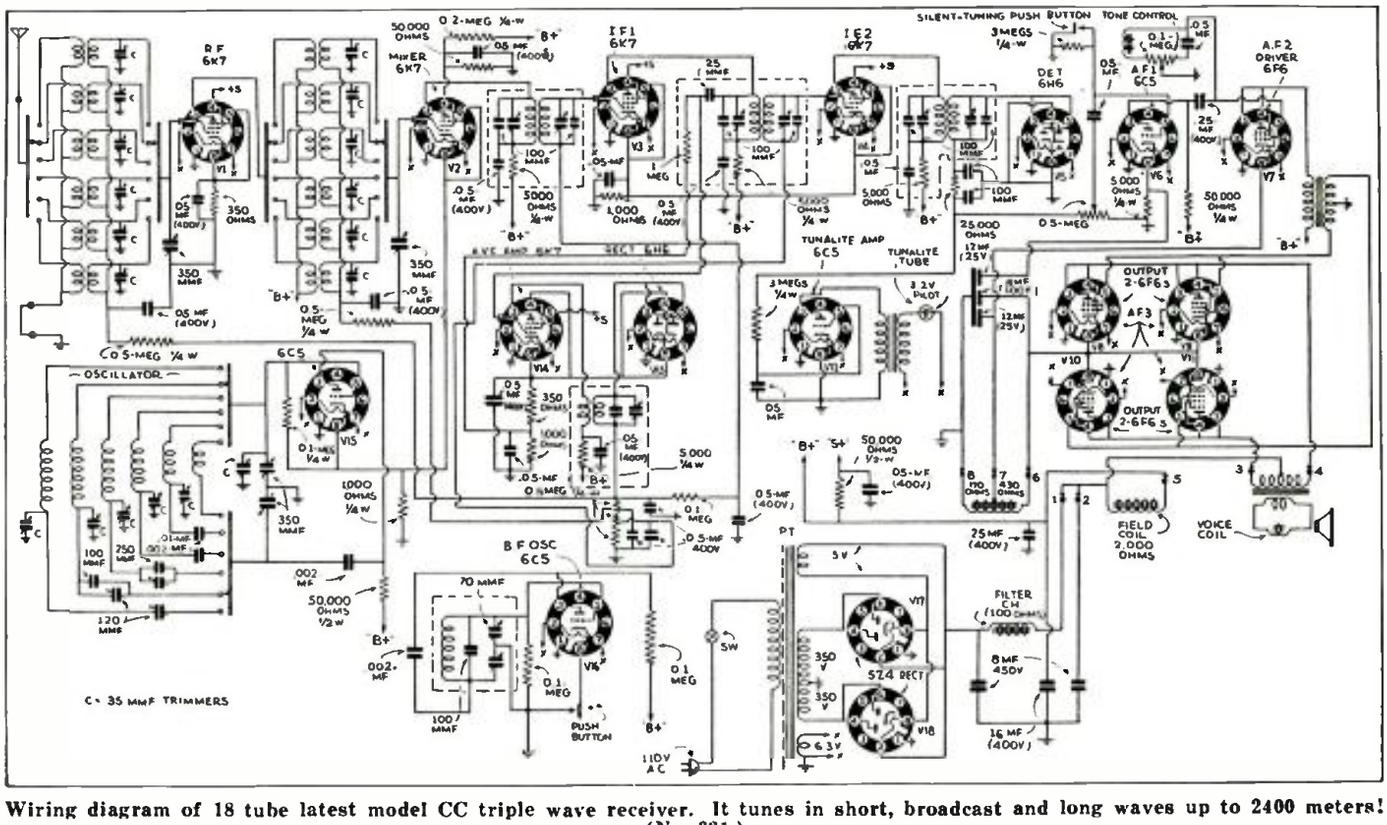
The Tun-A-Lite is a very sensitive light which is bright on either side of a station but which dims when a station is tuned in. It is dimmest when the receiver is tuned to exactly the frequency of the tuned station. The tun-a-lite is superior to meter and shadow tuning in three respects: The Tun-A-Lite 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.



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

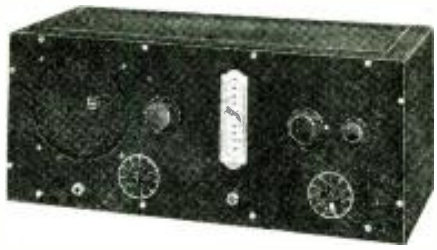
Tun-a-lite tuning is very accurate tuning because it takes advantage of the scientifically determined fact that the human eye is very sensitive to even very small changes in light intensity. The tun-a-lite

(*Continued on page 429*)



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

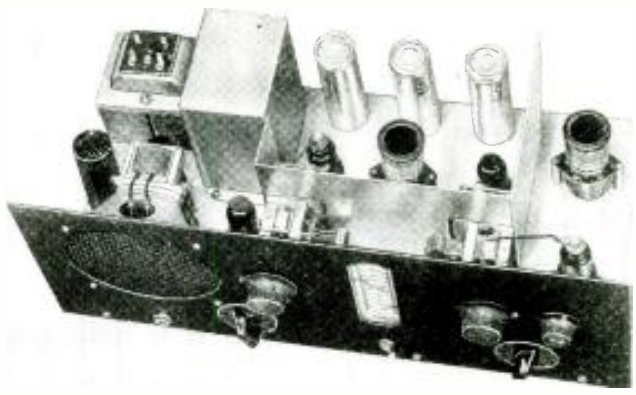


The photos show the very "Prof" appearance of the new Harrison short-wave receiver — the Royal model "Pro-Six." This set has full coverage and a range of 9¾ to 625 meters—with band-spread!

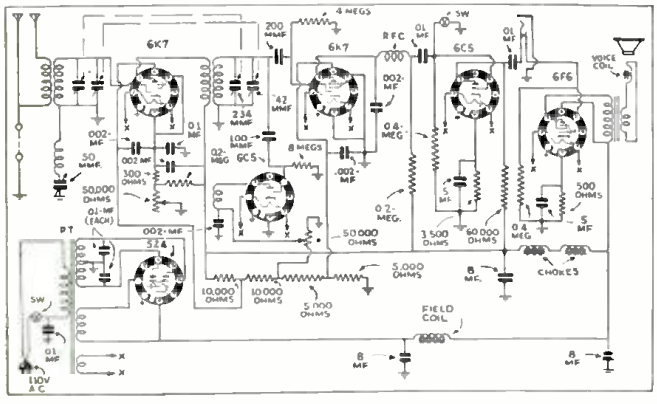
● THE new possibilities opened by the all-metal tubes are utilized in the New Royal model "Pro-Six." By the use of all-metal tubes a new high in shielding is reached. Every tube down to the rectifier has a metal shell which is bonded to the chassis. The metal tubes have a higher gain and are much more 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 9¾ 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



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.



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.)

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*)

2-Stage A.F. Amplifier
With Speaker and Power Supply
By Guy Stokely, EE*

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

● 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.

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.

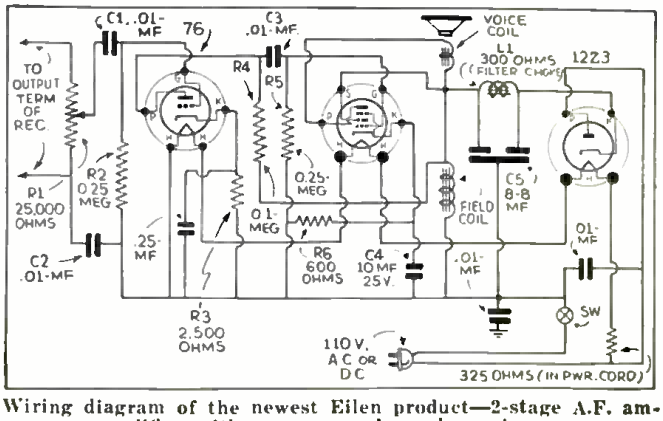
The grid of this tube is isolated from the positive voltage appearing across the output terminals of most receivers, by means of the coupling condenser C1, whose capacity is approximately 0.01 to 0.10 mf. The second condenser (2 (0.01 mf.) completes the audio input circuit to the amplifier. A grid leak 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.

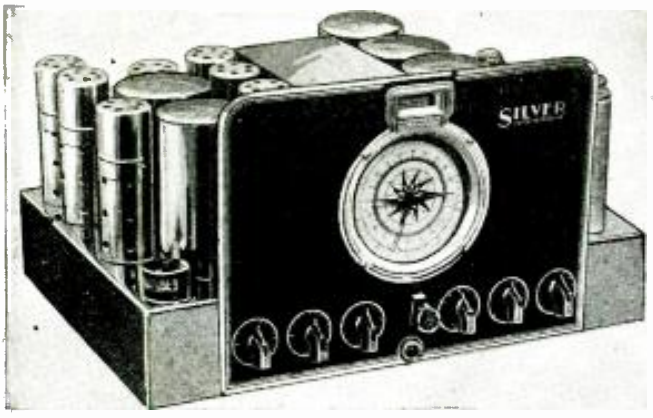
The filaments of the three tubes are connected in series and by means of the series resistor R7, are operated directly from the 110 volt A.C. or D.C. house-lighting circuit. (*Continued on page 428*)



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

*Eilen Radio Laboratories.

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



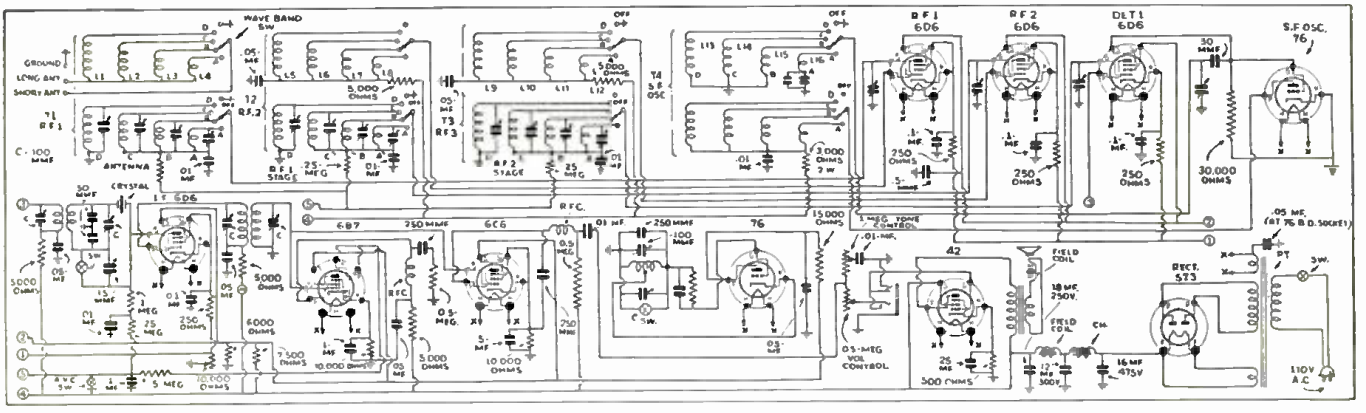
The "ship-shape" commercial appearance of this ultra modern 10 tube, 1200 to 33,000 kc. super-het, plus every new feature, makes it ideal for amateur or short-wave "DXer." (No. 319)

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*)

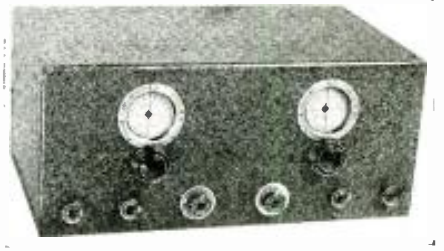


Wiring diagram for the new "Silver" super-het for short and broadcast waves.

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

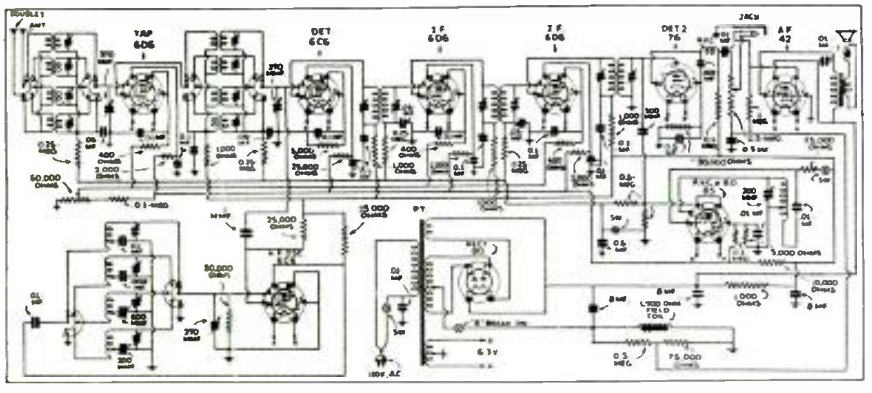
● THIS is a receiver that has been designed to satisfy the discriminating demands of experienced amateurs and short-wave listeners. The circuit is the regular super-het type, with a stage of pre-selection, separate detector and oscillator tubes, two stages of intermediate frequency amplification on 525 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 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.



The "Sargent 20" Super-het.

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 intercoupling 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-
(*Continued on page 432*)



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. Shuart

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.

No. 3—Resistance, Inductance, and Capacity

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 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 = Current
E = Voltage (EMF)
R = Resistance

The formulas 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:

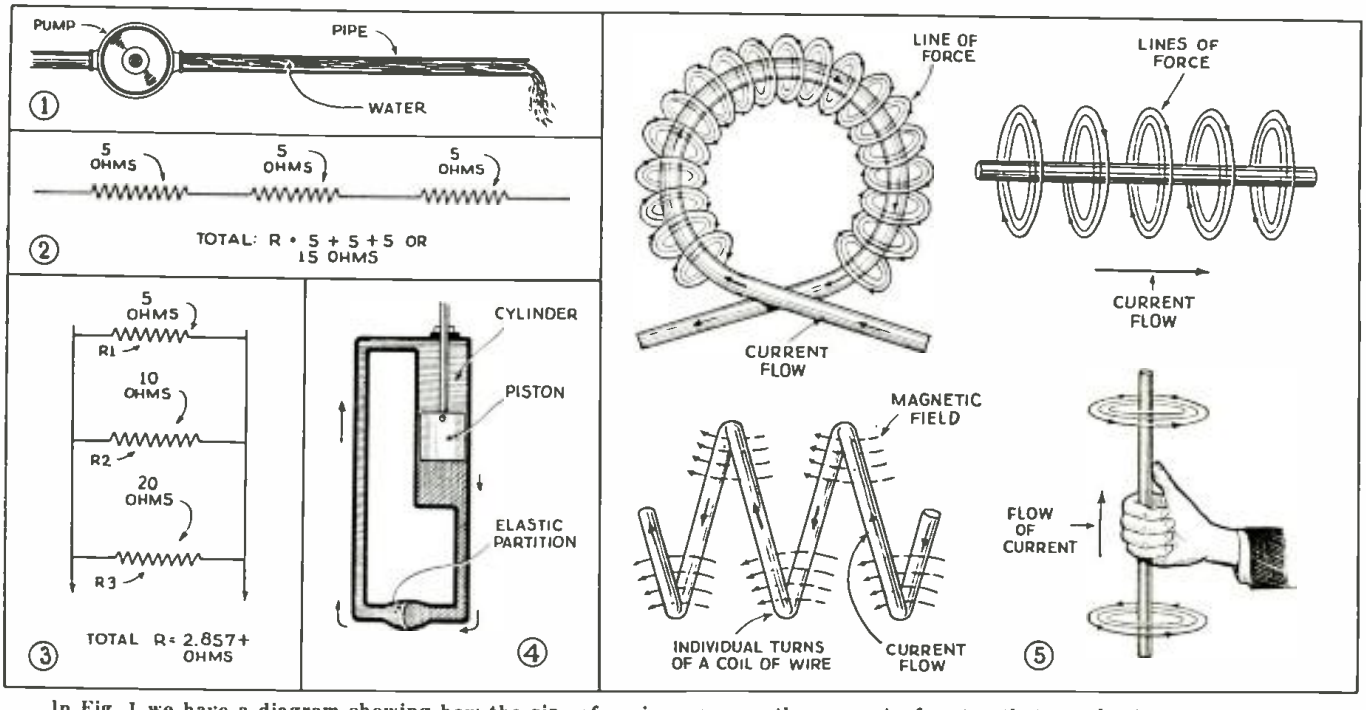
$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}} \text{ or}$$

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

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

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

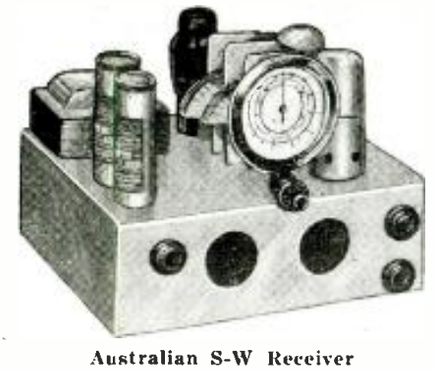
● THE Australian weekly radio magazine *Wireless Weekly* is becoming quite famous for the circuits it publishes. Some very unique arrangements have been presented in recent issues, and we have reprinted several of them on this page.

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.

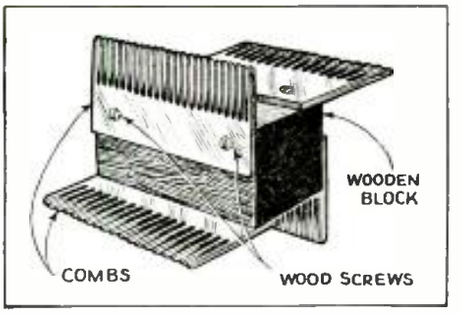
The circuit is shown here for the interest of those experimenters who might want to try it. The method of obtaining regeneration in the detector circuit is exceptionally interesting and will probably be one of attraction to experimenters who like to try "different" circuits.

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



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 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.

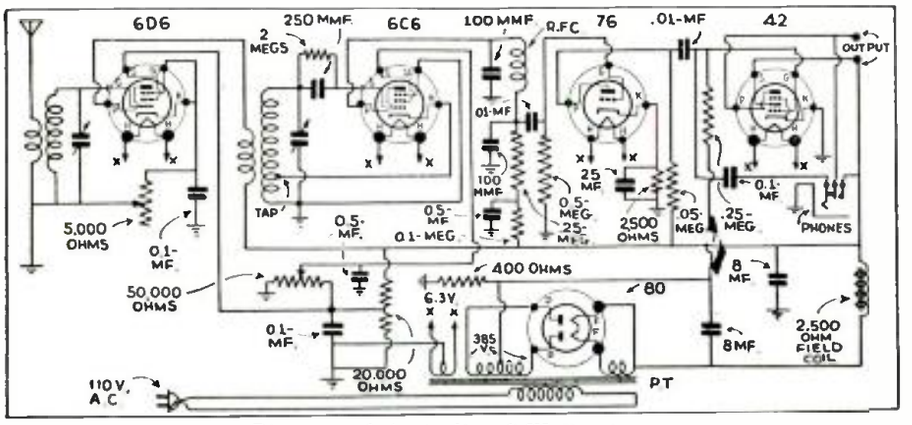


Diagram of Australian S-W Receiver

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.

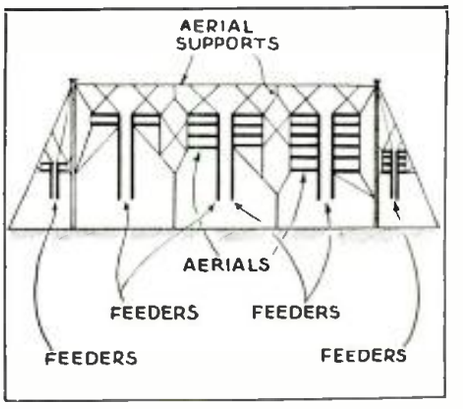
The aerial systems are completely transformed. All the original "beam" aerials, with their reflectors have been scrapped.

The aerials at present favored for the regular programs are all horizontal aerials of the dipole type, varying in length from double-wave to ½ and ¼ 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" 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 ¾-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

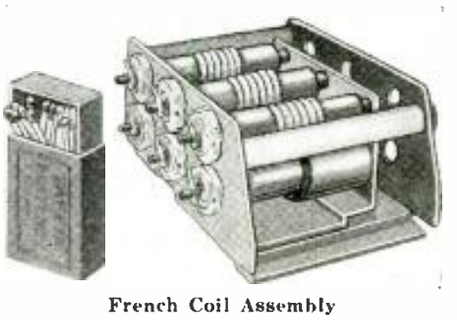
A Small Coil Assembly

● 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 at 2,000 kc. They are especially valuable for I.F. coils of superheterodynes, where unusually high gain is possible.



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:

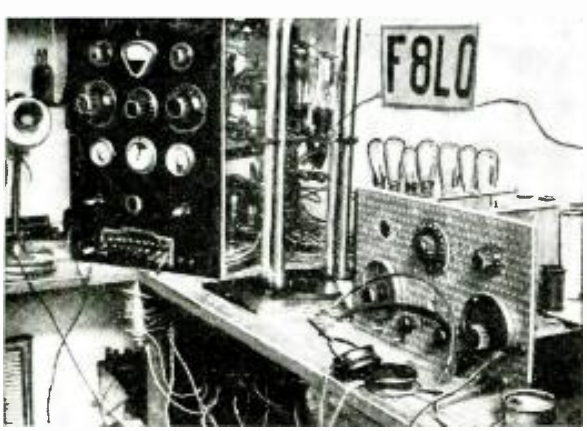
Here is a photo of my amateur phone and CW station. F8LO, with which I won the R.E.F. Cup Contest in 1934. The room which contains the station is only 5 feet by 5 feet! The transmitter seen on the left is a home-made affair and consists of a 42 Tri-Tet Oscillator and doubler, and a push-pull final amplifier 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 leaders 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)

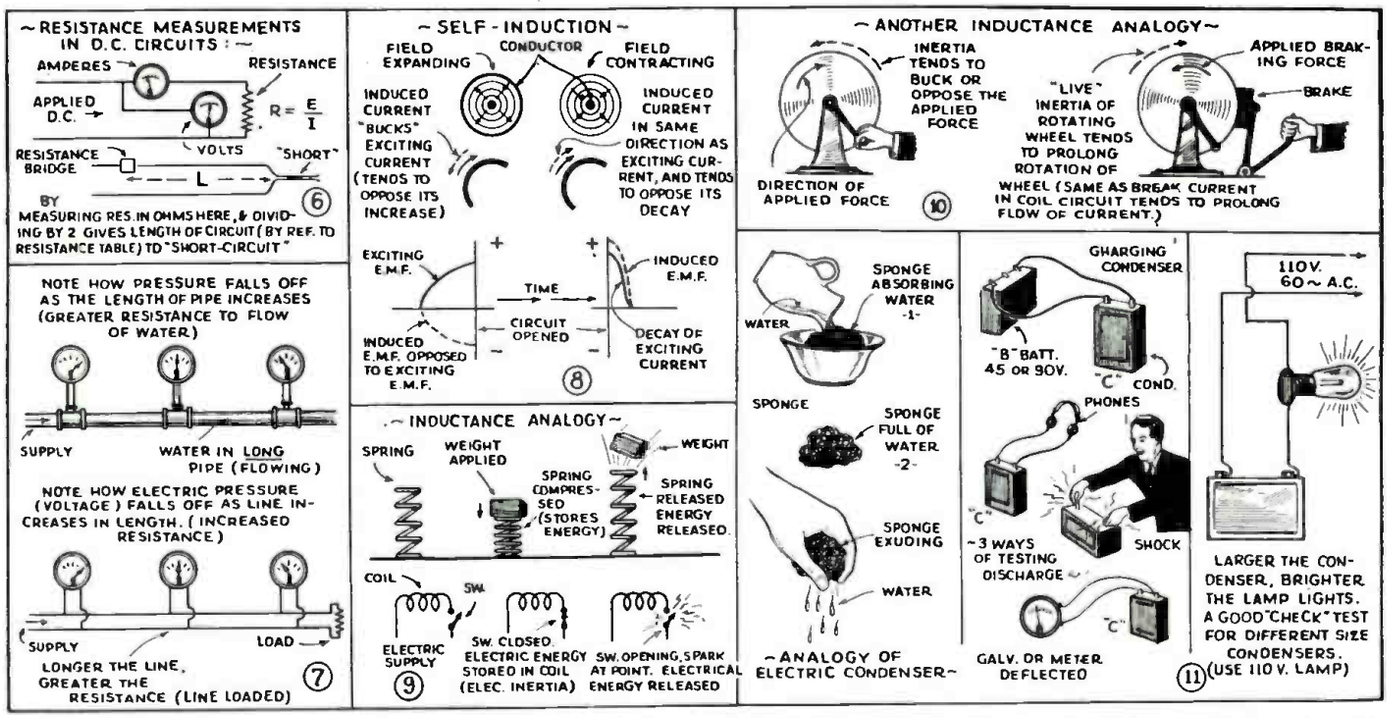


Fig. 6 above shows measurement of resistance. Fig. 7 shows how pressure or voltage decreases with increase in resistance to flow of water or electric current. Fig. 8 shows action of expanding and contracting magnetic fields. Fig. 9 shows mechanical "spring" analogy for inductance; Fig. 10—Fly-wheel analogy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

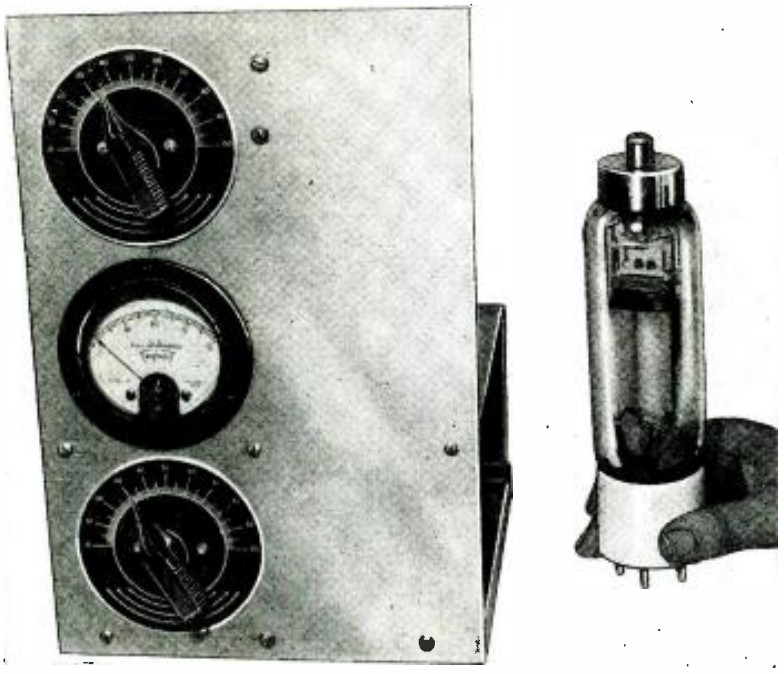
Induction subdivides into two branches—*self and mutual induction.* If the current passing through a coil, for example, is rising from zero to maximum value, such as when the circuit is closed from a battery, (or the first half of an alternation of an alternating current) the magnetic field around the 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.

● 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.

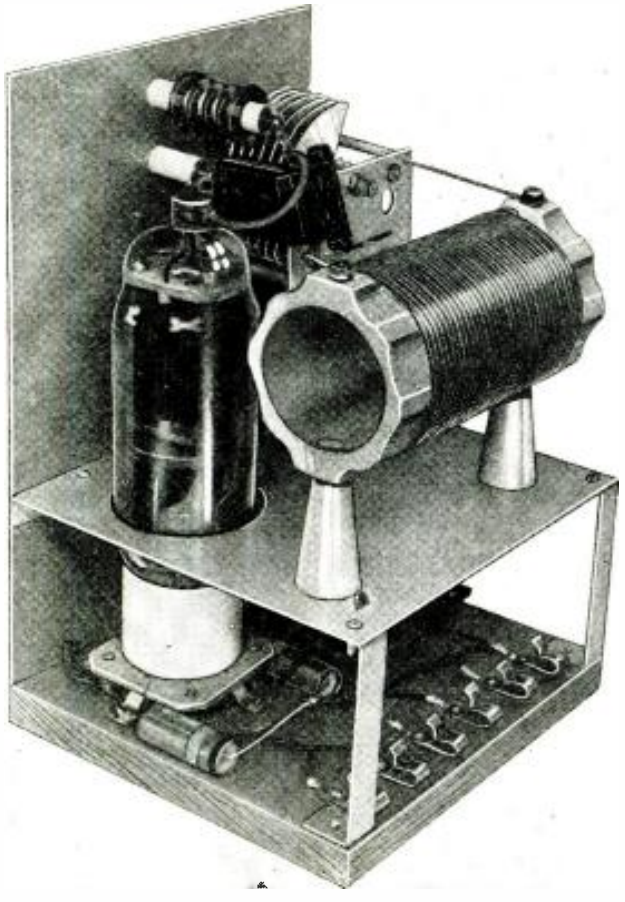
These tubes are the new RK28 and the RCA803 both rated at over 200 watts output for CW with only two or three watts of excitation; for phone work a 50 watt carrier can be obtained with an output of 200 watts on modulation peaks. The audio frequency requirements for phone operation are very small because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

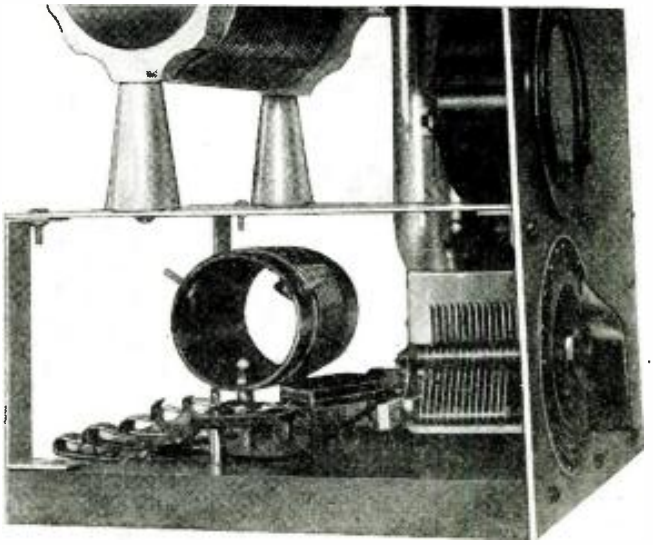
No fussy neutralizing adjustments are required, because the new tubes are so shielded internally that no self-oscillation is encountered; that is, providing proper shielding precautions are observed.

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 3/32 of an inch thick. The base is a ¾ 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 ⅛ 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.



Phone-CW Amplifier

By George W. Shuart, W2AMN

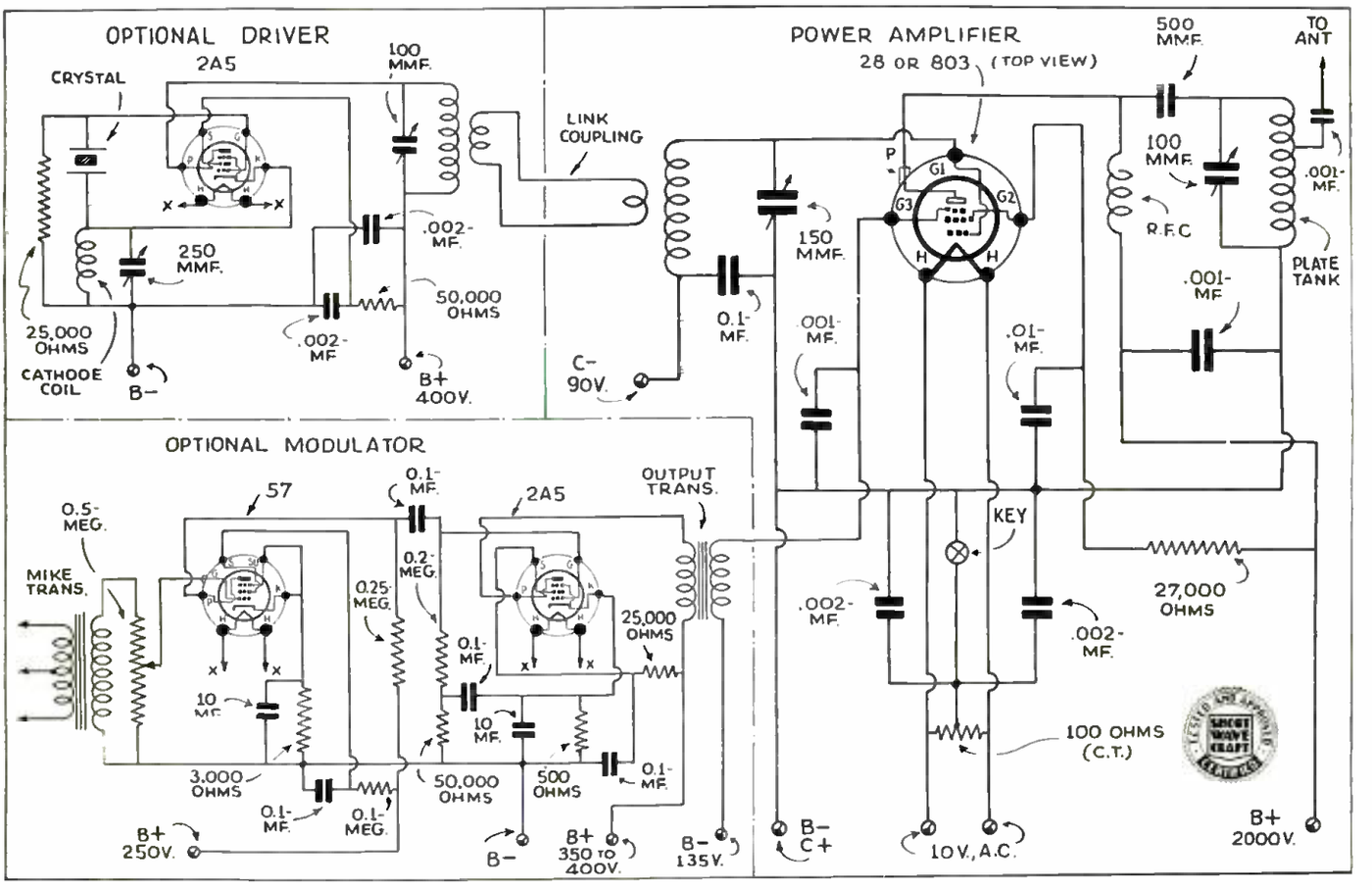
The amateur is at last offered an opportunity to construct a really simple, powerful and economical phone-CW transmitter. The new 200 watt screen-grid pentode tubes require only two or three watts of R.F. excitation and can be suppressor-grid modulated, with five or six watts of audio. Complete details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

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 ¼ 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 ¼ 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. Parallel 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 "wobbulation" 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.

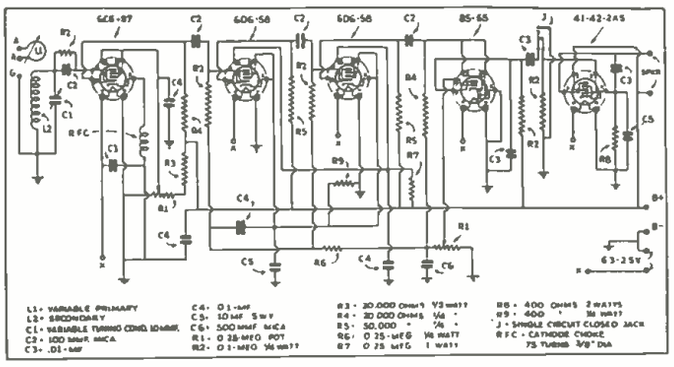
It was decided to construct a superhet receiver that would do away with the faults outlined above. A "conventional" superhet was built using 6D6 first detector, 76 oscillator, two 6D6's for I.F., 85 second *detector* and A.V.C. and first audio, and finally a 41 power audio. From this basic layout we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

*Eastern Radio Specialty Co.

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.

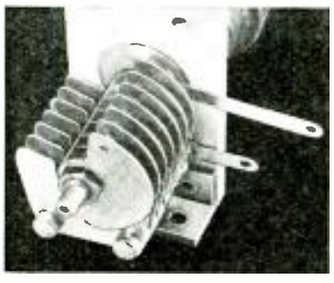
Incidentally it can be mentioned here that the intermediate frequency used was 1,000 kc. This frequency was chosen to reduce "image" response.

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.

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—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.

Chokes and condensers. (H14)

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 "Acorn" tube socket. (H15)

New Wire-Wound Resistors—H-16

The resistors shown in the photograph are made by Aerovox 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 ¼ by 1 inch, 10 watts—⅛ by 1¾ 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.

Jumbo Socket—H-17

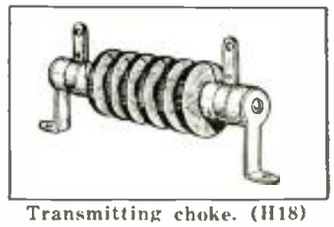
This new National Jumbo isolantite socket is designed for the use of the RK28 and R.C.A. 803 high-power R.F. pentodes. It is designed along the same lines as the standard National isolantite sockets, with such standard features as guide groove, and steel spring re-inforced "non-turning" contacts.

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.

Small resistors. (H16)

Jumbo tube socket. (H17)



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.

CORRECTED AND REVISED Monthly

Short-Wave Stations of the World

Complete List of Broadcast, Police and Television Stations

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

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

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

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

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

Around-the-Clock Listening Guide

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

From daybreak till 5 p.m. and particularly during bright daylight, listen between 13 and 19 meters (21510 to 15800 kc.).

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

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17790 kc. ★GSG
-B- 16.86 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
See "When to Listen In" column

17780 kc ★W3XAL
-B- 16.87 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ. Daily exc. Sun. 8-10 a.m.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

15270 kc. ★W2XE
-B- 19.65 meters
ATLANTIC BROADCASTING CORP.
485 Madison Av., N.Y.C.
Relays
WABC daily, 11 a.m.-5 p.m.

15260 kc. GSI
-B- 19.66 meters
DAVENTRY, ENGLAND
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
See "When to Listen In" column

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

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

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

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

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

15140 kc. ★GSF
-B- 19.82 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
See "When to Listen In" column

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

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

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

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

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

(All Schedules Eastern Standard Time)

14600 kc. JVH
-B.C- 20.55 meters.
NAZAKI, JAPAN
Broadcasts daily
4-5 p.m. and 12 m.-1 a.m.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12000 kc. ★RNE
-B- 25 meters
MOSCOW, U. S. S. R.
Sun. 6-9, 10-11 a.m., 3-6 p.m.
Daily 3-6 p.m., Wed. also 5-6 a.m.

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

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

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

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

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

11860 kc. GSE
-B- 25.29 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
See "When to Listen In" column

11830 kc. W2XE
-B- 25.36 meters
ATLANTIC BROADCASTING
CORP.
485 MADISON AVE., N. Y. C.

11810 kc. ★2RO
-B- 25.4 meters
E.I.A.R.
Via Montello 5
ROME, ITALY
8:15-9 a.m., 9:15-10:15 a.m.,
2:30-5 p.m.

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

11790 kc. W1XAL
-B- 25.45 meters
BOSTON, MASS.
Tues., Thurs. 7:30-9 p.m., Sun.
5-7 p.m.

11770 kc. ★DJD
-B- 25.49 meters
BROADCASTING HOUSE,
BERLIN, GERMANY
12-4:30, 5:05-10:45 p.m.

11750 kc. ★GSD
-B- 25.53 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
See "When to Listen In" column

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

11720 kc. ★CJRX
-B- 25.8 metere
WINNIPEG, CANADA
Daily, 8 p. m.-12 m.

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

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

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

11500 kc. VIZ3
-X- 26.09 meters
AMALGAMATED WIRELESS
OF AUSTRALASIA
MELBOURNE, AUSTRALIA
Calls Canada evening and early a.m.

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

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

10990 kc. ZLT
-C- 27.3 meters
WELLINGTON, N. ZEALAND
Phones Australia and England early a.m. Also broadcasts irregularly on Sunday, 9-10 a.m.

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

10740 kc. ★JVM
-C- 27.93 meters
NAZAKI, JAPAN
Phones California evenings

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

9635 kc. ★2RO
-B- 31.13 meters
E.I.A.R.,
ROME, ITALY
M., W., F. 6-7:30, 7:45-9:15 p.m.

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

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

9590 kc. ★VK2ME
-B- 31.28 meters
AMALGAMATED WIRELESS,
LTD., 47 YORK ST.
SYDNEY, AUSTRALIA
For October, Sunday 12:30-2:30, 4:30-8:30, 9:30-11:30 a.m.

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

9590 kc. W3XAU
-B- 31.28 meters
NEWTOWN SQUARE, PA.
Relays WCAU
12 N-7:50 p.m.

9580 kc. ★ GSC
-B- 31.32 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
See "When to Listen In" column

9580 kc. ★VK3LR
-B- 31.32 meters
Research Section,
Postmaster Gen'ls. Dept.,
61 Little Collins St.,
MELBOURNE, AUSTRALIA
4-8:30 a.m. except Sun.
also Fri. 10:30 p.m.-2 a.m.

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

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

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

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

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

9530 kc. ★W2XAF
-B- 31.48 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY 6.30 p.m.-12 m.
Sun. 4:15 p.m.-12 m.

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

9510 kc. ★GSB
-B- 31.55 meters
DAVENTRY,
B.B.C., BROADCASTING
HOUSE, LONDON, ENGLAND
See "When to Listen In" column

9501 kc. ★PRF5
-B- 31.58 meters
RIO DE JANEIRO, BRAZIL
Daily
except Sun. 5:30-6:15 p. m.

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

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

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

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

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

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

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

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

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

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

(All Schedules Eastern Standard Time)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7400 kc. HJ3ABD
-B- 40.54 meters
P. O. Box 508
BOGOTA, COLOMBIA
Daily 12-2 p. m.; 7-11 p. m. Sunday, 5-9 p. m.

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

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

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

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

7000 kc. HJ5ABE
-B- 42.86 meters
CALI, COLUMBIA
Irregular in evening

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

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

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

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

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

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

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

6650 kc. ★HC2RL
-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.

6650 kc. IAC
-C- 45.1 meters
PISA, ITALY
Calls ships, evenings

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

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

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

6550 kc. TIRCC
-B- 45.77 meters
RADIOEMISORA CATOLICA COSTARRICENSE
SAN JOSE, COSTA RICA
Irregularly 12n-2 p.m. and 5-7 p.m.

6550 kc. TI2PG
-B- 45.77 meters
APARTADO 225,
SAN JOSE, COSTA RICA
"Costa Rica Broadcasting"
9-10 p.m.

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

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

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

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

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

6425 kc. VE9AS
-X- 46.7 meters
FREDERICTON, N.B., CANADA
Operates irregularly

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

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

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

6250 kc. HJ4ABC
-B- 48 meters
PERIERA, COL.
9:30-11:30 a.m., 7-8 or 9 p.m.

6230 kc. OAX4G
-B- 48 meters
Apartado 1242
LIMA, PERU
Wed. & Sun. 7-10 p.m.

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

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

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

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

6160 kc. ★YV3RC
-B- 48.7 meters
CARACAS, VENEZUELA
Generally 4:00-10:00 p. m.

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

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

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

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

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

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

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

6120 kc. VQ7LO
-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.

6120 kc. ★W2XE
-B- 49.02 meters
ATLANTIC BROADCASTING CORP.
485 MADISON AVE., N. Y. C.
Relays WABC, 6-11 p.m.

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

6110 kc. ★GSL
-B- 49.10 meters
DAVENTRY,
B.B.C., BROADCASTING HOUSE, LONDON, ENGLAND
See "When to Listen In" column

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

6110 kc. HJ4ABB
-B- 49.1 meters
MANIZALES, COL., S. A.
P. O. Box 175
Mon. to Fri. 12:15-1 p. m.; Tues. & Fri. 7:30-10 p. m.; Sun. 2:30-5 p. m.

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

6100 kc. ★W9XF
-B- 49.18 meters
DOWNERS GROVE, ILL.
Relays WENR, Chicago
Daily except Mon, Wed. & 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.

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

6090 kc. ★VE9GW
-B- 49.26 meters
BOWMANVILLE, ONTARIO, CANADA

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

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

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

6072 kc. OER2
-B- 49.41 meters
VIENNA, AUSTRIA
9 a.m.-5, 7-10 p.m.

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

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

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

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

6060 kc. ★W8XAL
-B- 49.50 meters
CROSLEY RADIO CORP.
CINCINNATI, OHIO
6:30 a.m.-7 p.m.; 10 p.m.-1 a.m.
Relays WLW

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

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

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

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

6040 kc. PRA8
-B- 49.67 meters
RADIO CLUB OF PERNAMBUCO
PERNAMBUCO, BRAZIL
3:00-3:30 p.m. and from about 4-7 p.m. daily

6040 kc. ★W1XAL
-B- 49.67 meters
BOSTON, MASS.

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

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

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

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

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

6018 kc. ZHI
-B- 49.9 meters
RADIO SERVICE CO., 20 ORCHARD 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.

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

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

6000 kc. RV59
-B- 50 meters
MOSCOW, U. S. S. R.

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

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

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

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

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

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

(All Schedules Eastern Standard Time)

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

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

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

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

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

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

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

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

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

5660 kc. HJ5ABC
-B- 53 meters
CALI, COLOMBIA
11 a. m.-12 N.
Tues. and Thurs. 8-10 p. m.
Sun. 12 N.-1 p. m.

5650 kc. ★YV5RMO
-B- 53.1 meters
CALLE REGISTRO, LAS DELICIAS APARTADO de CORRES 214
MARACAIBO, VENEZUELA
11:30 a.m.-1 p.m., 5:30-10 p.m.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(All Schedules Eastern Standard Time)

Police Radio Alarm Stations

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

"WHEN TO LISTEN IN" Appears on Page 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 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, 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-

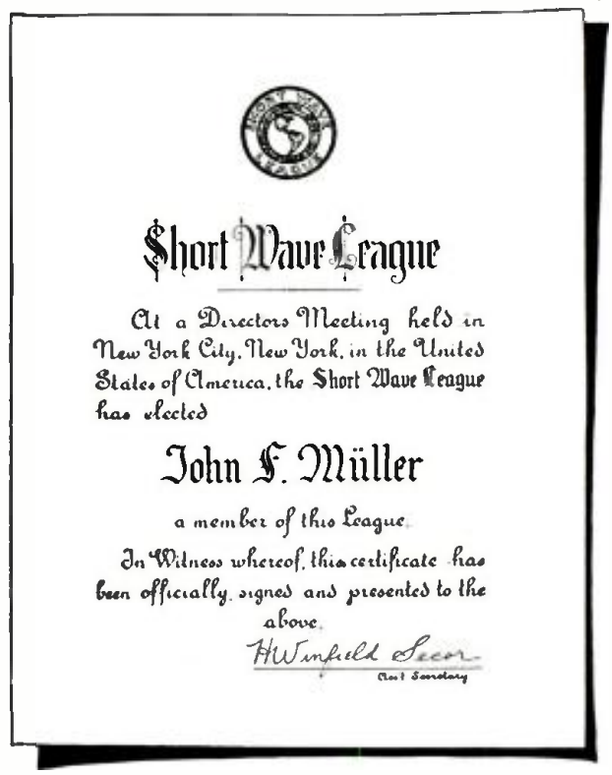
(Continued on page 436)

Here's Your Button

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

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

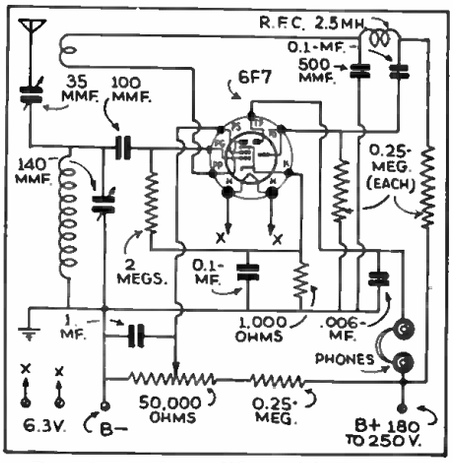
Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for $2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.



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

See page 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 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 ½ turn, and the 20 meter coil at ¼ turn from the B negative end of the grid winding.

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?

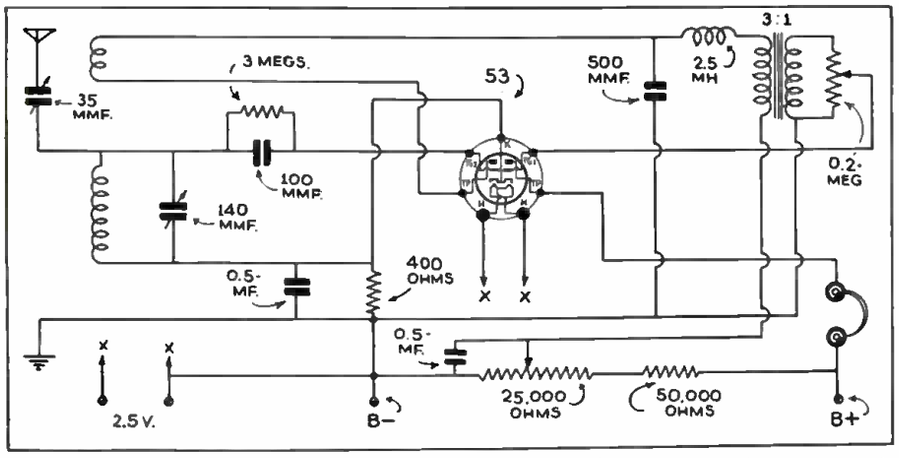
(A) In the article describing the antenna tuner all the information regarding the connections to a standard receiver input was given. Merely connect the two output terminals of the antenna tuner to the antenna and ground posts of the receiver. The feeder wires can be of either 12 or 16 gage solid enamelled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



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

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 *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

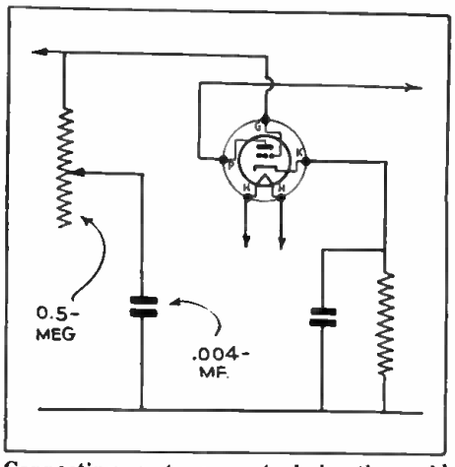
F. J. Saunders, Jr., Springfield, Ill.

(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 ½ meg. variable resistor in series with a .004 mf. condenser, across the grid of the final audio amplifier stage. As the arm of the resistor approaches the grid side, the tone will be lowered and vice versa.

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-**



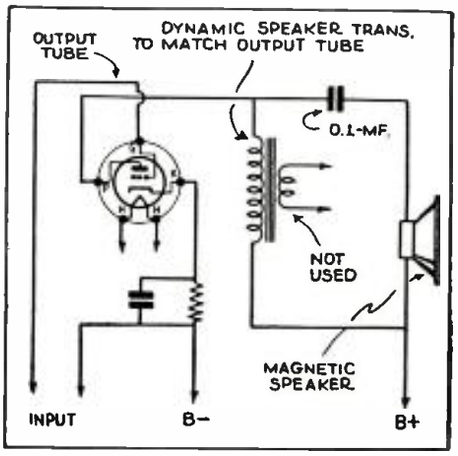
Connecting a tone control in the grid circuit of an audio amplifier.

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.



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.

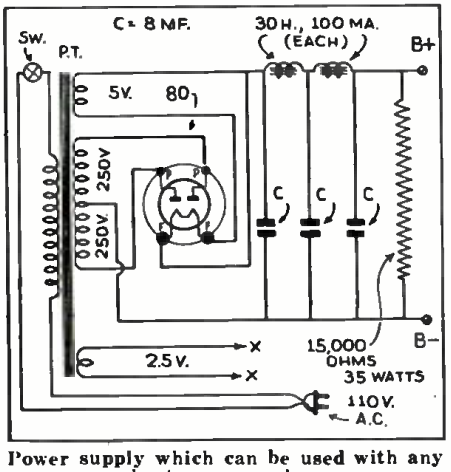
Correspondents are requested to write or print their names and addresses clearly. Hundreds of letters remain unanswered because of incomplete or illegible addresses.

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.

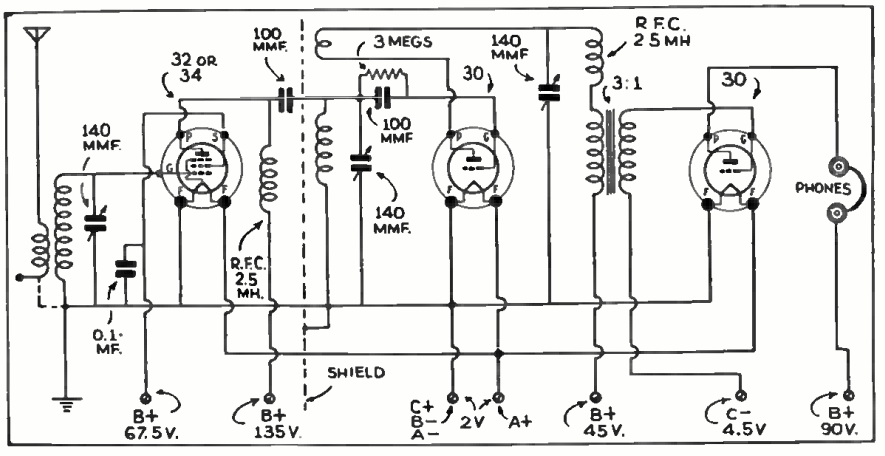
(Q) Will you kindly explain, through the aid of a diagram in the *Question Box*, the proper connections of a 3-winding plug-in coil, that is where the beginning and ending of each winding connects? I have asked several old timers and have gotten varied answers.

(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.

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.

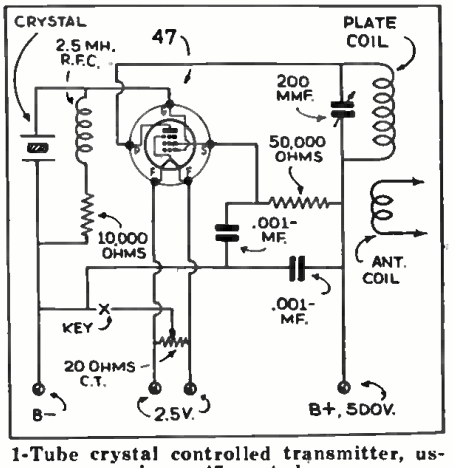
(A) The type 47 is well-known for its adaptability as a crystal oscillator. In the diagram we have shown all the connections. The tuned circuit values are not given and will be dependent upon the frequency at which the transmitter is operated. The key is connected between the filament center-tapped resistor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

HAS INVENTED A "RADIO BLANKET!"

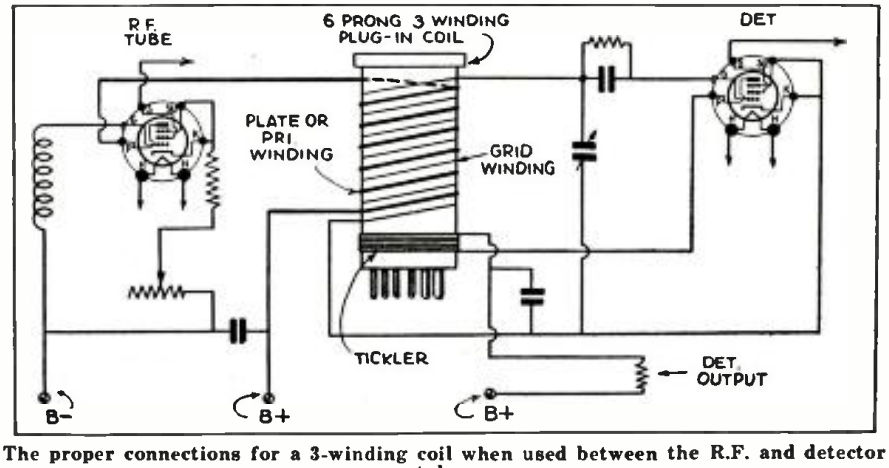
(No name Given.) U.S.S. Texas.

(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, 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 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.



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



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 (E.S.T.)	Kc.	Report
VE9GW	Bowmanville, Canada	Aug. 3; 3.45 p.m.	6,090†	R9-P
GSF	Daventry, England	Aug. 4; 4:00 p.m. (Recordings.)	15,140	R9
W8XAL	Cincinnati, Ohio	Aug. 6; 4:01 p.m.	6,060	R9-P
GSB	Daventry, England	Aug. 6; 5:15 p.m.	9,510†	R7
WLA	Lawrenceville, N.J.	Aug. 7; 3.45 p.m. (Phone test with London, England Program followed.)	15,340	R9
W1XAL	Boston, Mass.	Aug. 7; 4:30 p.m.	6,040	R9
COCD	Havana, Cuba	Aug. 7; 10:30 p.m.	6,130†	R8
HJ4ABE	Medellin, Col.	Aug. 7; 10.55 p.m.	5,950†	R9
W8XK	Pittsburgh, Pa. (Identification, Stars and Stripes Forever.)	Aug. 7; 12.00 Mid.	6,140	R9-P
W9XF-	Chicago, Ill. (Call and Loc. announced many times in Diff. languages.)	Aug. 8; 12:05 a.m.	6,100	R9-P
HJ4ABL	Manizales, Col. (Phoning gone station.)	Aug. 8; 12:10 a.m.	6,103	R8
W2XDG	New York, N.Y. (Exp., station. Test RC. Signed off at above time.)	Aug. 8; 4:07 p.m.	41,000†	R9-P
GSD	Daventry, England (Coo Coo Noodle Club.)	Aug. 10; 1:00 a.m.	11,750†	R9-P
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
GSC	Daventry, 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 (DJD DJN and DJC signed off at 10 45 p.m. Identification chimes at beginning and end of transmission.)	Aug. 11; 10.45 p.m.	6,020	R9
EAQ	Madrid, Spain (Their power is 30 kw.)	Aug. 17; 7.00 p.m.	9,860†	R8-F
W2XE	New York, N.Y.	Aug. 17; 10:00 p.m.	6,120	R7-F
CJRO	Winnipeg, Canada	Aug. 17; 10:30 p.m.	6,150†	R8
CJRX	Winnipeg, Canada	Aug. 17; 10:45 p.m.	11,720†	R8
W8XK	Pittsburgh, Pa.	Aug. 18; 1:00 p.m.	15,210	R9-P
W9XF	Comes on at 12:00 Mid. E.S.T., while W8XK (6140 kc.) leaves the air at the time.			

†—Frequency or Wavelength announced by station.
F—Bad Fading. P—Plus.

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 HI1J during every evening.

YV6RV and HJ1ABB always good (R8-9).

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

HCJB 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-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 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 ZP1O 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.

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.

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

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.

TI5HH, 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*)

Please mention SHORT WAVE CRAFT wh

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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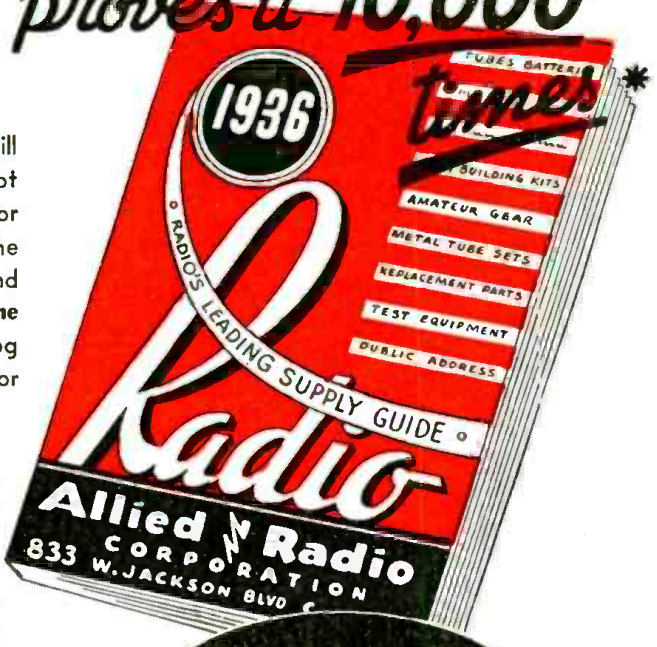

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Please send to me, without charge or obligation, the catalogs, booklets, etc., the numbers of which I have circled below.

2 3 4 5 25
28 57 72 74 75 76

My radio connection is checked below:

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( ) Short-Wave Experimenter
( ) Short-Wave Listener
( ) Service Man operating own business
( ) Service Man for manufacturer
( ) Service Man for jobber
( ) Service Man for dealer
( ) Service Man for servicing company
( ) Dealer
( ) Jobber
( ) Experimenter
( ) Professional Set Builder
( ) Amateur Set Builder
( ) Licensed Amateur
( ) Station Operator
( ) Radio Engineer
( ) Laboratory Technician
( ) Public Address Worker
( ) Manufacturer's Executive
( ) Student

My age is years.

I have been interested in radio for years.

I buy approximately $ .00 of radio material a month. (Please answer this question without exaggeration or not at all.

(Please Print Name and Address)

Name.....

Address.....

City.....State .....

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

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

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

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

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

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

2. HAMMARLUND 1936 CATALOG. Short wave fans and set builders will find a flock of new low-loss parts such as variable condensers, coil forms, sockets, transformers, chokes, shields, and other precision products especially designed for short-wave and ultra-short-wave work described in this catalog. Information on short-wave sets is included.

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

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

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

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

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

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

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

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

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

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

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.

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.

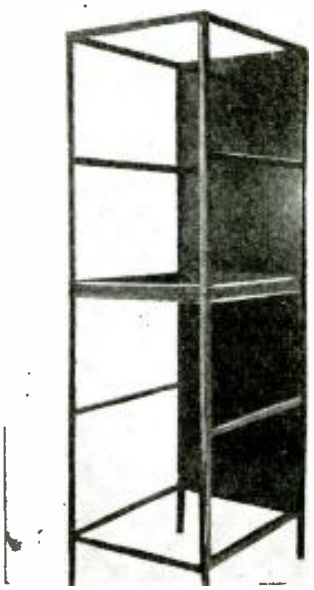
The transmitter may be changed over from one band to another in three minutes and the 20, 40 and 80 meter bands are used. It is hoped that 10 meters may be worked shortly

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).



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.

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 smoth 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 9¾ 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:

9¾—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.

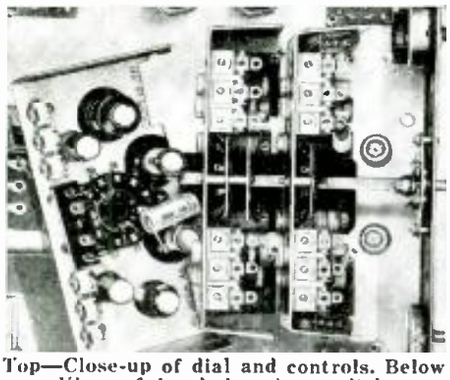
What's New in Short-Wave Apparatus

(*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 band-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!

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 your 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.

$20.00 Prize Monthly for Best Set

● THE editors are looking for "new" receiving circuits—from 1 to 5 tubes preferably. A $20.00 monthly prize will be awarded to the best short-wave receiver submitted. The closing date for each contest is 75 days preceding date of issue (Oct. 15 for the January issue, etc.). In the event of a tie, an equal prize will be given to each contestant so tieing. 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.

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.

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, "LaVoz 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 CRCX 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. TI2PG formerly on 6550 kc. is now on 6410 kc. HJ4ABC is now on 6135 kc.

New Beat Frequency Oscillator

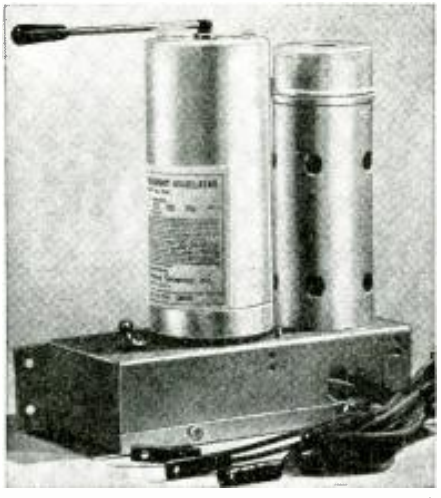
● THE Beat Frequency Oscillator is an important auxiliary to short-wave superheterodyne receiving sets and serves the purpose of enabling the listener to obtain code messages and other continuous wave broadcasts. It may also be used in locating regular broadcast or other modulated forms of transmission 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, 2¾ 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.

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

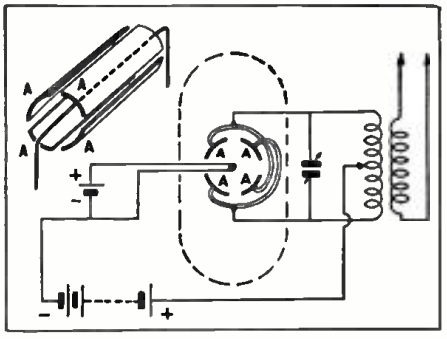
To produce these ultra high frequencies the so called "Haban-Roehre" (Haban tube) was used in Germany. This tube invented by the German radio engineer, Dr. Haban, is often called in England and America the *split magnetron.*

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.

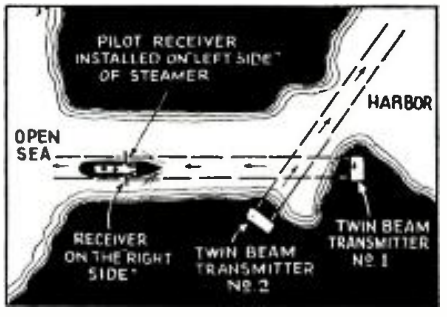
In addition to the magnetrons very small triodes are used for the reception of the decimeter waves. These tubes bring to mind the American "Acorn" tubes and are of tiny dimensions. The system of construction is greatly concentrated so as to make the time of the electrons' transit practically zero. Another 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.

DecimeterWaves—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.

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) Aerovox
1—.0005 mf. mica condenser (5000 volts) Aerovox.
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 Electroloy panel, I.C.A.
1—8 inch square by 1/8 inch Electroloy subpanel, I.C.A.
1—Large National grid clip
1—Transmitting pentode RK28 or RCA803

Coil Data

Grid
(See Text)

Band	Turns
80	20
40	8
20	5

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

Plate
(See Text)

Band	Turns
80	34 turns No. 12 wire on 3" form
40	12T ¼" Tubing 2" diameter
20	7T ¼" Tubing 2" diameter

Spaced to be 5½" long.

Short Waves and Long Raves

(*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!

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. ½-watt resistor, I.R.C.
R2—50,000-ohm ½-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.
1—S.P.D.T. Panel switch
1—type 6A6 tube
1—type 41 tube
4—Hammarlund isolantite sockets.

Coils

Band	A	B	C
1.2	5	11	24
1.3	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 Wave-length	Grid coil turns	Tickler turns	Distance between 2 coils
200-80	52 T. No. 28 En. Wound 32 T. per inch.	19 T. No. 30 En. Close wound (CW)	⅛"
80-40	23 T. No. 28 En. Wound 16 T. per inch.	11 T. No. 30 En. C. W.	⅛"
40-20	11 T. No. 28 En. 3-32" between turns	9 T. No. 30 En. C. W.	⅛"
20-10	5 T. No. 28 En. 3-16" between turns	7 T. No. 30 En. C. W.	⅛"

Coilform—2⅛" long by 1¼" dia. 4-pin base.

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.

FREE BATTERIES TO TROPHY WINNERS!

● The manufacturers of the well-known Burgess batteries have offered to furnish FREE one year's supply of batteries—all the batteries that the "trophy" winning set will need for a year—and providing it happens to be a Burgess Battery-powered set. A very fine offer indeed, and the editors are glad to pass on the good word to all their embryo trophy contestants.

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 lightweight.

I am enclosing a detailed log for this period.

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

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

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.	GSD	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	9.540	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.	2RO	9.635	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.	PHI	17.785	Holland	Came in fine
July 21	11:15 a.m.	GAA	20.388	England	Very loud, working N.Y.C.
July 26	7:15 p.m.	2RO	9.635	Italy	Fair
July 31	6:55 p.m.	2RO	9.635	Italy	Fair
July 31	7:05 p.m.	EAQ	9.860	Spain	Loud, but choppy
July 31	7:10 p.m.	FYA	11.720	France	Weak, but steady
July 31	7:15 p.m.	GSD	11.750	England	Very, very loud and clear
July 31	7:20 p.m.	DJD	11.770	Germany	Very loud
Aug. 4	9:40 a.m.	PHI	17.785	Holland	Fair
Aug. 4	9:50 a.m.	WNC	15.035	U.S.	Very loud, working HPF
Aug. 4	10:00 a.m.	HJB	14.950	Colombia, S.A.	Very loud working WNC
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.	GSC	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	11.875	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.	GSD	11.750	England	Loud, some fading
Aug. 7	7:45 p.m.	DJD	11.770	Germany	Very loud
Aug. 11	9:30 a.m.	PHI	17.785	Holland	Very fine
Aug. 11	9:40 a.m.	HPF	14.485	Panama	Loud, working WNC
Aug. 11	1:40 p.m.	FTA	11.940	France	Fair
Aug. 11	6:45 p.m.	GSC	9.580	England	Very, very loud, clear
Aug. 11	6:55 p.m.	EAQ	9.860	Spain	Best for same time
Aug. 11	7:00 p.m.	DJD	11.770	Germany	Very loud and clear
Aug. 11	7:10 p.m.	GSD	11.750	England	Very, very loud
Aug. 11	7:35 p.m.	FYA	11.705	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	11.875	France	Very loud and steady
Aug. 17	4:50 p.m.	2RO	9.635	Italy	Loud and clear, steady
Aug. 17	4:55 p.m.	COH	9.428	Cuba	Fair
Aug. 17	5:05 p.m.	PRF5	9.500	Brazil	Very fine, clear
Aug. 17	5:10 p.m.	GSB	9.510	England	Weak
Aug. 17	5:45 p.m.	WNC	15.035	U.S	Working YNA
Aug. 18	8:50 a.m.	GAA	20.380	England	Very, very loud
Aug. 18	9:00 to 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 "Dordyto." 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.

HIZ, 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.

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, Bandoong, 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

hours at a time before they speak. Try for them at 6:00-7:00 a.m., E.S.T. Another station is SUZ, Cairo, Egypt. No one should experience any difficulty in picking up this station. They call London from 11:00-12:00 a.m., E.S.T., daily on a frequency of 13.83 megs. They announce in English and cannot be missed. They are slightly above the amateur band, and have a very steady signal.

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 VWY, 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,
2939 South Loomis St.,
Chicago, Ill.

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.
W9XK—Iowa City, Ia.
W9XAK—Manhattan, Kans.
W9XAO—Chicago, Ill.
W6XAH—Bakersfield, Calif.
2750-2850 kc.
W3XAK—Portable
W9XAP—Chicago, Ill.
W2XBS—Bellmore, N.Y.
W9XAL—Kansas City, Mo.
W9XG—W. Lafayette, Ind.
W2XAB—New York, N.Y.
VE9AR—Saskatoon, Sask., Can.
VE9ED—Mt. Joli, Que., Can.
42000-56000, 60000-86000 kc.
W2XAX—New York, N. Y.
W6XAO—Los 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.
W9XK—Iowa City, Ia.
VE9BZ—Vancouver, B.C., Can.
VE9DS—Montreal, Que., Can.
VE9AU—London, Ont., Can.
VE9RC—Quebec, Que., Can.
VE9AG—Walkerville, Ont., Can.

Latest TUBE DEVELOPMENTS

A New Vacuum Tube for Ultra-High Frequencies

By C. E. FAY

Vacuum Tube Development, Bell Telephone Laboratories

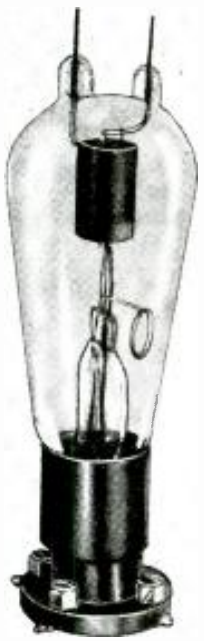


Fig. 2—The Western Electric 304A vacuum tube—designed for frequencies from thirty to three hundred megacycles

In the past few years, considerable attention has been devoted to the development of radio communication at the ultra-high frequencies. As the available channels in the lower frequency range become assigned, this high-frequency portion of the radio spectrum, including frequencies 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 interelectrode 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-

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 tub 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-

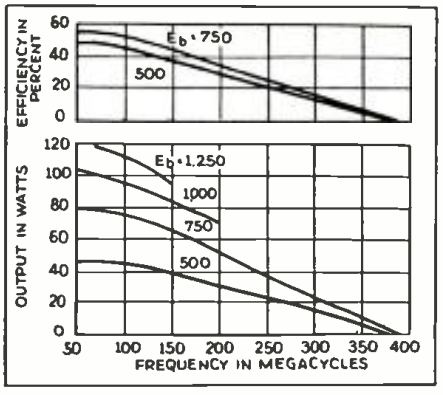


Fig. 3—Output and efficiency characteristics of 304A tube at various plate potentials.

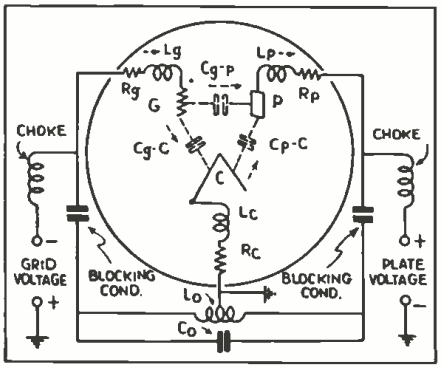


Fig. 1—Diagrammatic arrangement of vacuum tubes showing external and internal reactance.

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-

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.

Filament Voltage	7.5 Volts
Filament Current	3.25 Amperes
Maximum D.C. Plate Voltage—Unmodulated	1250 Volts
Maximum D.C. Plate Voltage—Modulated	1000 Volts
Maximum D.C. Plate Current	0.10 Ampere
Maximum Continuous Plate Dissipation	50 Watts
Maximum R.F. Grid Current	.5 Amperes
Maximum D.C. Grid Current	0.020 Amperes
At a Plate Voltage of 1000 Volts D.C. and Plate Current of 0.050 Amperes	
Amplification Factor	11
Transconductance	2300 Micromos
Plate Resistance	4800 Ohms
Interelectrode Capacities	
Grid to Plate	2.5 Micro-microfarads
Grid to Filament	2.0 Micro-microfarads
Plate to Filament	0.7 Micro-microfarads

—Bell Laboratories Record.

Push-pull oscillator for 60 mc. using 304A tubes.

The next DOERLE article will appear in the December issue.

New Silver Receiver For "Hams" or "Fans"

(*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.

For the engineer its performance is easily described by saying that its four low-C 200 mmf. tuning bands cover 1700 to 33,000 kc., which includes the 160, 80, 40, 20 and 10 meter amateur and all short-wave broadcast bands, its sensitivity is below a microvolt all over this range, its inherent noise never exceeds 10 milliwatts at maximum sensitivity, its selectivity is variable from 150 cycles 10,000 times down to 10 kc., its fidelity is controllable from flat to 4 db. from 30 to 4000 cycles, to peaked audio for C.W. reception, its undistorted power output 3.0 watts, rising to a maximum of about 4.0 watts.

While considering the really ideal performance described above, let's take a look at its other features as briefly as possible.

Circuit: Superheterodyne, with two 6D6 tuned r.f. stages on all four bands, suppressor grid injected 6D6 s.g. first detector, 76 electron coupled H.F. oscillator, one 6D6 i.f. stage, high gain 6C6 tetrode second detector, 6B7 amplified A.V.C., optimum inductively coupled variable-pitch 76 beat oscillator, 42 output pentode and 5Z3 rectifier.

Band Change: Individual coils for each band, picked up by dependable Yaxley eight-gang wave change switch just like you find in all good broadcast receivers.

Frequency Stability: Individually shielded coils, all circuits Hammarlund air dielectric, not compression mica, tuned and trimmed, plenty of ventilation, and temperature isolation make for the ability to stay "zero beat" on a good 20 meter signals for hours.

I.F. Amplifier: Set at 25 microvolts absolute sensitivity to place the limit of inherent noise at thermal agitation in the antenna circuit where it belongs, not as usual at the first detector so as to lose weak signals in set noise. Two Aladdin Polyiron 465 kc. I.F. transformers, air tuned, and variable as to selectivity to suit your taste. Crystal I.F. transformer dual tuned.

Sensitivity: Variable so you can adjust it with two knobs from 50 cycles wide to 10 kc.—or a socket wrench pushed through two I.F. can holes lets you vary the I.F. transformer coupling and selectivity even further.

Crystal Filter: Of course, but one that makes the usual garden variety look sick by comparison. As much, and usually more sock in series circuit as when cut out, and in parallel, the ability to drop an unwanted heterodyne completely out without impairing phone signal quality.

Band-Spread: One tuning dial, accurately calibrated (yes, the builder can so align it without any extra test equipment) with geared, no slip, band-spread pointer on 200 division, 360 degree inside scale which accurately and positively relogs. Fast and slow tuning ratios, 23:1 and 130:1 spread, 1000 degrees on 160 meters, 700 degrees on 80 meters, 400 on 40, 120 on 20, and 200 degrees on 10 meters. Effective feet, not inches, of dial space on the amateur and short wave broadcast bands, since 360 degrees of band spread equals about one foot of dial space and five full turns of slow knob for 360 degree band spread pointer rotation.

A.V.C. (automatic volume control) of course, but amplified so it really does a job on weak signals, and speeded up so it does likewise on C.W. A switch cuts A.V.C. out for C.W., and in for phone if so preferred.

Controls: Enough and no more. Not usual blind knobs, but every one labeled as to what it does, and calibrated so you can tell that QSO just how much better he comes in tonight than he did with the old rig last night.

R-Meter: A sensitivity meter that lets you actually measure signals as weak as 5.0 microvolts absolute—and that's not an R9 signal, its about R2-R3.

Construction: Finish is polished chromium, like the finest custom-built jobs.

Alignment: The sensitivity meter is the output meter in aligning, the crystal in a temporary circuit using no extra parts except that odd '99 or 30 tube, its socket and a couple of flashlite batteries does the I.F. job, while signals do the whole R.F. job. Hammarlund's air trimmers make all this a pleasure, not the usual uncertain and God-knows-when headache.

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 compiete 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—4½" 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 Midgets—15 mmf.
Continental Carbon Company
4—250 ohm, ½-watt Resistor
1—500 ohm, 1-watt Resistor
1—6000 ohm, 1-watt Resistor
2—10,000 ohm, ½-watt Resistor
1—3000 ohm, 2-watt Resistor
1—30,000 ohm, 1-watt Resistor
5—5000 ohm, ½-watt Resistor
2—15,000 ohm, ½-watt Resistor
4—250,000 ohm, ½-watt Resistor
3—500,000 ohm, ½-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—1¼" Black Bar Pointers
McMurdo 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

Advertisements are inserted at 5c per word to strictly amateurs, or 10c a word to manufacturers or dealers. Each word in a name and address is counted. Cash should accompany all orders. Copy for the December issue should reach us not later than October 5th.

BOOKS

ARMY-NAVY GIVES FREE radio operators' training for service on aircraft, ships. Salary, expenses paid. Information pamphlet, how to apply, 20c. Continental, Box 344, Dept. 4, Indianapolis, Ind.

CALLBOOKS!! 70,000 AMAteurs!! $1.25. Order from W8DED, Holland, Michigan.

CODE MACHINES

OMNIGRAPH CODE LEARNER'S. 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.

ELECTRICAL SUPPLIES

INSULATION, WIRE, VARnishes, supplies, etc. Send 3c stamp for bulletin. Autopower, 414 S. Hoyne Ave., Chicago.

GENERATORS

TWENTY NEW PRACTICAL changes for automobile generators. See our advertisement at bottom of page 437. Auto Power, Inc.

"HAM" OFFERS AND WANTS

FOR SALE—200 WATT XTAL CONtrol phone transmitter complete with Super-Het receiver $225. Write for details. W 8 H B K, 2613—109 Street, Point Place, Toledo, Ohio.

SKYRIDER 5, 12-200 METERS, Complete, Perfect, $18.00. Also will buy or trade for Scott. Bill Lyon, 4151 Jackson, Chicago.

34-30-30 RECEIVER, BLACK crystalline finish, 15-550 meter coils, tubes and 3,000 ohm fones, $9.75. J. Tate, 205 Simpson, Ardmore, Pa.

NATIONAL SW3, 2 VOLT, COMplete. Write Grossman Turner, Route 4, Carrollton, Mo.

.00035 VARIABLE CONDENSERS —3 for $1.00. W8RW, Bluffton, Ohio.

INSTRUCTION

RADIO ENGINEERING, BROADcasting, aviation and police radio. Servicing. Marine and Morse Telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Colt St., Valparaiso, Ind.

PATENTS & INVENTIONS

HAVE YOU A SOUND, PRACTICal invention for sale, patented or unpatented? If so, write Chartered Institute of American Inventors, Dept. 92, Washington, D. C.

QSL—CARDS—SWL

SWL CARDS, VERIFICATION Cards, Swl Log Systems. Stamp for Samples. W8DDS Print, Dept. L, 2156 West 80th Street, Cleveland, Ohio.

QSL's, SWL's, FINEST QUALITY Stock, Attractive. Samples (stamps). W-8-F-S-N, 1827 Cone, Toledo, Ohio.

QSL CARDS, NEAT, ATTRACtive, reasonably priced, samples free. Miller, Printer, Ambler, Pa.

QSL'S—125 FOR $1.00, W8RW, Bluffton, Ohio.

SHORT WAVE COMPONENTS

RADIO BASES 6x8x2 25c, 8x10x2 35c, 10x14x2 50c, 10x18x2 55c, 12x18x2 60c. 40 sizes in stock. Ham bases made to order. Radio Builders Supply Co., 337 So. Clark Str., Chicago, Ill.

PARTS AND KITS FOR ALL sets in Short Wave Craft. Chas. Brand, 1063 Lafayette Ave., Brooklyn, N.Y.

PLUG-IN COILS, WOUND TO order. Noel, 728 Birch, Scranton, Pa.

SHORT WAVE RECEIVERS

THE AMLIE DX'ER IS HOPED TO go on market early 1936. Complete Plugless, AC and DC, any band from 14 to 3,000 meters, the Receiver winning International Fame. Watch your magazine. King of VK'S. Oliver Amlie.

OUR TUBELESS CRYSTAL SETS have received 2,100 mites. Simple Blueprint for building 18 Types—with your subscribition "Setbuilders Data" —25c. Laboratories, 151-A Liberty, San Francisco.

IN STOCK—SHIPPED PREPAID Hammarlunds, Nationals, RME9D, Lincolns, etc. Trade-in your receiver Schwarz Radio Service, 15 Lawrence Ave., Dumont, N. J.

MAKE SIMPLE LONG DISTANCE pocket radio. No tubes—no batteries. Reception over hundreds of miles reported. Supersensitive Melomite Crystal and instructions, 25c, Postpaid, Melomite, Dept. PS, Fairmount, Kansas City, Mo.

TELEVISION

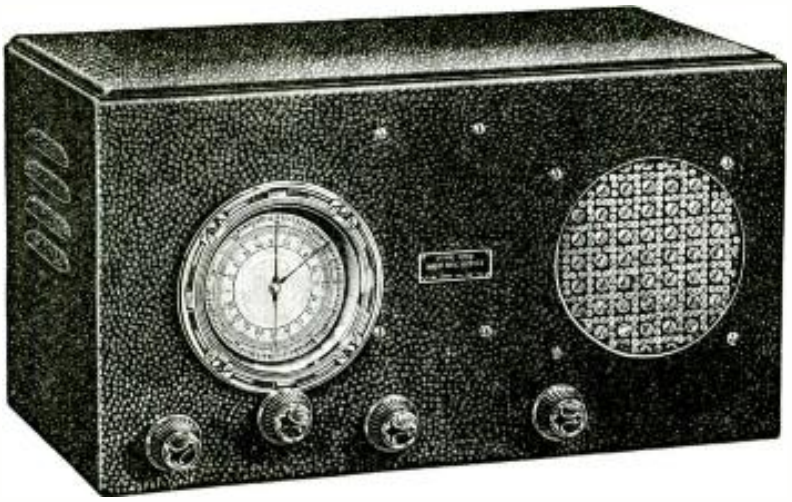
TELEVISOR COMPLETE $13.00. Arthur Pohl, 2134 Palms Ave., Detroit, Mich.

TRANSMITTING EQUIPMENT

INTRODUCTORY OFFER, ONE 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, Tarony, Phila., Pa.

NEW 1936 CATALOG. SPECIAL offering on every known power supply, lowest prices with highest quality. Transmitters and special power packs built to order. Monitors, wavemeters, Transformers and filter chokes of every size. Everything for the transmitting station. General Engineering Corp., Charlotte, Michigan.

AMATEUR EQUIPMENT DEsigned on order. Reasonably priced. W1IBY, West Hartford, Conn.



take notice!—

CONTINUOUS BANDSPREAD

on all bands

THE OFFICIAL

DOERLE BANDSPREAD

5-TUBE DE-LUXE A. C. SHORT-WAVE RECEIVER

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
- 15-200 Meters
- Fully Shielded
- Bandspread Dial
- Dynamic Speaker
- Headset Jack
- Beautiful Cabinet

NATION-WIDE *TESTIMONIALS* PRAISE THIS SET

Dear Sir:
I want to tell you that the radio which I bought from you recently is working fine. I have received California on long-waves, and on short-waves have logged about 93 stations. Three from the greatest distance are VK3LR, VK2ME and VK3ME, all located in Australia. And I get them consistently, not just once in a great while, at great volume, on a small window-sill aerial.
The set certainly has some "kick" to it.
Ernest J. Orishek, 118 White St., Westfield, Mass.

Dear Sirs:
Just a line or so to give you an idea of what my Doerle A. C. 5 hauled in during a 2 weeks listening test. All of the G and D stations were received also TIEP, W9XF, PRADO, HJ4ABE, W8XAL, W2XE, W8XK, CJRO, YU2RC, CJRX, COC, HJ4ABB, HJ1ABB, YU5RMO, YP3RC, WCRCT, CT1AA, W1XAL, W9XAA, W1XAZ, EAQ, WE9GW, HC2RL, HJ3ABD, KEJ, HJB, HP5B, HJ1ABD, WNB, YUIRC, H1Z, JYK, FYA, YU4RC, OA4AD, RNE, PHI, RKI, WNC, YNA, COH, PRF5, WON, XEBT, W2XAF, LSI, 12RO, 1RM, 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 band-spread dial makes tuning a real pleasure. I only have a short wire aerial so cannot give you any long list of stations received, but have received many foreign stations. I think Rio De Janeiro about the best distance at about R8 volume.
Ralph C. Rathbun, 9 Seward Ave., Bradford, Pa.

Gentlemen
Here is a list of Short-Wave stations I have received in a short time with my "DOERLE AC5", with a very poor aerial for short-wave work. EAQ—Madrid, Spain; W1XAZ—Springfield, Mass.; W2XAF—Schenectady, N.Y.; COH—Havana, Cuba; COC—Havana, Cuba; VE9GW—Bowmanville, Ontario, Canada; CT1AA—Lisbon, Portugal; PRF5—Rio De Janeiro, Brazil; HJ1ABB—Barranquilla, Col., S. A.; PRADO—Riobamba, Ecuador, S. A.; DJC, Berlin, Germany; XEBT—Mexico City, Mexico; YV5RMO—Maracaibo, Venezuela, S. A.; CRJO, Winnipeg, Canada; W2XE—New York, N. Y.; W8XK Pittsburgh, Pa.; HP5B—Panama City, Panama; FYA—Paris, France; GSC & GSI—Daventry, England.
EAQ—Madrid, Spain and COD—Havana, Cuba come in every night on the loud speaker regardless of weather conditions. This is the third and best receiver I have owned in the short time I have been interested in Short Waves.
Emerald H. Delbeugge, Rose-Mary Dahlia Gardens, Martins Ferry, Ohio.

Original letters plus others may be seen at our office.

BEFORE you buy any other Short-Wave Receiver, be sure to take advantage of our FREE five day trial offer explained below. Satisfy yourself, in your own home and at your leisure that this IS one of the greatest values in radio, and that it DOES have features which are found in more expensive receivers.

A powerful 5-tube "rig" complete with its self-contained hum-free power pack and dynamic speaker; all mounted on a single chassis and contained in a large handsomely finished black crackle cabinet with patterned screen speaker grill.

Two tuned stages—regenerative detector, 3AF stages with powerful 41 pentode output and perfectly matched dynamic speaker; all these features contribute to the great power and fine performance of this Doerle short-wave receiver.

CONTINUOUS BANDSPREAD ON ALL BANDS. A special double-pointer, double-scale, airplane dial having a tuning ratio of 125 to 1 is employed.

Many fine features that you would expect to find in more expensive receivers are incorporated in this "ACE TOP-NOTCHER" of the entire Doerle line.

Either a short-wave doublet or standard antenna may be used. A new antenna-adjusting scheme permits perfect alignment of both tuned circuits without appreciably affecting the setting of the tuning dial. Provisions are made to use headphones if desired, with a switch to cut out the dynamic speaker.
All parts and workmanship fully guaranteed.

LOOK AT THIS DX-QSL LIST!

During its initial test, in New York City, this receiver pulled in on its loud speaker, at good room volume, the following enviable log: **W1XAL, W1XAZ, Boston; W3XAL, Boundbrook, N.J.; W8XAL, Cincinnati; W9XAA and W9XF, Chicago; GSC, GSD, GSE, GSF, Daventry, England; DJA, DJB, DJC, DJD, Zeesen, Germany; HBL, HBP, Geneva; VE9GW Ontario; V9DN Quebec; GE9DR Montreal; VE9HX Halifax; XETE Mexico City; YU1BC, YV3BC Caracas CP5 Bolivia; LSN Buenos Aires; COC Havana; EAQ Madrid; WQO and WEF, testing with the Byrd Expedition** and a whole flock of amateurs in practically every radio district of the United States. After that, we could no longer keep our eyes open so we "signed off" to bed.

The testimonials printed on this page testify that, in actual use, our customers are attaining even greater success. Uses a simple regenerative circuit—so simple as to be entirely fool-proof. Tubes: 1—6D6, 1—6F7 (actually two tubes in one), 1—37, 1—41 power output tube and 1—80 full-wave rectifier. Two gang tuning condenser; single dial control; FULL-VISION ILLUMINATED BAND SPREAD AIRPLANE DIAL. Ship. wt. 35 lbs. **No. 5000. "DOERLE AC-5" Short-Wave Receiver.** Complete with Tubes, Speaker and 8 coils 15 to 200 meters. Completely wired and tested. (NOT SOLD IN KIT FORM) YOUR PRICE..... **$27.58**
Set of 2 Broadcast coils $1.75 additional

7 PAGES of Instructions and Diagrams Included with each SET

USE THIS COUPON for—

FREE 5 DAY TRIAL

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

Gentlemen: 11-35
I enclose ..... dollars ..... cents, for your new Doerle 5-Tube De-Luxe Short-Wave receiver on a five day free trial basis. I am to prove to my own satisfaction that it will give me world-wide reception and that your guarantee means exactly what it says. If, at the end of five days after receipt of radio, I am not perfectly satisfied, I will write you accordingly, whereupon, you will send shipping instructions. Upon receipt of the radio, you will refund me the full purchase price. I agree to pay express charges one way, and you the other.

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Send post card or letter. Book sent by return mail. See pages 426 and 432 for our other "ads."

RADIO TRADING CO., 101A Hudson St., New York City

Index to Advertisers

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

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—0.1 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

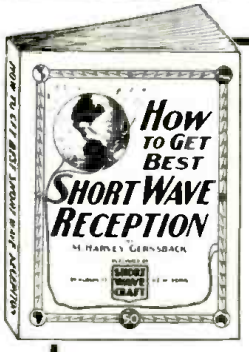
List of Accessories

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—C8X Speaker with 7000-ohm Transformer, field 495 ohms, 110 M A

Another view of the Silver Super-het.

Here are the Six BEST SHORT-WAVE RADIO BOOKS!

Without doubt you will have to go a long way to buy better books on short waves than you find on this page. Each book is written by a well-known authority on short waves . . . each book has been carefully illustrated with photographs and diagrams to make the study of this field of radio much simpler. The volumes on this page are the finest books on short-waves which are published anywhere today. Order one or more copies today . . . find out for yourself how fine they are. Prices are postpaid.



How to Get Best Short-Wave Reception

By M. HARVEY GERNSBACK

This book tells you everything you ever wanted to know about short-wave reception.

The author, a Professional radio listener and radio fan for many years, gives you his long experience in radio reception and all that goes with it.

Why is one radio listener enabled to pull in stations from all over the globe, even small 100 watters, 10,000 miles away, and why is it that the next fellow, with a much better and more expensive equipment, can only pull in the powerful stations that any child can get without much ado?

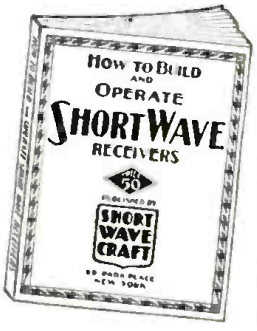
The reason is intimate knowledge of short waves and how they behave. Here are the chapters of this new book:

1. What are Short Waves and what can the listener hear on a short-wave receiver or converter?
2. How to tune and when to listen in on the short waves.
3. How to identify short-wave stations.
4. Seasonal changes in short-wave reception.
5. Types of receivers for short-wave reception.
6. Aerial systems for short-wave receivers.
7. Verifications from short-wave stations.

The book makes excellent reading matter. There are many tricks in short-wave reception that even some of the "old-timers" do not know. Be sure to get it.

40 Illustrations, 72 Pages. Stiff, flexible covers **50c**

HOW TO BUILD AND OPERATE SHORT-WAVE RECEIVERS



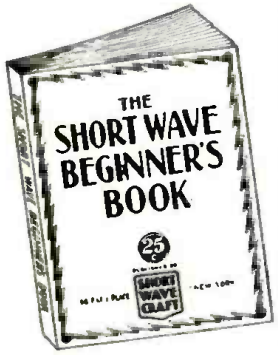
THIS is the best and most up-to-date book on the subject. It is edited and prepared by the editors of SHORT WAVE CRAFT, and contains a wealth of material on the building and operation, not only of typical short-wave receivers, but short-wave converters as well. Dozens of short-waves sets are found in this book, which contains hundreds of illustrations: actual photographs of sets built, hookups and diagrams galore.

This book is sold only at a ridiculously low price because it is our aim to put this valuable work into the hands of every short-wave enthusiast.

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

150 Illustrations, 72 Pages. Stiff, flexible covers **50c**

THE SHORT-WAVE BEGINNER'S BOOK



HERE is a book that solves your short wave problems—leading you in easy stages from the simplest fundamentals to the present state of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

The book is profusely illustrated—it is not "technical." It has no mathematics and no technical jargon.

It also gives you a tremendous amount of important information, such as time conversion tables, all about aerials, noise elimination, all about radio tubes, data on coil winding and other subjects.

Partial List of Contents

Getting Started in Short Waves—the fundamentals of electricity. Symbols, the Short Band of Radio—how to read schematic diagrams. Short Wave Coils—various types and kinds in making them.

Short Wave Aerials—the points that determine a good aerial from an inefficient one.

The Transposed Lead-in for reducing Static.

The Beginner's Short-Wave Receiver—a simple one tube set that anyone can build.

How to Tune the Short-Wave Set—telling the important points to get good results.

Audio Amplifiers for S-W Receivers.

Learning the Code—for greater enjoyment with the S-W set.

Wave length to Kilocycle Chart.

Wire Chart—to assist in the construction of coils.

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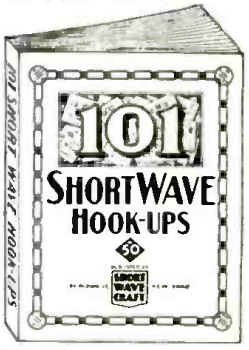
101 SHORT-WAVE HOOKUPS

Compiled by the Editors of SHORT WAVE CRAFT



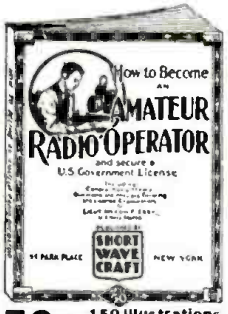
EACH and every hook-up and diagram illustrated is also accompanied by a thorough explanation of what this particular hook-up accomplishes, what parts are required, coil-winding information, values of resistors, etc., in fact, everything you want to know in order to build the set or to look up the data required.

To be sure, all of the important sets which have appeared in print during the past five years are in this valuable book. Sets such as the Doerle, Dimmure, the "19" Twinplex, Oscillodyne, Hendon "Stand-by," Meissner Triplex, "Globe-Trotter," 2-Tube Superhet, Minidyne, "Loop Receiver, "Doerle" 2-tube Battery, "Doerle" 3-tube Battery, "Doerle" 2-tube A.C., "Doerle" 3-tube A.C. Doerle "Signal Gripper," Duo R.F. 4-tube Receiver, The Sargent 9-33 Tapped Coil Receiver, Globe-Girdler 7, The 2-Tube "Champ"—2 Tubes Equal 3, Hum-Band "2-Tube Pee-Wee" Wyeth All-Way 6, Denton Economy 3, 2-Tube "Regenerative-Oscillodyne" will be found here, with full descriptions. In many cases, we have also included a picture hook-up for those who do not wish to follow the regular symbolic hook-up, but wish to have a regular wiring diagram.

This is a very handy volume, especially for those "fans" who wish to study the best sets in the short-wave art, from one tube up to ten tubes.

100 Illustrations, 72 Pages, Stiff, flexible covers **50c**

HOW TO BECOME AN AMATEUR RADIO OPERATOR



WE chose Lieut. Myron F. Eddy to write this book because his experience in the amateur field has made him prominent in this line. For many years he was instructor of radio telegraphy at the R.C.A. Institute. He is a member of the I.R.E. (Institute of Radio Engineers), also the Veteran Wireless Operators' Association.

If you intend to become a licensed code operator, if you wish to take up phone work eventually—this is the book you must get.

Partial List of Contents

Ways of learning the code. A system of sending and receiving with necessary drill words is supplied so that you may work with approved methods. Concise, authoritative definitions of radio terms, units and laws, brief descriptions of commonly used pieces of radio equipment. This chapter gives the working terminology of the radio operator. Graphic symbols are used to indicate the various parts of radio circuits. General radio theory particularly as it applies to the beginner. The electron theory is briefly given, then waves—their creation, propagation and reception. Fundamental laws of electric circuits. Especially those used in radio are explained next and typical basic circuits are analyzed. Descriptions of modern receivers that are being used with success by amateurs. You are told how to build and operate these sets. Amateur transmitters. Diagrams with specifications are furnished so construction is made easy. Power equipment that may be used with transmitters and receivers, rectifiers, filters, batteries, etc. Regulations that apply to amateur operators. Appendix which contains the International "Q" signals, conversion tables for reference purposes, etc.

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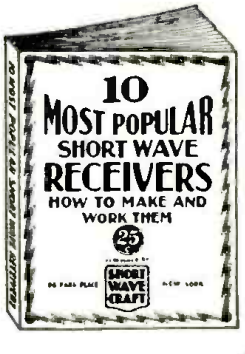
TEN MOST POPULAR SHORT-WAVE RECEIVERS

—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 worth-while specifications. Everything from the simplest one-tube set to a 5-tube T. R. F. receiver is presented. Complete lists of parts are given to make each set complete. You are shown how to operate the receiver to its maximum efficiency.

CONTENTS

The Doerle 2-Tube Receiver That Reaches the 12,500 Mile Mark, by Walter C. Doerle.

2-R.F. Pentode S-W Receiver, having two stages of Tuned Radio Frequency, by Clifford E. Denton and H. W. Secor.

My de Luxe S-W Receiver, by Edward G. Ingram.

The Binaweg 2-Tube 12,000 Mile DX Receiver, by A. Binaweg, Jr.

Build a Short-Wave Receiver in your "third-Car," by Hugo Gernsback and Clifford E. Denton.

The Dentun 2-Tube All-Wave Receiver, by Clifford E. Denton.

The Denton "Stand-By," by Clifford E. Denton.

The "Stand-By" Electrified.

A COAT-POCKET Short-Wave Receiver, by Hugo Gernsback and Clifford E. Denton.

The S-W PENTODE-4, by H. G. Cisin, M. E.

Louis Martin's Idea of A GOOD S-W RECEIVER, by Louis Martin.

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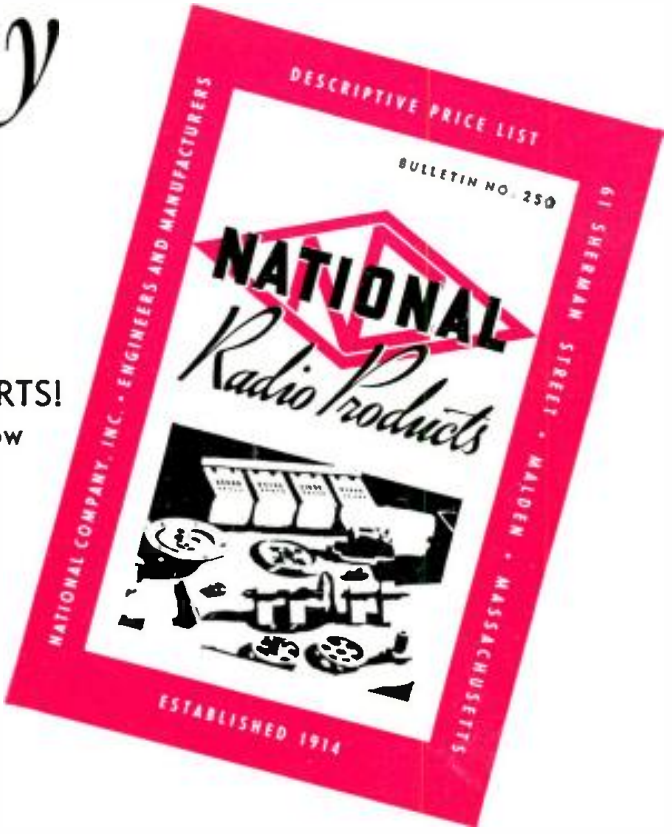

Your copy of the new National General Catalogue is ready. In its twenty pages you will find complete dope on the famous HRO High Frequency Receiver and advance information on the new receivers. You will find your old favorites such as the R-100 choke and its bigger brothers, which continue to prove that the amateur knows a good product when he sees it. You will find new favorites such as the flexible-shaft coupling which makes mechanical hookup as easy as electrical hookup. There are new condensers, such as the TMA which is bigger and better for husky transmitters, and the UM condensers which are smaller and better for H.F. circuits. And there are old products with new ranges, such as the PW-1 precision condenser which now is available in ranges up to 500 mmf. There is also the PW-O, which is the dial and worm drive of the PW condenser, arranged so that it can be used to drive a big condenser or what have you.

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FULL SCOPE HIGH FIDELITY Brilliant Concert Tone

Now, get complete range of audible frequencies from 30 to 16,000 cycles, being transmitted by four new High Fidelity Broadcasting stations—W1XBS, W9XBY, W2XR and W6XAL. Glorious new Acousti-tone is achieved . . . assuring life-like, crystal-clear "concert" realism.

V-FRONT

EVERYWHERE, radio enthusiasts are praising this amazingly beautiful, bigger, better, more powerful, super selective, 18-tube 6-tuning range radio. They say it is a tremendous improvement over Midwest's 16-tube set, so popular last season. It is sold direct to you from Midwest Laboratories at a positive saving of 30% to 50%. **(This statement has been verified by a Certified Public Accountant who conducted an impartial survey among representative Ohio, Kentucky and Indiana raido retailers.)** Before you buy any radio, write for FREE 40-page 1936 catalog. Never before so much radio for so little money. Why pay more? You are triple-protected with: One Year Guarantee, Foreign Reception Guarantee and Money-Back Guarantees!

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