THE RADIO EXPERIMENTER'S MAGAZINE

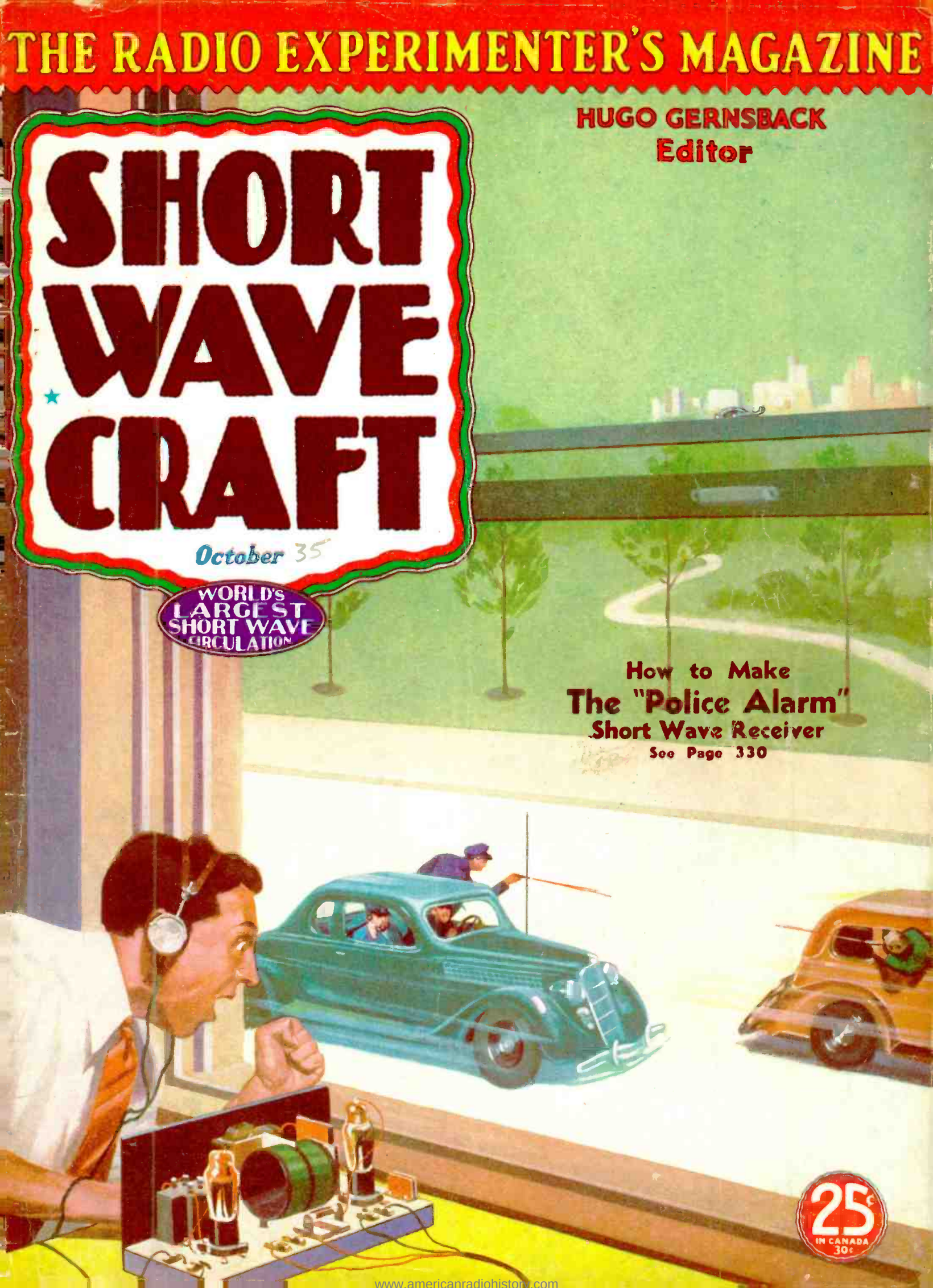
HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

October 35

WORLD'S LARGEST SHORT WAVE CIRCULATION

How to Make
The "Police Alarm"
Short Wave Receiver
See Page 330



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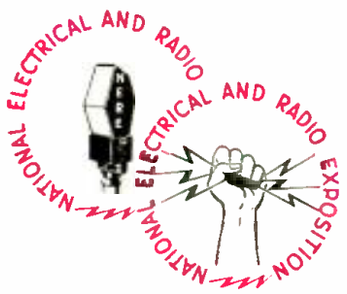

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- The Modern Miracles of Radio and Electricitv Demonstrated in Terms of "The Man in the Street"?
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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Doerle • Van Alstyne • Cisin • Shuart • Lester

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

GEORGE W. SHUART, W2AMN
Associate Editor

Contents for October, 1935

Features in the November Issue

5-Meter "Communications Receiver"—A brand new super-regenerator on which the stations "roll in"—with no hiss! By George W. Shuart, W2AMN.

Plenty of Short-Wave Receivers for the "Fan", using a small number of tubes and of economical construction cost.

A C.W. and Phone Amplifier—using a new 200 watt screen-grid pentode tube.

A 4.5 to 100 meter 3-tube S-W receiver for the "Fan", by Ernest Kahlert.

Third Lesson of the Amateur Course—Why a vacuum tube oscillates.

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

OUR COVER

Our cover painting this month portrays an exciting moment in the life of a short-wave "Fan," when he picks up an exciting police call and a few minutes later sees the police car racing by to the scene of the trouble. You will enjoy many a short-wave thrill with the "Police Alarm" Receiver, fully described by Mr. Doerle, already well known to our readers, on page 330.

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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Don'ts for Short Wave Listeners

An Editorial By HUGO GERNSBACK

● WHEN experimenters first started to dabble in short waves, and when they built their own sets in order to receive the broadcast emissions from foreign countries, they had a pretty good idea what could be expected from short waves. They knew the peculiarities and the shortcomings, as well as the advantages of short waves and acted accordingly.

Then the radio industry stepped in and started to manufacture regulation radio sets under the misnomer of *All-Wave* Radio Sets. Recently, the Federal Trade Commission stepped into the picture and stopped practically the entire radio industry not only from making extravagant claims, as far as short-wave reception was concerned, but the name *All-Wave Radio* is not to be used commercially hereafter in the United States as a designation of a radio set which receives short and long waves.

The Federal Trade Commission held that commercial sets, which tune from about 4 meters up to 600 meters, are *not* "all-wave" sets because the radio spectrum goes much lower than 4 meters and also much higher in wavelength than 600 meters. Much harm has been done where the public was misled into thinking that by merely tuning the set the same as it did for ordinary broadcast, foreign stations could be tuned in at will, at any time during the day or night. Many complaints were received on account of this, and otherwise excellent radio sets were condemned by the public, all because it had not been properly informed by the radio industry as to the vagaries of short waves.

SHORT WAVE CRAFT has preached this sermon for years, and the writer has had a number of editorials on the subject. It is to be hoped that the radio industry will now take heed to properly educate the public who buy combination short wave and broadcast sets so that John Smith, who knows nothing about radio whatsoever, will know exactly what he can expect from short waves.

Here is a short list of DON'TS which should be of interest to all those who have not had much experience in short waves, and the writer hopes that those of his readers who see this editorial will pass it on to non-technical radio listeners, who are now buying or have bought commercial combination sets which combine *short waves* with regular *broadcast* waves:

Don't tune for short waves as you would tune for broadcast waves. By moving the knob less than a hair's breadth, you may pass several stations. This is due to the exceedingly sharp tuning of the short wavelengths.

Don't tune in indiscriminately on short waves, because you are apt to get nothing. Most sets are calibrated in megacycles; therefore look up in your newspaper or short wave magazine at which point of the scale a certain station is apt to come in, then tune *very* carefully for it.

Don't tune in at the *wrong* time! Certain stations come in only at certain times of the day as well as of the season. *Don't* tune in the evening when the best time to receive a certain station would be, for instance, in the afternoon.

Don't expect to get a short-wave station very easily. It takes a fine hand to bring in the very distant ones, because the more distant the station the finer you have to tune—i.e., the further the station is away, the sharper the tuning.

Don't expect to get every station on the globe the first day you have your set. You first must become familiarized with the workings of the receiver and know exactly how to tune it. This takes time and patience. Go for the so-called *star* short wave stations first. They are usually the easiest ones to pull in.

Don't expect to get the same station—even the very powerful ones—every day. Due to conditions in the upper reaches of the earth's atmosphere, sunspot cycle, variations in the earth's magnetic field, etc., short-wave reception changes constantly. There are days when short-wave stations will come in even louder than a "local" broadcast station, filling the entire house with an uncomfortably loud volume of music. Two or three days later, it may not be possible to get the same station at all, although it may be on the air. This is not the fault of the set, and it is not the fault of the tuning; it simply means that external conditions of which I spoke above, are such that reception on such days often becomes an impossibility.

Don't expect to get certain stations instantly, even though they may come in loud. The reason for this is the phenomena called fading. During one minute the station may be so faint that you can hardly hear it, while the next minute it will pound in like a "local." Always remember, that "foreign" stations may fade—another reason why patience and slow tuning is necessary.

Don't use ordinary aerials and poor insulation, particularly during wet weather. Only the best and most carefully laid out and installed aerials, erected by experts, will bring in short waves satisfactorily. Any old aerial is good enough for the 200 to 550 meter broadcast band. Only the best is good enough for short waves.

Don't try indoor aerials, because you only will be able to receive *certain* stations, and most of the others not at all.

Don't be discouraged by extraneous noises artificially created and called "man-made" static. These noises do not prevail at all times, except in localities abounding with electric flashers, X-Ray machines and the like.

Don't become discouraged easily. Every new short-wave listener, before he has become familiarized with the vagaries and peculiarities of short waves, is apt to become disheartened the first day when trying the new set.

Don't try to get the same results from short waves as from broadcast (200 to 550 meter) waves. And always remember, that reception may be poor one day and surprisingly excellent the next.

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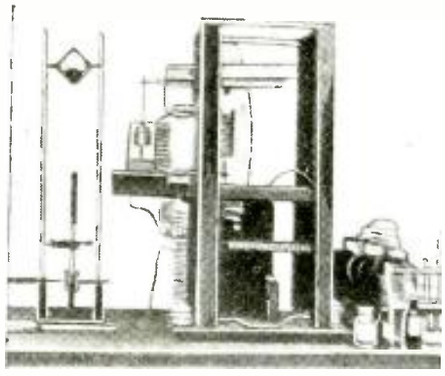
Editorial and Advertising Offices, 99-101 *Hudson Street, New York City*

Ultra Short-Wave Cheese



Apparatus used in making cheese by ultra short-waves

● TODAY radio waves are used for treasure finding, medical application, metal melting, theft prevention, and now, as the famous Austrian scientist, Dr. Korber recently reported to the spring meeting of the Biophysical Society of Vienna, radio waves can even be used to produce cheese! Dr. Korber conducted, in the past year, a great many experiments to determine the influence of high frequency impulses on germs and ferments, and found, for example, that a certain kind of germs treated by ultra short waves over a period of 15 minutes showed a tremendous growth, but he found also that these germs, when treated by ultra short waves over a period of about 45 minutes, were destroyed entirely.

While extending the field of investigation on germs and ferments to include milk, Dr. Korber found some irregularities which could not be explained in the normal way, and these he investigated also. He endeavored to find the reason for the recurring irregularities by controlling the lactic acid content of the material under test, but this did not seem to bring the solution, and last but not least, he made experiments with rennin, an enzyme which is secreted by the gastric glands of all mammals. It is an organic material which is an important factor in the digestion of milk within or without the body, and is often used in the preparation of certain desserts, and needed in great quantities for the production of cheese, because it is exceedingly potent. Commercially, rennin is commonly obtained from the stomach of the calf, and it is often made into a concentrated extract known as rennet, or into tablets known as junket.

Dr. Korber, speaking about his experiments to the owner of one of the largest Austrian dairies, obtained the cooperation of this dairy, and started to investigate the influence of ultra short waves on the rennin fermentation on

(*Continued on page 359*)

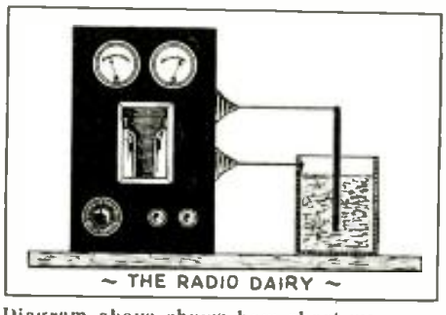
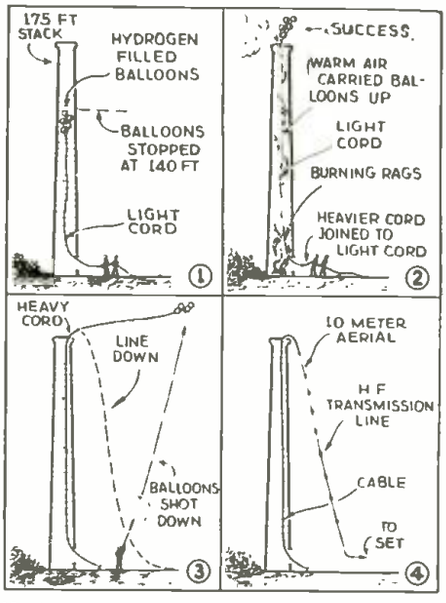


Diagram above shows how short-wave apparatus was set up for making cheese

Balloons Raise S-W Antenna



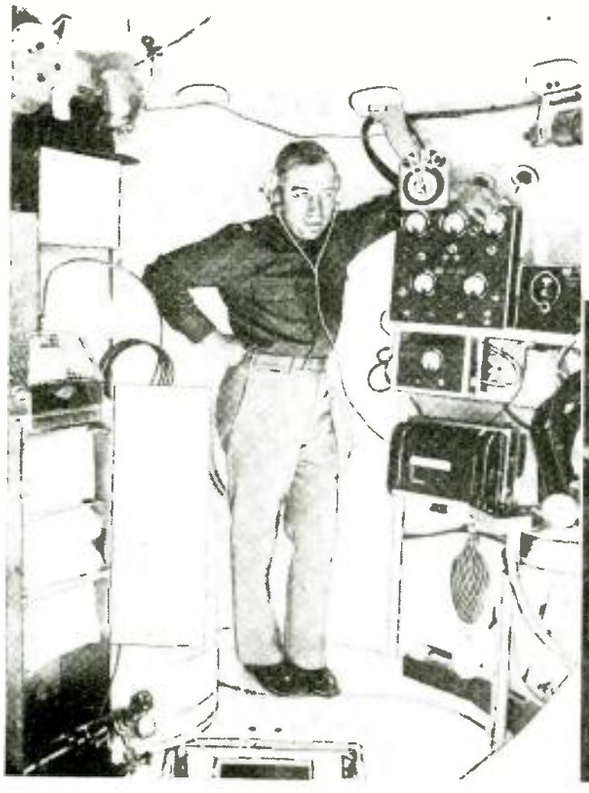
Various stages in "balloon hoisted" aerial erection

● ONE of the most interesting problems ever to confront a radio construction engineer was recently encountered in Chicago Heights, Ill., when a new "RCA Terra Wave" transmitter was to be installed for transmitting police calls on ultra short waves, 30,100 kc., with call letters W9XGD.

A 175-foot brick smoke stack was handy for the purpose of supporting the aerial but as a professional steeple

(*Continued on page 374*)

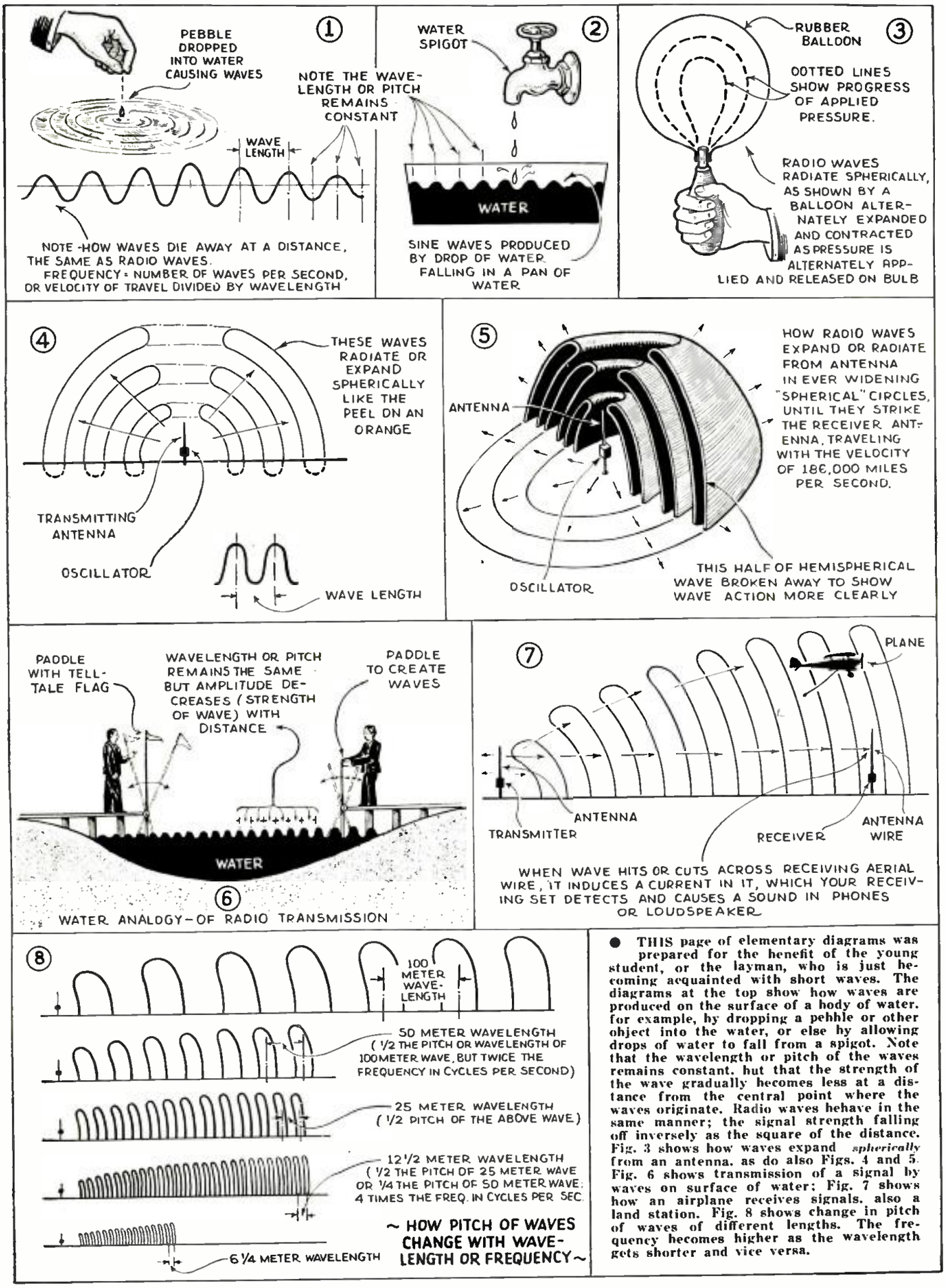
Short Waves Important In Stratosphere Flights



● THE photo at the left shows the interior of the metal gondola in which Capt. Orvill A. Anderson, pilot of the National Geographic-Army Air Corps, and Capt. Albert W. Stevens, Commander, hope to rise from the Black Hills of South Dakota to the height of thirteen or more miles above the earth. In front of Capt. Anderson are the "short-wave" radio receiver and transmitter, which will keep the flyers in communication with the earth. At the top left is the unshielded electroscope for detecting cosmic rays.

The photo below shows the "stratosphere camp" of the U. S. Army and the National Geographic Society, which has set up a most complete layout to prepare for the takeoff of the stratosphere balloon. Here is the data collection department of the completely equipped weather bureau. The two men seated are privates E. D. Lauren and H. R. Slutter. They are typing short-wave radio weather reports from various stations; note the Hammarlund "Comet-Pro" receivers. On the right is one of the two teletype machines.

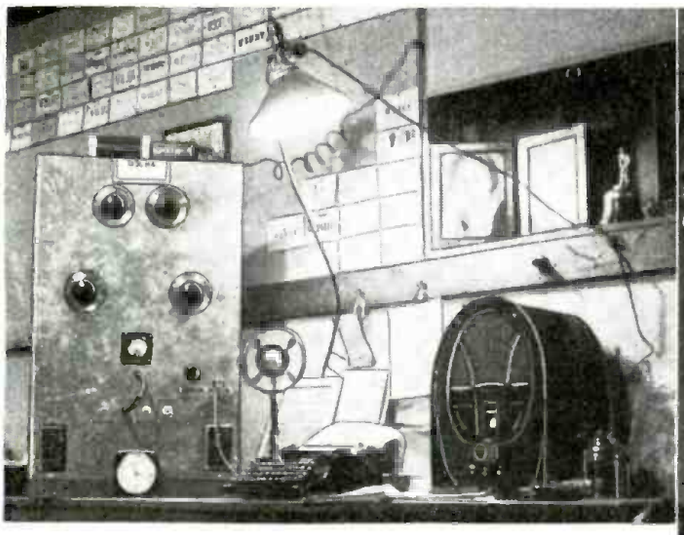
How Radio Waves Are Propagated



● THIS page of elementary diagrams was prepared for the benefit of the young student, or the layman, who is just becoming acquainted with short waves. The diagrams at the top show how waves are produced on the surface of a body of water, for example, by dropping a pebble or other object into the water, or else by allowing drops of water to fall from a spigot. Note that the wavelength or pitch of the waves remains constant, but that the strength of the wave gradually becomes less at a distance from the central point where the waves originate. Radio waves behave in the same manner; the signal strength falling off inversely as the square of the distance. Fig. 3 shows how waves expand *spherically* from an antenna, as do also Figs. 4 and 5. Fig. 6 shows transmission of a signal by waves on surface of water; Fig. 7 shows how an airplane receives signals, also a land station. Fig. 8 shows change in pitch of waves of different lengths. The frequency becomes higher as the wavelength gets shorter and vice versa.

Amateur Transmitter

Used by C.C.C. at Camp Harrison, Mich.



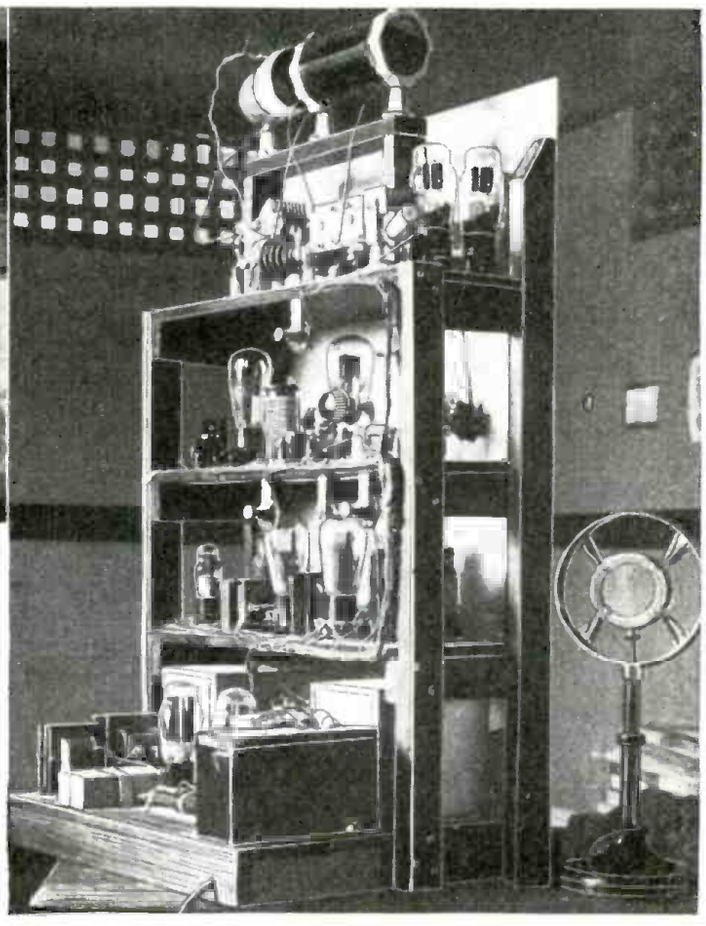


Photo above shows installation of Amateur Transmitter at C.C.C. Camp at Harrison, Mich. Right—close-up of rear of the transmitter. It employs a pair of 46's in parallel as the power amplifier. Note microphone at the extreme right. The receivers used are a Philco and a PR-10 (for communication purposes.) Separate power supplies are used for the R.F. section and the speech amplifier.

By Robert E. Kearney
1st Lt. Engr-Res, Commanding

● THE accompanying photos show the transmitter used at Camp Harrison, and it is of the rack and panel type construction, 19 inches wide, 32 inches high and 7½ inches deep, with an aluminum panel. The R.F. portion consists of a type 47 crystal oscillator, 46 buffer and a pair of 46's in parallel as the power amplifier. For speech equipment we are using a crystal microphone which plugs into a rack on the front panel, a 57 high gain amplifier is resistor coupled to a 56 which is transformer coupled to a 46-Class "A" driver, driving a pair of 46's as Class "B" modulators. The normal power input to the final amplifier stage is 40 watts.

For an antenna system, we have a 40 foot piece of pipe on top of our water tank or a grand total of 67 feet high. The other end of the antenna is supported by a similar piece of pipe 20 feet above and attached to an electric light pole or a total of 45 feet above the ground. The antenna is an end-feed Hertz cut to 243 feet for 1929 kilocycle operation. It is due North and South.

At the present time, for a receiver, we are using one of the model "89" Philcos which works out very satisfactorily on the 160 phone band, as a "Stand-by" monitoring receiver, and we use a PR-10 for communication purposes. However, we have placed an order for one of the new Patterson PR-12's and expect to have this receiver in the near future.

The transmitter was installed on January 3, 1935, and operated under a portable license until February 20, 1935, when the new station license was issued. During the first three weeks in January contacts were made and QSL cards were received from all United States districts and three of the Canadian districts.

This station at Camp Harrison maintains a monitoring schedule with W8AEQ operating portable at Camp Fife Lake, Fife Lake, Michigan, which station operates on 1900 kilocycles. Constant contact by phone has been maintained with Fife Lake all during day light hours the past spring. Inasmuch as Camp Harrison is the Southernmost camp of the Fourth Forestry District, while Camp Fife Lake is the Northernmost camp of this same district, this arrangement has worked out extremely satisfactorily to the District Commander and to the Company Commanders concerned.

The author—Lt. Robert E. Kearney.

It is hoped that a transmitter will soon be installed at Camp Higgins Lake, the district headquarters of the Fourth Forestry District, and plans are under way to install a low power transmitter at Camp Houghton Lake, which camp is only thirteen miles north of Camp Harrison, thereby linking them with the District "net."

The principal advantage of this transmitter is in the fact that it is entirely self-contained. Two separate power supplies are used, one for R.F. portion and one for the speech portion. W8GHA maintains schedules with W8HZV, located at Camp Huron-Hayes, the 1618th Co. C.C.C., at Clinton, Mich. W8AEQ maintains schedules on the Army Amateur Net, clearing all traffic. DX records in the four directions for W8GHA are W6HOE, Monrovia, California; W5DUK, Kemah, Texas; W9HNJ, Hurley, Wisconsin; and W1HSO, Stonington, Maine. Want reports from CCC camps hearing us.

SHORT WAVE SCOUTS

NINETEENTH "TROPHY CUP"

Presented to
SHORT WAVE SCOUT

ARTHUR E. VREDENBURGH
13 ABERDEEN TERRACE, STAMFORD, CONN.

For his contribution toward the advancement of the art of Radio

by

SHORT WAVE CRAFT Magazine

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

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

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

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

19TH TROPHY WINNER

27 Stations, 18 Foreigns

● THE nineteenth trophy is awarded to Mr. Vredenburgh for his excellent list of 27 stations, all of which were verified, and 18 of them were *foreign*. Mr. Vredenburgh received all of these stations on a 12-tube "Air Line" all-wave radio receiver. That's nice work, Mr. Vredenburgh, and we hope that you like your trophy.

There were only two entries this month and if some of you fellows don't get busy there won't be very much competition. The number of stations in the lists now winning trophies is not very great, since we changed the rules to include only verified stations. This makes it all the easier for the fellow who has only a few veris. Do not hesitate to send them in, as you stand a good chance of winning this beautiful trophy.

There has been some misunderstanding among a few of our contestants regarding the closing date for each contest. For instance, the closing date for this Trophy was Aug. 1. A few of our readers have thought that the closing date for an issue, for instance August issue, which appears on the newsstands July 1, was July 1. It is impossible to close a magazine and put it on the newsstand all in the same day, and we trust that our contestants will realize that the closing date for a contest is the first of the month prior to the date that the issue appears on the newsstands. The entries sent in up until Aug. 1 were judged for this (Oct.) issue, which was scheduled to go to press Aug. 16, and appear on the newsstands Sept. 1.

FOREIGN STATIONS

COC—5/5—49.9—P.O. Box 98, Havana, Cuba.
COH—5/7—31.8—Calle B No. 2 Vedado Havana, Cuba.
CJRX—5 13—25.6—Winnipeg, Manitoba, Canada.
VE9GW — 4/30 — 49.26—Bowmanville Ontario, Canada.
HIZ—5 19—47.5—Santo Domingo, Dominican Republic.
HC2RL—5 19—45.00—"Quinta Piedad," P.O. Box 759, Guayaquil, Ecuador.
HJ4ABA—5 5—25.6—"Ecos de la Montaña," Medellin, Colombia, S.A.
HJ3ABII—5/13—50.25—"La Vos de la Victor," Bogota, Colombia, S.A.
HJ1ABE—5/24—49.05—La Vos de "Los laboratorios Fuentes," Box 31, Cartagena, Colombia, S.A.
PRADO—5 2—45.31—"El Prado," P.O. Box 98, Riobamba, Ecuador.
RNE—5/5—25.00—Radio Centre, Solyanka, 12, Moscow, U.S.S.R.
2RO—5/3—31.13—"Prato Smeraldo," Rome, Italy.
YV3RC—5/14—48.78 — "Radiodifusora Venezuela," Caracas, Venezuela, S.A.
YV6RV—5 6—46.01—"La Vos de Carabobo," Valencia, Venezuela, S.A.
YV5RMO—5/26—51.28—"Ecos del Caribe," Box 214, Maracaibo, Venezuela, S.A.
EAQ — 5/14 — 30.43 — "Radiodifusion Ibero-Americana," P.O. Box 951, Madrid, Spain.
PRF5—5/19—31.58—"Comp. Radio Internacional do Brasil," P.O. Box 709, Rio de Janeiro, Brazil.
PHI—5/10—16.88—N. V. Philips Radio, Huizen, Holland.

UNITED STATES STATIONS

W1XK—5/10—31.33—Boston, Mass. Relays WBZ and WBZA.
W2XE—5/9—49.02—New York City, N.Y. Relays WABC.
W2XAF — 5/6 — 31.48 — Schenectady, N.Y. Relays WGY.
W8XAL—5/8—49.5—"The Nation's Station," Cincinnati, Ohio. Relays WLW and WSAI.
W9XAA—5/10—49.34—"The Voice of Labor and Farmer." Relays WCFL. Chicago, Ill.
W9XF — 5 20 — 49.18 — Chicago, Ill. (Downers Grove.)
W1OXFN — 5/29 — 47.2 — Ground station for the 1935 stratosphere flight. Tested irregularly; also had schedule with W3XAL at 10 a.m. mornings. Rapid City, S. Dak. (Base of operation.)
W8XK—5/5—25.26—The pioneer relay broadcasting station.
W8XK—5/7—19.71—The pioneer relay broadcasting station.

(First figures following "call letters" represent month and day of month; second set figures is wavelength in meters.)

Honorable Mention Awards

George Wentz, Brookford, N.C.
23 stations, 19 foreign

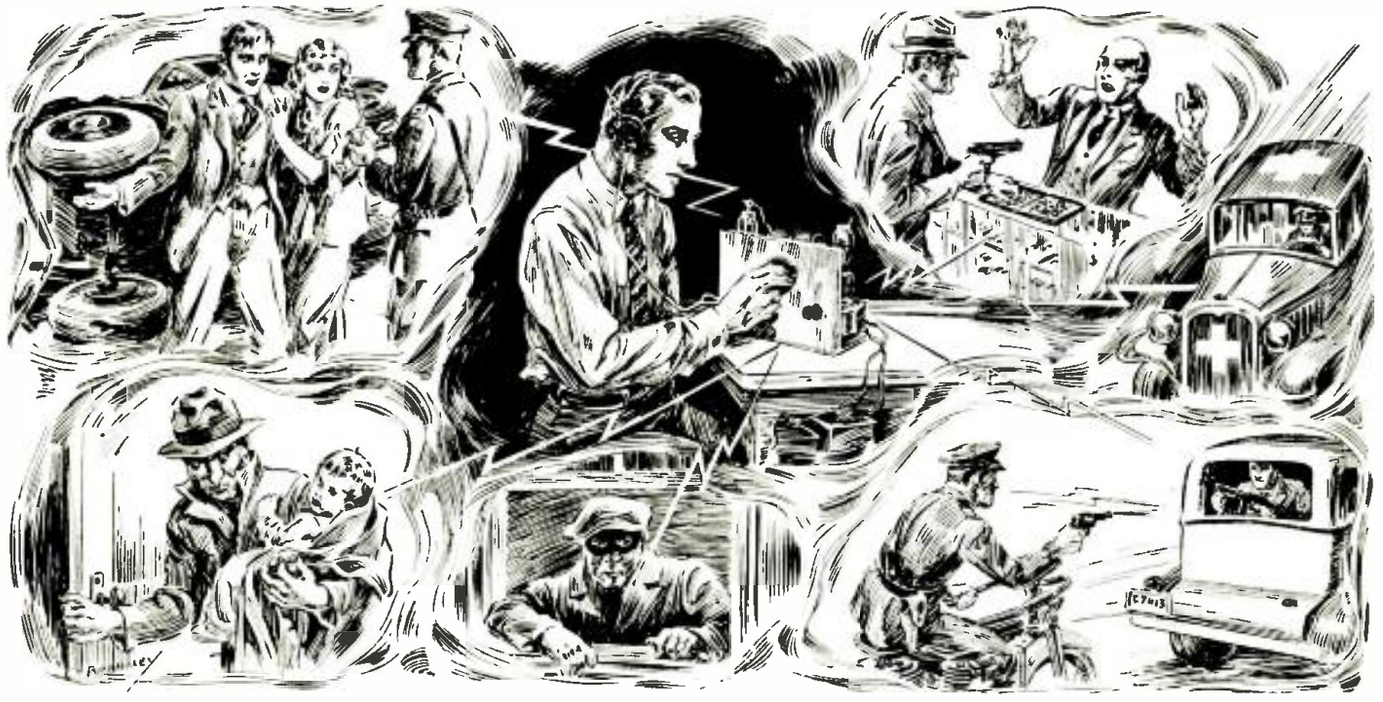
Trophy Contest Entry Rules

● 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; the 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" station.. This contest will close every month on the first day of the month, by which time all entries must

(*Continued on page* 383)



The above picture provides some idea of the thrilling situations frequently covered in short-wave police calls on the 120 and 180 meter bands.

The "Police Alarm"

Short-Wave Receiver

Covers 100-200 Meter Bands: Works on 110 Volts A.C. Power-Pack

By Walter C. Doerle
Originator of the famous "Doerle" circuit.

Mr. Doerle has here provided a veritable "Pandora's Box" of wonders in the form of an inexpensive 2-tube short-wave receiver designed to cover the police bands only. If you have never heard police calls on short-waves, you have missed the thrill of your life!

WHEN you were a little shaver of a kid, a policeman was a very inspiring person to you and if some day you too could become a "cop," life to you would be Paradise. And why not? Because he was a big fellow, he had a spick and span uniform, he had an expression of straightforwardness and bravery, he had much authority placed on his shoulders (for the "star" is that symbol), he carried a gun and knew how to use it, he had a swinging "billy" while patrolling his *beat* and a host of other deportments. But wait, we are getting ahead of the story. You are grown-up now and your chances of "making" a police officer are much greater than in years past. Then it was trial and error—now it is more scientific and more super so by means of *short waves.*

Short Waves Offer You Training

But what are you doing with your time now or what training are you pursuing? Why not take advantage of the many free "courses" offered to you through the use of a short-wave set as herein described and become a *public officer* in the Police Corp? But you say, what are these courses? Well, in stenographic language, our recent kidnap cases are enough to baffle the brains of many brilliant police forces —this is the "college course" and it tops the list of courses as requiring the best minds for permanent solution. As a second course, murderings rank next, petty burglaries are third, and auto accidents are at the bottom. So you see unless full advantage is taken of radio in the short-wave field, it is hard to be convinced that scientists have made a worth-while contribution to our civilization.

And these courses are not formal, because with each "announcement" of a police case in the short-wave ether, you get plenty of variety—may we add, real people, real places, real clues, real solutions—which set precedents and real honors to those who will but make use of short-wave reception. For in the end, short waves are for the public's benefit and benefit derives only after wide and consistent usage.

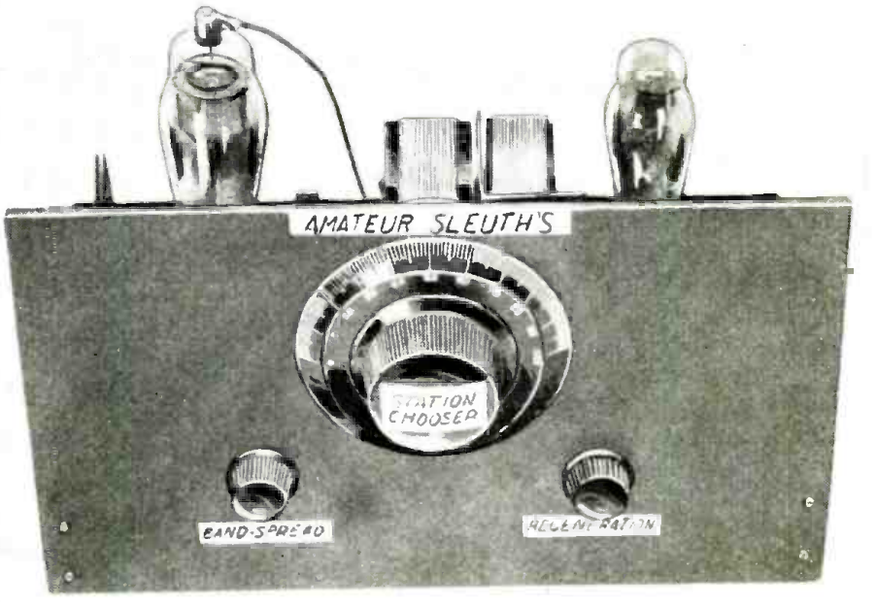
Thus when you listen-in on short-wave police calls, the training is better because of more concentration. As the announcement of a "burglar on an apartment house roof" is very concise, you have more time to think, "what would I do if I were the policeman responding to this call in a short-wave radio-equipped auto?" It is the space of time lapsing between headquarters and you, that gives you the "edge" on this short-wave training. In other words, time for thinking out solutions to the various police broadcasts, makes for the winning of the battle against crime and makes for a more brilliant and intelligent outcome of the case.

Major Constructional Details

As this two-tube A.C. set was constructed to eliminate the many difficult features experienced by those desirous of short-wave reception, the outcome of extra effort in this direction, resulted in a very simple receiver as represented in the accompanying photographs. Furthermore simplicity makes for very low expenditure of money for the components, for you see that some important parts were made by hand.

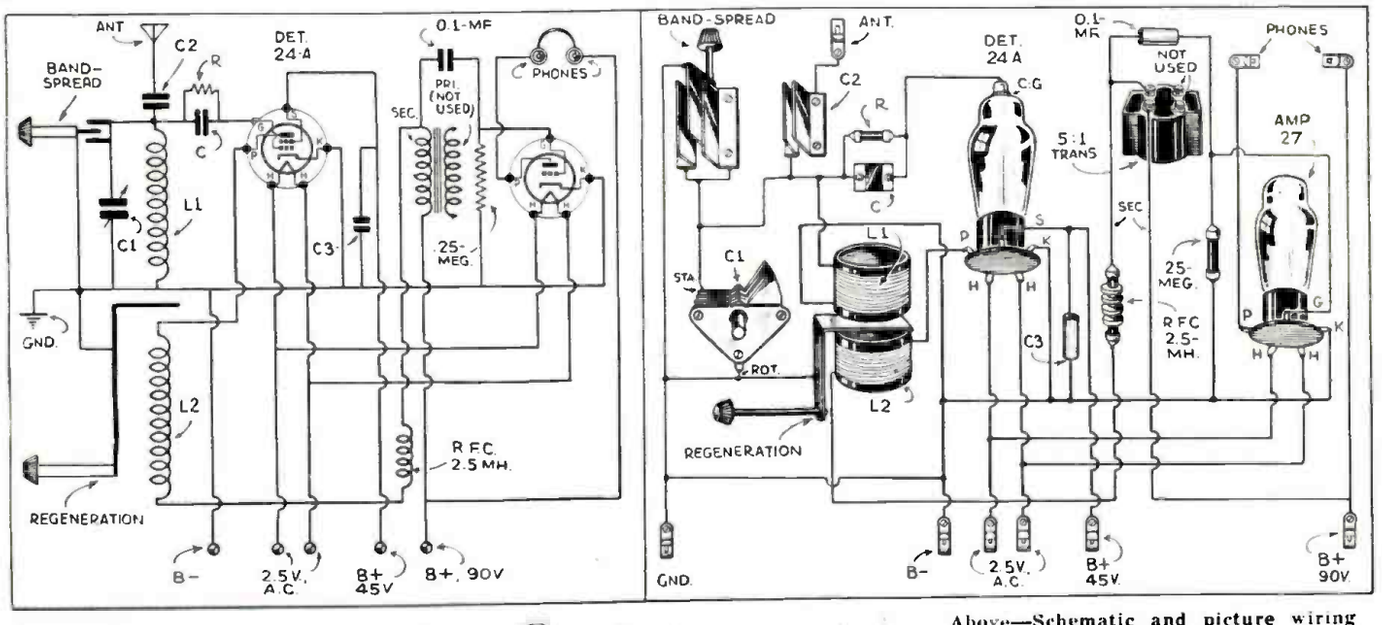
The front view of the set shows a 7"x12" panel fastened to the subpanel cleats by means of four ¾" wood screws. Then mounted on or through this panel are the various controls. The "Station Chooser" condenser C1 of

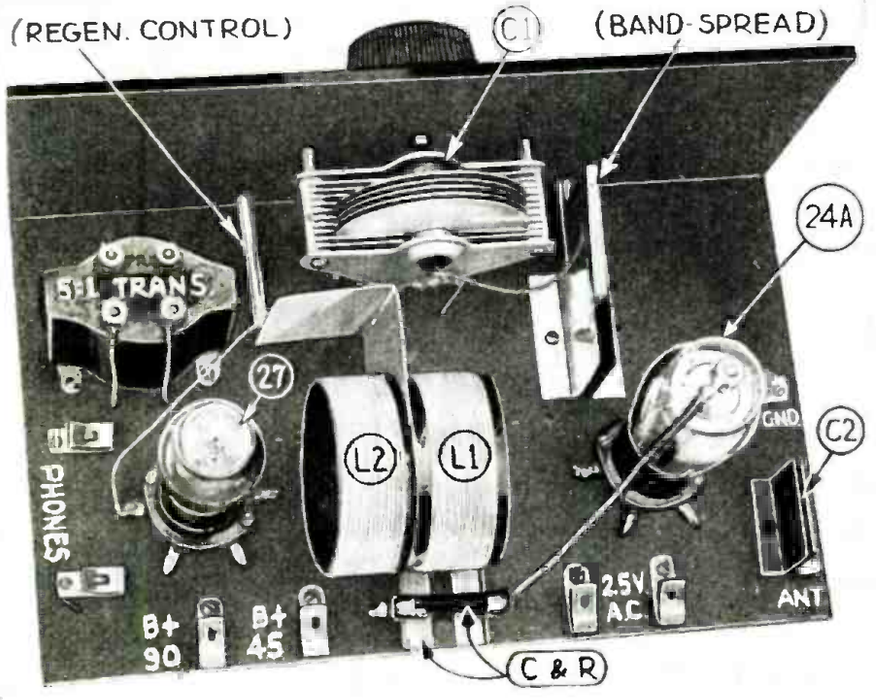
The photo at right shows a front view of the "Police Call" short-wave receiver, designed especially for tuning in the police calls on the 120 and 180 meter police bands. It operates on 110 volts A.C.



.00025 mf. (250 mmf.) is quite near the top but in the center of the longest dimension. On the left of C1 is the "bandspread" condenser control, necessitated by the fact that police-calls transmissions are greatly crowded together (see Police Radio Alarm Stations list on another page of this magazine). On the right of C1 is the "regeneration" shield control. This was made so that the price of a feed-back condenser was eliminated. It gives very smooth feed-back action over the whole tuning range of approximately 100-200 meters. But more will be said later on regarding the fabrication of the *bandspread* and *regeneration* arrangements.

As to the subpanel (see photo), the parts manufactured and homemade





Above—Schematic and picture wiring diagrams for the police call short-wave receiver. The plate current may be supplied by "B" batteries or a "B" eliminator. Left—Rear view of the "Police Call" set.

were bolted to it by means of 6/32 round-head machine screws. This subpanel of 7"x12" tempered pressed wood was mounted on two ¾"x2"x7" wood cleats placed at the ends and held by six ¾" wood screws, four serving to also hold the "Ant.," "Gnd." and "Phone" Fahnestock clips in place. These 2"-deep wood cleats allowed sufficient depth for hooking up the parts, the placement of a radio frequency choke (R.F.C.) and screen-grid by-pass condenser C3 of .5mf. under the subpanel.

From photo No. 2 you learn the following facts which go hand-in-hand with the simplified circuit of this police-calls receiver. On the right-hand side of the subpanel are fastened the two plates of the antenna coupling condenser C2 with the lead-in clip, and toward the front panel is the other clip, which represents the "B—" and

(*Continued on page* 371)

Improved

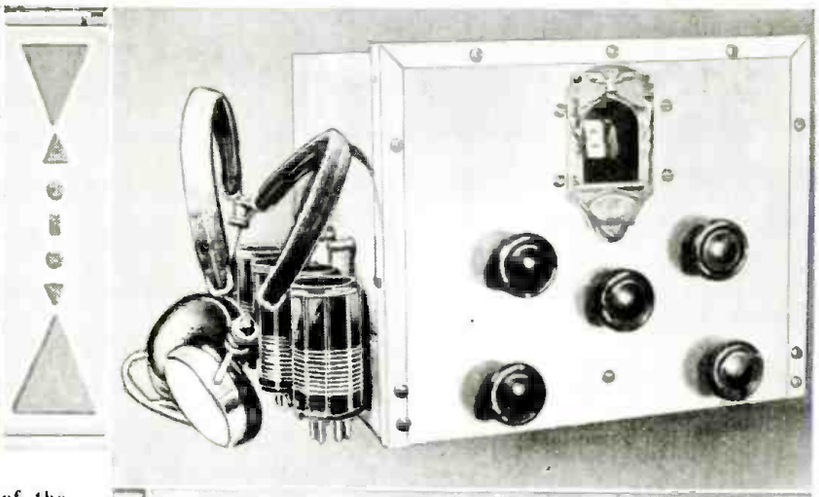
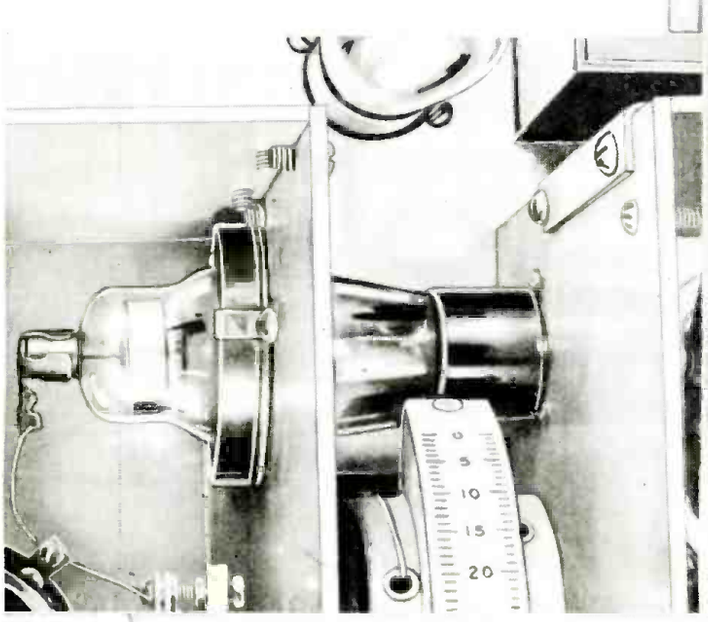


Fig. 7. No shielding is necessary for the portion of the R.F. tube between the cabinet compartments. Right: Panel view of receiver; while 5 knobs appear the instrument has single dial control. Fig. 1.



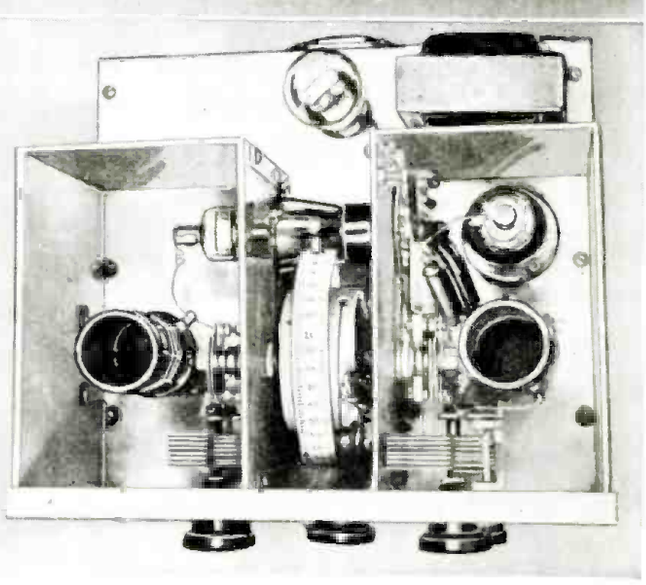


Fig. 3 Left: How the short grid lead is obtained by mounting the type 58 R.F. tube horizontally. A cut-off tube shield caps over the portion which protrudes into the left compartment. Fig. 2. Above: Top view with the tube shields removed.

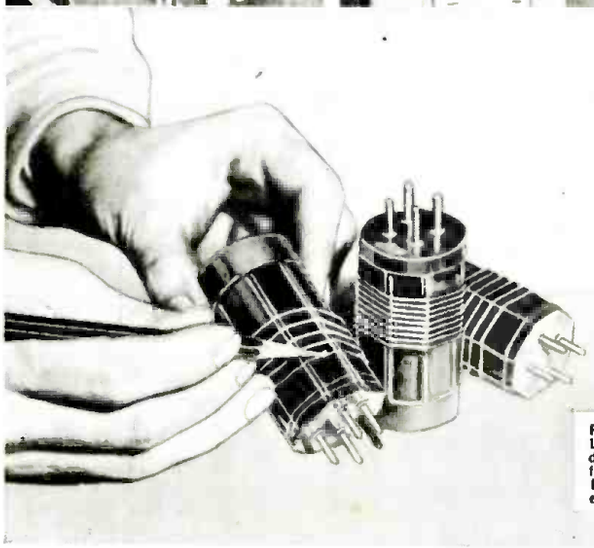
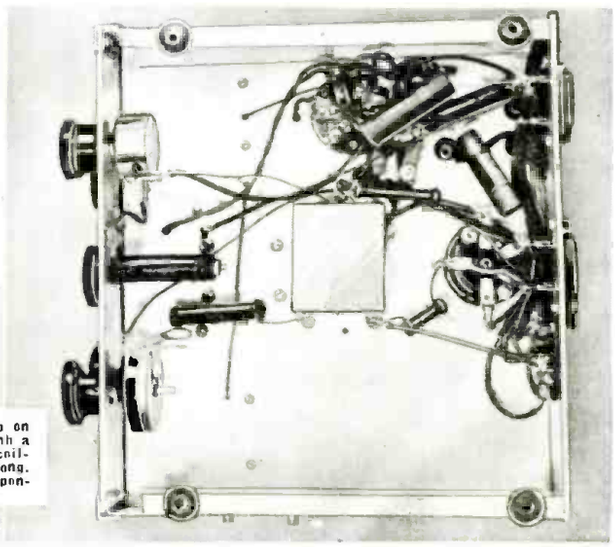


Fig. 6. Left: The tap on L4 is connected through a drill-hole in the coil-form to the fifth prong. Fig. 5. Right: Components under subpanel.



3-Tube Autodyne Set

This Month's $20.00 Prize Winner

By T. C. Van Alstyne, (VE3LN)

A dandy short-wave receiving set for the fan as well as the ham. Coil data are given for both the short-wave broadcast and the ham bands. The tubes operate on 2.5 volts A.C., the plate supply being either from batteries or a "B" eliminator. Strong signals will operate a loudspeaker. With headphones all the "foreigns" can be heard.

● TUBE for tube, dollar for dollar, many believe it is difficult to outperform two 58's and a type 56 tube as a three-tube receiver. Stability, sensitivity and reliability characterize the circuit of the instrument described and illustrated, while the compact cabinet design facilitates easy mechanical construction. An additional feature is the short grid-lead obtained by mounting the R.F. tube horizontally, a practice tube manufacturers agree is quite permissible.

This receiver will be found excellent for either the short-wave *listener* or the licensed *amateur* (ham) and is readily converted from one to the other, after it has been constructed. Coil and condenser data for both types of service is included in the table.

As will be seen from the photographs the portion of the instrument above the sub-panel consists essentially of two compartments with the tuning drum in between. The left compartment contains the R.F. stage, the right section the detector stage. While the R.F. socket is in the detector compartment; the tube itself passes through circular holes in the shields between the compartments and protrudes into the R.F. (radio frequency) section. A cut-off tube shield is fitted over the portion terminating in the R.F. section; no other shielding is necessary for this tube. The detector tube is covered with a tube shield in the conventional manner. The type 56 tube and choke comprising the audio amplifier appear on the rear ledge formed by the sub-panel. A study of figures 2 and 3 will make the general layout clear.

Aluminum may be used for the cabinet construction if desired, but sheet steel will serve equally well, is much easier to work and less expensive. While the exact dimensions may be varied to suit the material at hand and the builder's fancy, he will be well advised to adhere to the three (including the subpanel section) compartment scheme illustrated.

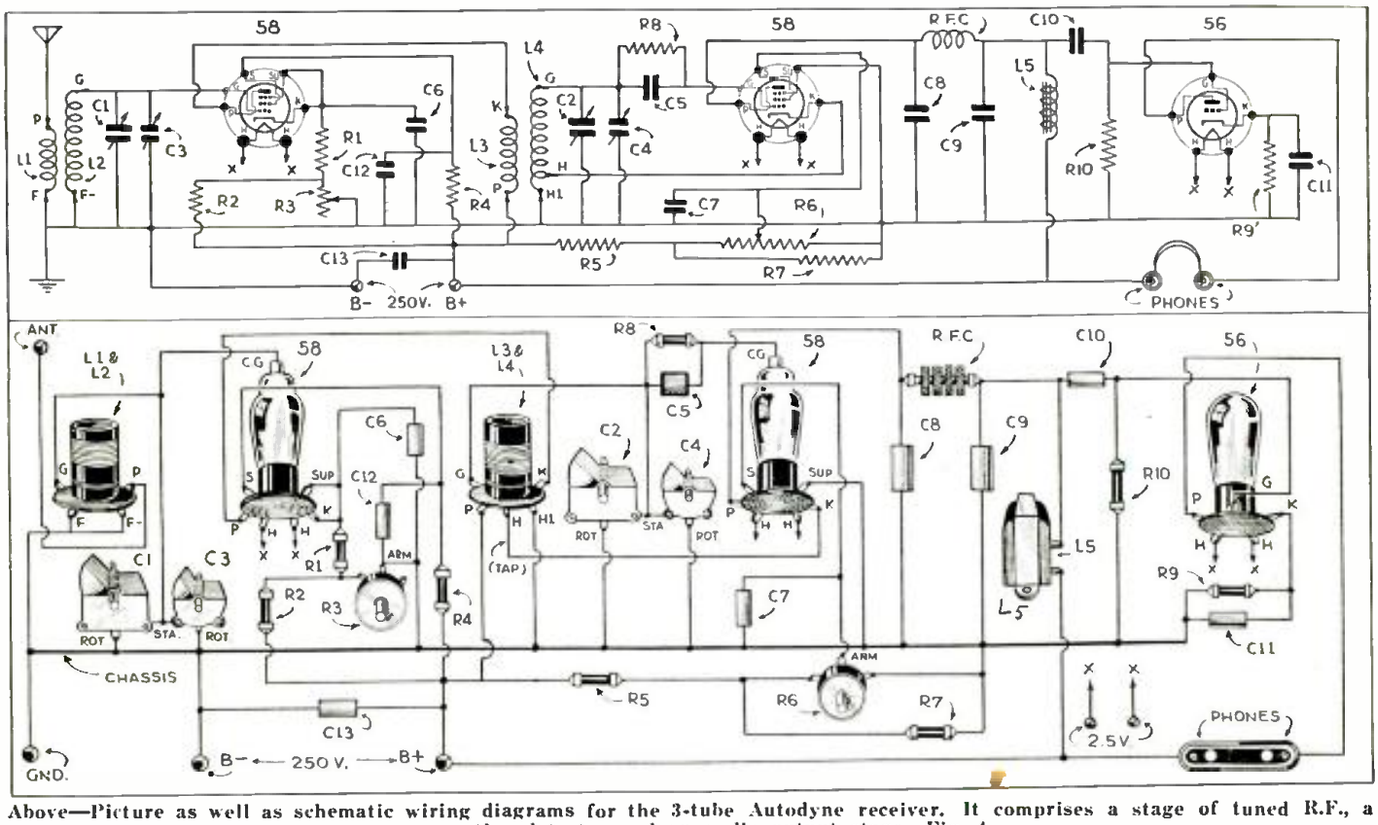
Tuning Condensers

The tuning condensers C1 and C2 in the circuit diagram are ganged to the tuning drum; use flexible couplings to insure smooth control. The resonating condensers C3 and C4 are mounted on the front panel above the subpanel the volume control and regeneration control beneath the subpanel. Figure 1 illustrates the symmetrical layout for these parts by the positions of the knobs: Top, from left to right, resonator C3, tuning control, resonator C4; bottom, volume control R3 and regeneration control R6. Although the five knobs appear on the front panel the receiver is, of course, single controlled insofar as tuning is concerned.

Coil Data

Two 1½" diameter coil forms, a 4-prong and a 5-prong, are necessary for each band. The windings L1 and L2 comprising the antenna coil are wound on the same (4-prong) form. Similarly, the windings L3 and L4 are wound on the same (5-prong) form to constitute the detector coil, the fifth prong being used for the tapped connection on L4. All primaries, L1 and L3, are close-wound with No. 36 D.C.C.wire. The grid coils, L2 and L4, for the two largest coils are close-wound with No. 28 D.C.C. and the two smallest with No. 18 enameled wire, spaced to occupy 1¼". A space of about ¾" should be left between the two windings and, needless

(*Continued on page* 360)



Above—Picture as well as schematic wiring diagrams for the 3-tube Autodyne receiver. It comprises a stage of tuned R.F., a regenerative detector and an audio output stage. Fig. 4.

A 2-Tube

By H. G. Cisin, M.E.

Front view of the 2-tube receiver here described, which will bring in those fine S-W musical programs from Europe and other countries on headphones.

● AFTER many years of designing sets and circuits for radio fans, the writer has come to the conclusion that this urge to build radio sets is an insidious disease which gets into the blood and which is practically incurable. For a while it looked as if the current scarcity of ready cash would effect a temporary cure, but this has not been the case. Instead, there has been a change in the demands of the set-builders who insist on carrying on their experiments, but now look for means and methods of accomplishing their aims without spending much money.

In order to take care of these new demands of the experimenters, the writer has designed a new system of set construction which he calls "Standardized Radio." It has been originated especially to meet the requirements of novices, although it will also be extended later on to take care of the "old-timers." If followed out faithfully, it will provide a real education in set construction and design for the short-wave beginner and it has this great advantage: the cost of getting started is very low and, thereafter, the cost of making the new sets is so small as to be practically negligible.

The idea is to start with a metal chassis having four socket holes such as shown in the illustration. One of the

A Dandy Set for Those Just Starting in the Short-Wave Receiving Game. This Set Is for Headphone Reception and Operates from 110 Volt A.C. or D.C.

holes will be used for the plug-in short-wave coil and one for the rectifier. The initial experiment will cover the construction of a two-tube A.C.-D.C. all-wave set, making use of a very efficient circuit developed by the writer. The 37 tube has been selected as a rectifier. The tube which does the work is a 6C6 pentode tube. This is connected in the circuit as a regenerative detector. The set is very easy to put together and to wire and when completed it will be capable of bringing in foreign stations on the short-wave coils and regular broadcast stations on the broadcast coil. In the form shown, it is designed particularly for earphone operation.

In building a set of this kind, the writer recommends the use of good standard parts. Improved results will justify the slight extra expenditure. A glance at the diagram shows that *band-spread* has been added to the circuit. This is a desirable refinement demanded by most short-wave enthusiasts.

The use of *regeneration*, while sneered at by some "big shot" engineers, gives the 1-tube set potentialities as great as a 10-tube set. Some of the fans may be mystified as to the reason why certain engineers look down on the regenerative circuit and will only talk about or recommend a superheterodyne. Perhaps this mystery can be cleared up when we consider the fact that the patents on the regenerative circuit have expired, whereas the superheterodyne still has about two years to run.

1-Tube Set Can Get Distant Stations

The old theory that the addition of more tubes adds to the distance-getting possibilities of a set has been thoroughly exploded. Under suitable conditions a single tube, if properly used, can bring in just as great distance as ten or twenty tubes and very often with less accompanying noises. Naturally there must be reasons for the use of multi-tube sets, but enormous distance reception is not one of them. By increasing the number of tubes, it is possible to obtain increased amplification, high-fidelity loudspeaker reception, preselection, automatic volume control and various other refinements desired by those who are able to pay for them.

Getting back to our Standardized Radio, this first experimental receiver, equipped with the 37 rectifier and the 6C6 regenerative detector, will serve as a foundation for future experiments. In a later article, we will show how to replace the 6C6 tube with the dual purpose 6F7 tube, thus adding an additional audio stage. In order to do this, no extra expense is involved, aside from the cost of the new tube and a few small fixed resistors and condensers. Thereafter, a 12A7 tube may be substituted for the 37. The 12A7 is also a dual purpose tube. Then a low-priced amplifier may be added so that the little set will operate a dynamic speaker. All in all, the writer has worked out about thirty different designs which proceed methodically, step by step, utilizing various types of tubes, adding refinement here and there and giving the constructor worth-while instruction in the rudiments of radio engineering, design, and construction. It is planned to describe some of these circuits in future issues of *Short Wave Craft*.

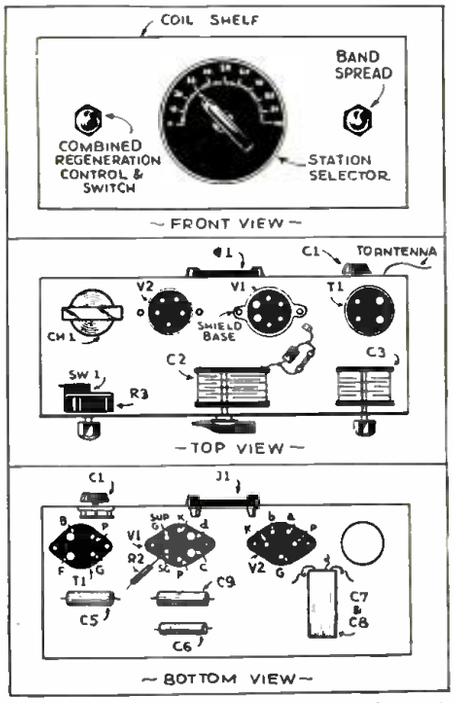
Rear view of the 2-tube receiver for headphone reception.

Beginner's Receiver

Standardized Radio for the S-W Constructor

Hook-Up Is Simple

The set illustrated can be assembled and wired by the novice in several hours. Before starting to assemble the set, let us glance through the schematic diagram in order to obtain a clearer conception of the circuit used and the theory involved. Starting with the 37 rectifier tube, it will be noted that the grid and the plate are connected together so as to form an anode, with the cathode acting as the positive terminal of the rectifier. When this cathode becomes heated due to its proximity to the filament, the action is such that current can pass only in one direction, viz: from the anode to the cathode. Thus, when the set is used on alternating current, half of the cycle cannot pass but the other half passes without opposition from the grid-plate to the cathode. In other words, the alternating current is converted into a pulsating or interrupted direct current. This pulsating current would be useless for feeding the plate of the regenerative detector unless it were properly filtered (smoothed out). Filtering is accomplished by means of the 300-ohm choke, by-passed at either end by 8 mf. electrolytic condensers. As a result, the pulsating current is smoothed out to such an extent that hum is barely noticeable in a sensitive earphone. The filter choke, of course, is connected in series with the rectifier cathode.



Diagrams above show front view of panel, also top and bottom views of subpanel.

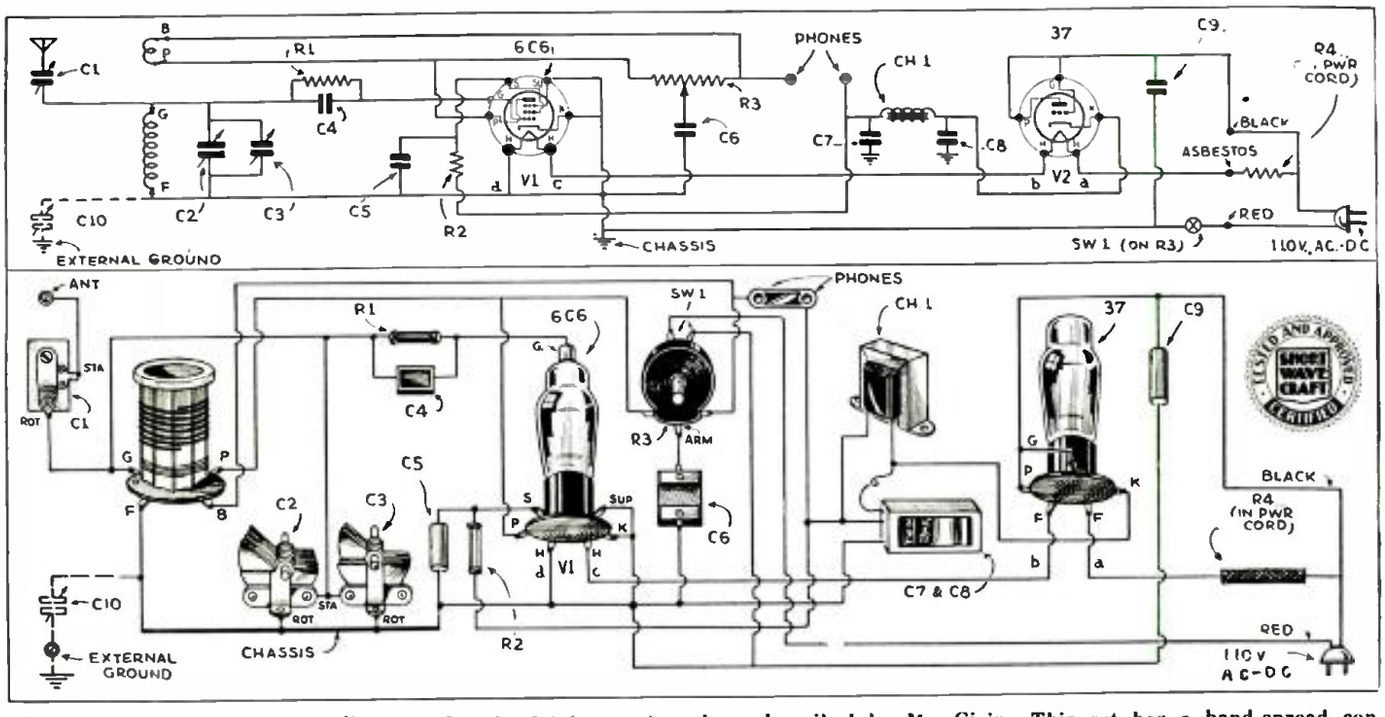
6C6 Acts As Regenerative Detector

We now come to the 6C6 regenerative detector. This 6C6 tube is a pentode consisting of a control grid which connects to the top of the tube, a screen grid, a plate, a suppressor grid, a cathode, and a filament or heater. As in the case of the rectifier, the sole pur-

(Continued on page 361)

LIST OF PARTS

C1—Antenna Trimmer, Hammarlund MICS-70 (10 to 70) mmf.
C2—Station Selector Variable Condenser, Hammarlund MC-140-S (140 mmf.).
C3—Bandspread Condenser, Hammarlund MC-50-S (50 mmf. Max).
C4—.0001mf. Mica Condenser.
C5—.1 mf. Cartridge Condenser.
C6—.002 mf. Mica Condenser, Dubilier.
C7—} Dual Electrolytic Condenser.
C8—} Cardboard Container, 8 mf. Each Section. Aerovox.
C9—1 mf. Cartridge Condenser.
C10—(optional) .1 mf. Cartridge Condenser.
R1—1 Meg. ohm, ½-watt Resistor, I.R.C.
R2—25,000-ohm ¼-watt Resistor, I.R.C.
R3—75,000-ohm. Electrad Potentiometer with switch SW1.
R4—350-ohm, 50-watt Resistor Line Cord.
T1—Hammarlund 4-Prong plug-in coils—5 coils covering band from 17 to 560 meters.
CH1—20-henry, 300-ohm Filter Choke.
J1—Twin Earphone jack.
Shield. Hammarlund TS-50 for tube V1.
V1—6C6 Type Tube.
V2—37 Type Tube.
Screen Grid Clip.
Chassis, 9¼"4½"x6" high.
1—Calibrated Dial.
1—Dial Pointer.
2—Small Black Knobs.

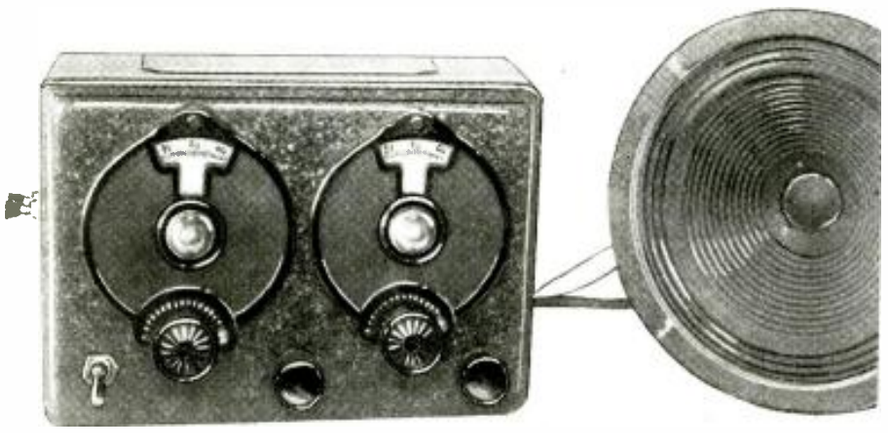


Schematic and picture-wiring diagrams for the 2-tube receiver here described by Mr. Cisin. This set has a band-spread condenser and operates from 110 volts A.C. or D.C.

5 Meter T.R.F. Receiver

By George W. Shuart, W2AMN

It looks as though there may be plenty of "DX" on the 5-meter band in view of the 700 and 800 mile distance bridged already. This proves that it is quite worthwhile to improve our transmitting and receiving equipment. This tuned R.F. receiver, using the new Acorn tubes, is extremely sensitive to weak signals and provides a minimum amount of background noise. A screen-grid pentode (954) is used as the T.R.F. amplifier, a 955 triode is used as the "self-quenching" detector, and either a 41 or 42 pentode as the audio amplifier.



The T.R.F. 5-meter receiver ready for operation. Signals from Dayton, Ohio, were heard on this set by W2AMN.

● THE recent sensational "DX" (distance reception) which has occurred on the five meter amateur band has caused a considerable increase in the activity on that band and will lead to greater accomplishments during the remainder of this year without a doubt. We refer to the reception and transmission of signals between New York City and adjacent points, and the middle western states. This "DX" which has recently been accomplished has done more than anything else to make the "boys" perk up a bit and realize that there is need for improvement in the apparatus used by the Hams and that it is certainly worth while, now that we find our signals are liable to be heard in areas located outside of the usual "25 to 50 mile" range of the five meter "sigs."

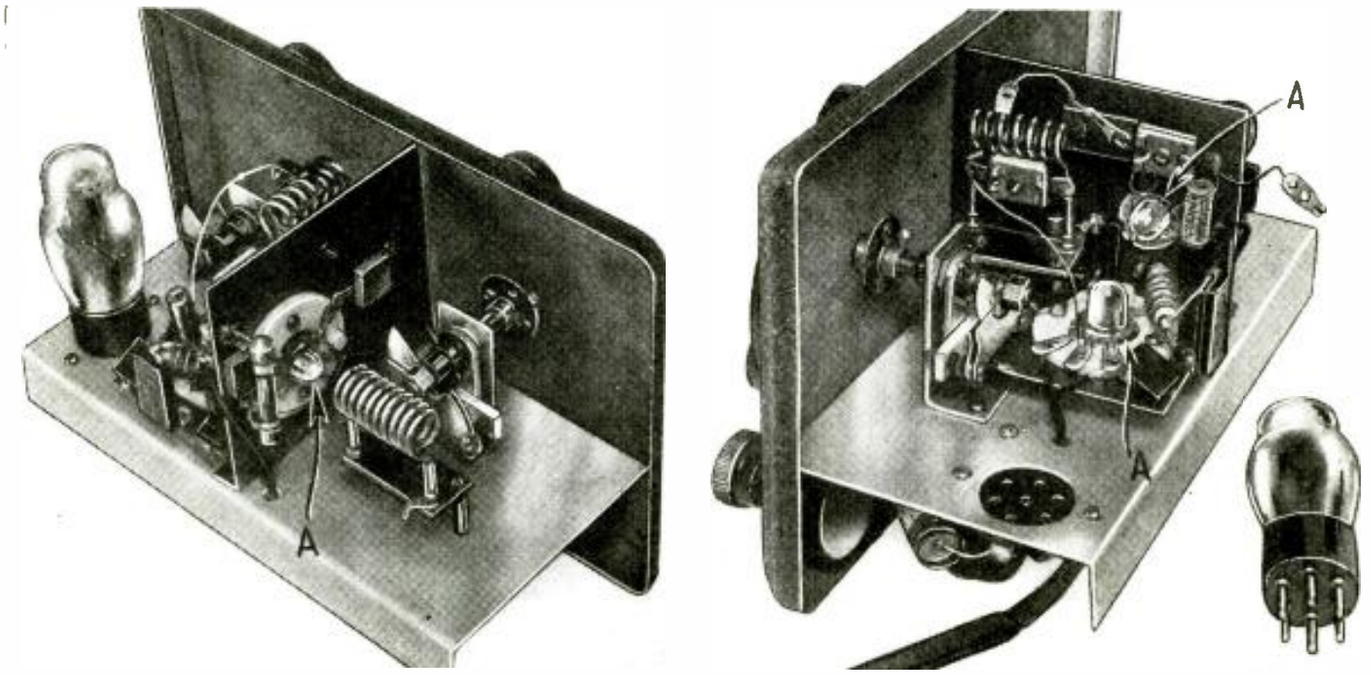
For transmission we can still think of nothing better than the "good ole" "long-lines" oscillator which was described in *Short Wave Craft* way back in October 1934. However the receivers are at present not the most desirable and it is in them that the greatest improvement can be made. With all due respect to the now very popular "resistance superhet" as it is commonly called by most Hams, we believe that unless you live in a very "quiet" location the super-regenerative receiver is still the best bet.

With the new "Acorn" tubes recently developed for use on the ultra high frequencies, there is no reason why we have to stick to the old style receiver; especially when we have made some excellent progress in the design of receivers operated on the lower frequencies.

3 Tubes Used in T.R.F. Hook-up

The receiver here described and shown in the photographs is the outcome of extensive experimenting, and to say the least, it has more than repaid us for our efforts with its excellent performance. Three tubes are used and the lineup is—a stage of tuned R.F. in which there is a decided signal gain, a more or less unconventional super-regenerative detector and a single stage of audio amplification.

(*Continued on page* 357)

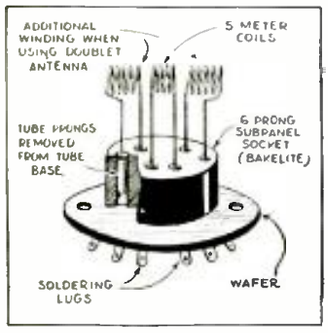


Left—This view shows the R.F. stage and just how the parts are laid out. Right—A view of the detector stage with the plate clip of the 954 removed. Note that the padding condenser is mounted directly on the plug-in coil. A—Acorn tubes.

\$5.00 PRIZE WINNER

$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.

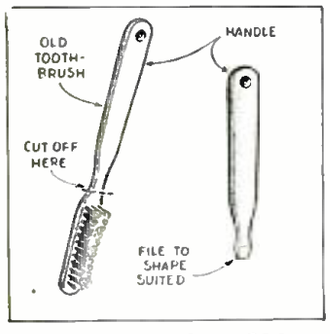


ULTRA S-W PLUG-IN COILS

This sketch as drawn shows how I have put to good use the prongs removed from tube bases. The advantage of being able to remove the coils (5 meter) for any necessary change or adjustment can be seen at once.

The 6-A socket was chosen because the double contact within the socket held the coils firmly in place and practically eliminated the possibility of poor joints and noise. One suggestion—solder the connections well, using rosin core solder. "Tin" the ends of each coil end before inserting it into the prong. Do a THOROUGH job the FIRST time! You won't have to do it over again and the results will be well worth the additional effort.—Harold J. Clark.

▼ ▼ ▼



NEW USE FOR OLD TOOTHBRUSH

Many short-wave "Fans" have found occasion to employ a screw-driver made of some insulating material for adjusting trimmer condensers in antenna circuits or I.F. transformers. By removing the brush portion of a discarded tooth brush and filing a flat edge on the handle, an excellent non-magnetic screwdriver can be made. I trust this kink will be of value to the readers of SHORT WAVE CRAFT magazine.—Charles Pfleuger.

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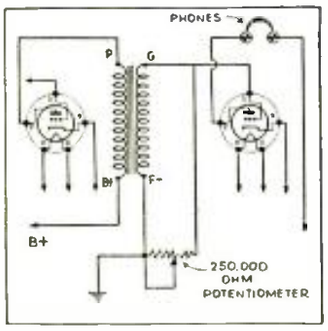
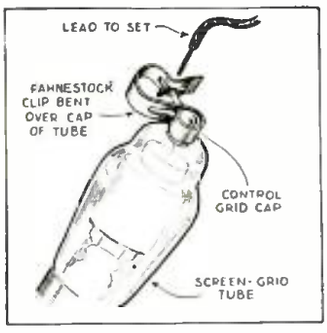


ELIMINATING FRINGE HOWL AND MOTORBOATING

Fringe howl and motorboating may be eliminated by simply placing a resistor across the secondary of the A.F. transformer leading to the troubled stage. This method does not give maximum results. The resistor is to drain off audio voltage, but if it is too low a value, you will get weak signals. If it is too high, the receiver will howl. To get best results, put a 250,000 ohm potentiometer across the secondary of the audio transformer so that the optimum resistance may be found. This potentiometer also acts as a smooth working volume control. I find this system very successful and satisfactory.—Phil Reich.



HANDY GRID CAP

In one of your issues you published a kink employing a Fahnstock clip as a connection for the control-grid of a screen-grid tube. The illustration shows a much better way to use this clip for the same purpose. These clips are obtained from discarded "B" batteries and are ideal for this purpose because they have exceptionally long ends.—Frank Pulaski.

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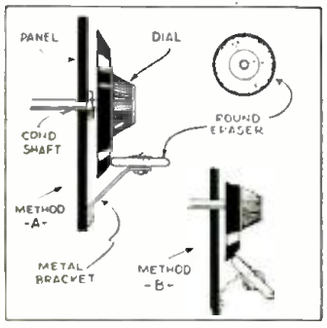
A REAL VERNIER

Here is a kink that has helped to bring in many DX stations. All that is needed is a round eraser and a piece of fairly stiff brass. The eraser is fastened to the bracket



and the bracket to the panel with small bolts. A station is tuned in with the dial and for fine adjustment a little pressure on the eraser and a beautiful vernier is the result. If a small dial is used the eraser may be mounted on a bracket so it touches the edge of the dial as in B.—Chas. R. Steegmuller.

▼ ▼ ▼

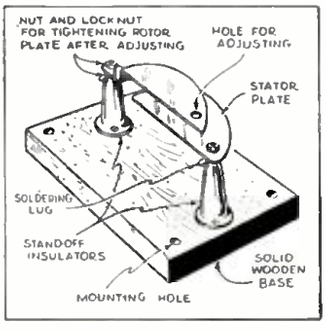
ELIMINATING HUM

Here's a kink for eliminating hum, that will save a good many experimenters a good many dollars in power supply filter. When the power supply is built, place the power transformer in its permanent position, and then with nothing else mounted in the power supply, turn on the transformer. Connect a pair of headphones across the filter choke. An "induction hum" may be heard. By turning the choke at various angles, a location will be found where no hum is audible in the headphones. Locate the choke in that position, permanently, and then wire up the power supply and filter. Using this system, it is often possible to get complete filtering with only one 5 henry choke and two 1 mfd. condensers. The proper location for microphone transformers, audio transformers, modulation chokes, etc., may also be found in this manner when it is necessary to mount these units on the same base as the power supply.—Frank E. Shopen.

HOME-MADE NEUTRALIZING CONDENSER

A condenser that can be used as an antenna trimmer on receivers or as a neutralizing condenser on transmitters can be made from two midget stand-off insulators and two stator plates from an old discarded variable condenser.

The stand-off insulators used are about 1 5/16" high. A bakelite or wooden rod that is pointed is used to adjust the rotor. When the neutralizing adjustment is made, the rotor can be locked into place by tightening the nut indicated on the diagram. —Joe Balas.



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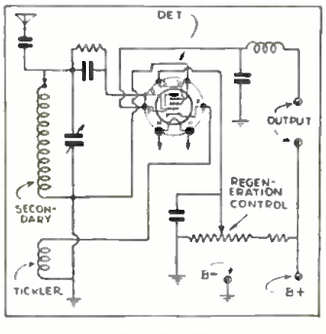
E.C. DETECTOR

Here is my kink which I hope will be given consideration when you decide the winner for the best kink of the ones submitted. It is a method by which a two-circuit detector using the regeneration control in the screen-grid circuit may be converted into an electron-coupled detector. Only a few changes need be made in the wiring, and no extra parts need be added to the detector.

Since the electron-coupled detector is more preferable than the usual two-circuit detector, readers of your magazine will find this kink valuable. I have enclosed a short description and a diagram of the kink, which I think every radio "Fan" can easily use to his advantage.—Seiko Yakahi.



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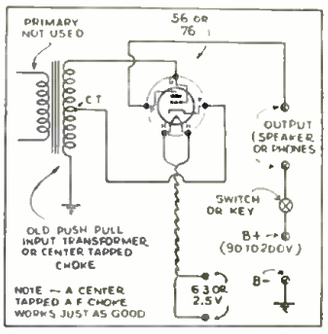
CODE PRACTICE OSCILLATOR

Here is my favorite kink and I hope that it is published in SHORT WAVE CRAFT. A center tapped push-pull input transformer may be connected as shown in the diagram and will make an excellent code practice oscillator. The oscillation is very good and it has an excellent tone. The tone of course, will depend a lot upon the tube and make of transformer used. Either a 56 or a 76 tube will work very nicely; 6.3 volts are used for the 76, while 2.5 volts are used for the heater of the 56. The output of this oscillator is sufficient to operate a small speaker with excellent volume.—Vic Mountain.



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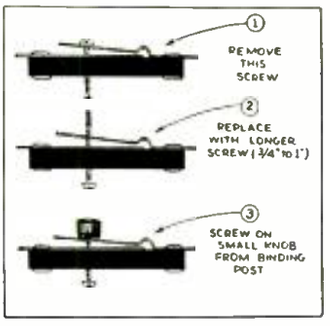
EASILY ADJUSTABLE ANTENNA CONDENSER

Probably many S.W. "Fans" have pondered over the inconvenience of adjusting the antenna condensers with a screwdriver. Here is my solution to the problem.

The small knob serves as an insulated hand adjustment and forces the movable plate down very evenly.—Fred Tann.



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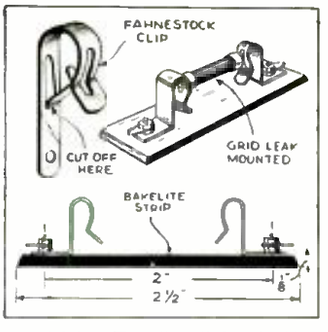
GRID LEAK MOUNTING

Many set builders use grid-leak mountings and here is a stand made from two Fahnstock clips, one inch in length. Details of how to make this two-cent G.L. stand are shown in the diagram. This stand is very rigid and holds grid-leaks

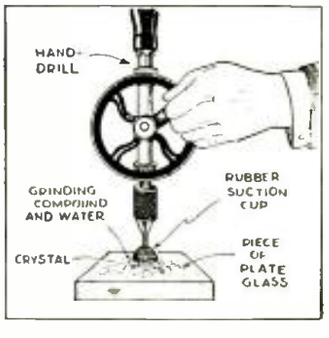


very tightly. The clip (F.C.) should be shaped out as shown in plan. The clips (C) should then be mounted on the strip of bakelite (B) with screws (S) together with the soldering lugs (L). A hole should be drilled in the center of the strip of bakelite for mounting.—Stanley J. Kaukus.

▼ ▼ ▼

GRINDING YOUR OWN CRYSTALS

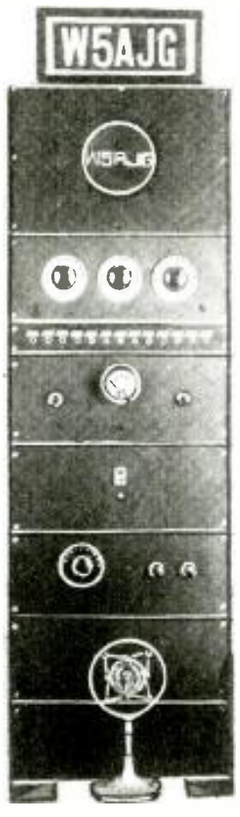
Here is a kink that I would like to enter in the short-wave kink contest. In grinding crystals I used the regular method of a piece of plate glass, grinding compound, and water.—Edwin Cheever.



SHORT WAVES and

Leroy May's "Ham" Station Takes Prize

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



Leroy May has done himself proud in building this magnificent transmitter and speech amplifier. It is a very close approach to commercial apparatus of this type and by means of jacks the system is rendered very flexible.

TRANSMITTER: Referring to photo of transmitter (left) bottom to top: Main power switches, and pilot indicators. Filament Voltmeter. Modulator Plate Meter. Osc. and Doubler Tuning Controls. Meters for all stages. Power Amplifier tuning Controls. Antenna network and R.F. meters for same.

SPEECH RACK: Referring to photo of speech rack. Top to bottom: Eight-inch dynamic loudspeaker for receiver. Three channel mixing panel. Jack strip for mixing purposes. Vacuum Tube Volume Indicator. Power-pack. Auxiliary 5-tube receiver. Blank Panel. Blank Panel. Microphone (Double-Button).

Transmitter Circuit. Type 47 Crystal Oscillator, conventional circuit. Five crystals of various frequencies selected by selector switch. Plug-in coils.

Type 46 Buffer or Doubler stage, conventional circuit. Plug-in coils—all frequencies—160 to 20 meters. Individual neutralizing condensers included in coil forms. Resistor grid leak bias.

Another type 46 Buffer or Doubler stage, similar to above. Plug-in coils, etc.

Above three stages work into an R.F. Class "C" Amplifier, consisting of two type 210 tubes in parallel. Plug-in coils for all bands. 800 volts on plates. 100 watts input on CW. 40 watts phone. This stage used as final amplifier at present time. Under construction is an R.F. Amplifier using: Two type 203-A tubes—Class "C"—400 watts input—to be modulated by two type 211 tubes Class "B." This modulator unit is also under construction.

Present modulator. Two type 250 tubes, Class "A," preceded by two stages of transformer-coupled 227 tubes.

Antenna network—impedance matching type per Collins' scheme.

Speech Rack: Three channel mixer, including a stage of 56 pre-amplification for double-button mike. Also two stage pre-amplifier using a type 53 tube, for use with a homemade condenser mike.

Jack strip, allowing for mixing of various inputs. (Receiver for rebroadcasting amateur signals, telephone line, duplex work and so on.)

(*Continued on page* 364)

(Thanks a lot for your interesting letter, T.C.C., and we are glad to know you liked Mr. Shuart's article on the 1-tube super-regenerative receiver. It will prove very interesting undoubtedly to our readers to learn that you were able to accomplish such long distance reception on this little 1-tube set.—Editor)

POLICEMAN OWNS DANDY STATION

Short Wave Craft:

I have been reading *Short Wave Craft* for three years and made up my mind to build a real set, which you will see in photo. I record most of the time, using the RCA record blanks.

I have recorded foreign stations very, very well and have verifications from King George of London, cards from France and Germany, Belgium, Spain, Cuba, Argentina, Moscow, Australia, Rome, and many South American stations, as well as those all over the U.S.A.

I am a member of the *Short Wave League* of U.S.A. and *International Broadcasting Club* of London, member No. 232951. My set is made up with a 16-tube "Midwest," 60-watt P.A. amplifier, dual recorder, a National power-pack, 45 to 180 volts, 2-stage pre-amplifier for D.B. American "mike." Two loudspeakers, Utah and Keystone, wind up my set.

WALTER M. ELWELL,
73 Myrtle St.,
Bridgeton, N. J.

(Some "listening post," Walter, and we would not mind sitting down in front of this excellent set and giving the dial a twirl ourselves. With the 16-tube Midwest receiver and your other auxiliary apparatus, you should certainly have a fine command of the short-wave stations all over the world. We note that you have an electric phonograph and play-back and it is surprising that more of these attachments are not in use by radio experimenters, as excellent quality of reproduction is easily attained.—Editor)

Cracker-jack short-wave listening post of Walter M. Elwell, member of the Police Department of Bridgeton, N.J.

OUR 1-TUBER GAVE HIM GREATEST KICK!

Editor, Short Wave Craft:

For about twelve months now I have been taking your very fine radio magazine *Short Wave Craft.*

I have been a short-wave fan for a few years now and have built many sets. At present I am using a 10-tube superhet., comprising 58 R.F. Phillips AK1 (Octode) as 1st detector, two 58's as I.F. tubes, 2B7 as second detector and A.V.C., 56 transformer (Ferranti) coupled to 45's, 57 B.F.O. and 5Z3 rectifier, with which I get great results, but the *greatest kick* I have ever gotten out of short waves was from a little 1-tube set, the circuit of which I found in your *Short Wave Craft*, issue of December 1934.

This "job" was Mr. Shuart's super-regenerative set, which I hooked up with an English valve, a Phillips A415, using 45 volts high tension and 4 volts on filaments.

The first night I switched on this "one-lunger" it went great—right away! As your fellow countryman, Mr. Ripley, says "*Believe it or not*," I tuned in London, Paris and Berlin, *without antenna or earth!* For your benefit, Parramatta is about 15 miles from Sydney and Sydney is roughly 10,000 miles airline, from London and every bit of the transmission was very clear on phones, so this will, I think, take some beating!

I shall continue to take your magazines in the future as little circuits like the above are very interesting.

T. C. CORRY, H.F.E.
29 Park Lane,
Parramatta, N.S.W.,
Australia.

LONG RAVES . . . OUR READERS' FORUM

HE HEARD SYDNEY FINE!

Editor, Short Wave Craft:

I saw in the July number of *Short Wave Craft*, page 187, a statement that there hadn't been any reports of anyone receiving Sydney, Australia, at that date. I wish to report reception of VK2ME four Sunday mornings in succession between 5 and 7 a.m., C.S.T. Sunday morning, June 9, VK2ME gave time 6 a.m., C.S.T. here. They had a bird sing before giving the time, their clock struck 10 o'clock p.m. (so the announcer said over there). And they had recordings of the Minneapolis Symphony orchestra on their program on that morning, June 9. This morning, June 23, about 5:30 a.m., C.S.T., I had this station; there was lots of static but I heard clearly the song—"Massa's in the Cold, Cold Ground."

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: Sept. 15 for Dec. 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.

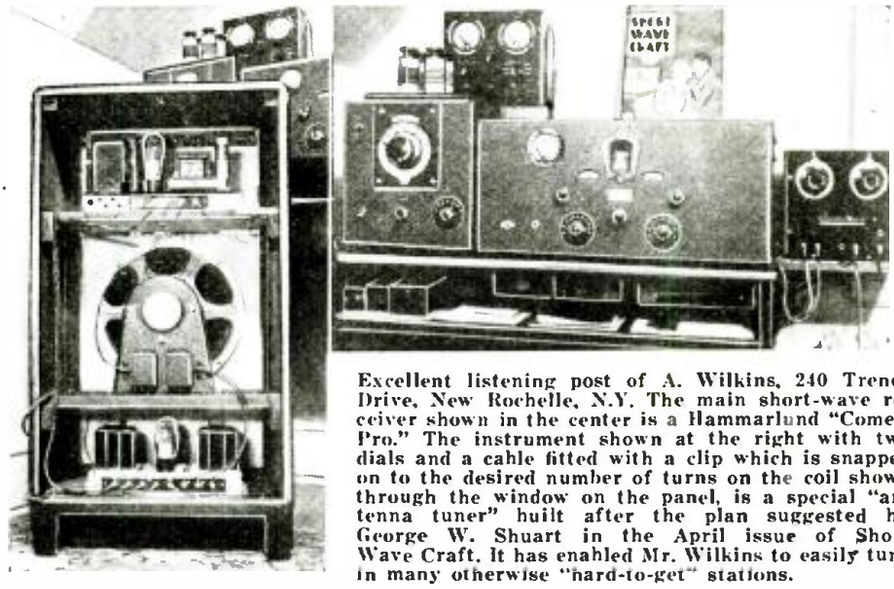
Some of these receptions have been extremely clear. Have a 16-B 11-tube Philco All-Wave radio set and use a 100-ft. outside aerial, pointing from my town southeast. I have gotten about 40 short-wave broadcast stations all over the world.

The way I understood this report meant this country (U.S.). Having seen this statement in *Short Wave Craft* made me want to report my reception of VK2ME, 9590 kc. on dial. I further wish to state that I get *Short Wave Craft* every month and enjoy reading it very much, as I have been interested in short waves for a number of years. I am mailing VK2ME a copy of this report.

H. L. HULLETT,
1305 S. High St.,
Columbia, Tenn.

(Thanks very much for your report, H.L.H., and we shall be very glad to receive similar reports from our many readers in different parts of the world. Speaking of VK2ME brings to mind that some of the boys have made records of the programs, and we shall be glad to learn the details of just how they accomplished this stunt.—Editor)

This Short-Wave Listening Post has crack amplifiers



Excellent listening post of A. Wilkins, 240 Trenor Drive, New Rochelle, N.Y. The main short-wave receiver shown in the center is a Hammarlund "Comet-Pro." The instrument shown at the right with two dials and a cable fitted with a clip which is snapped on to the desired number of turns on the coil shown through the window on the panel, is a special "antenna tuner" built after the plan suggested by George W. Shuart in the April issue of Short Wave Craft. It has enabled Mr. Wilkins to easily tune in many otherwise "hard-to-get" stations.

A LIVE NEW ZEALAND STATION

Editor, Short Wave Craft:

Noticing your requests for "good" station photos, I thought I would send a photo of my outfit and see what you think of it. The transmitter is a "Hartley" MOPA using a '45 oscillator, swinging a TC 04/10 with 20 watts input. Modulator is a 50 in a Heising circuit, with a speech-amplifier of two 56's transformer-coupled. Power supply is rectified A.C. with a "brute-force" filter. Rectifiers are G.V.1's. The cabinet contains the transmitter and power supply complete.

Behind the "mike" can be seen a harmonic monitor, next to which is a four-tube T.R.F. receiver. Other equipment consists of A.C. motor and magnetic record pick-up, speaker, absorption type wavemeter and a Weston meter for testing any component on the table. To right of table is a fully shielded key. The outfit can be changed over from phone to C.W. in a second with one switch (dual) cutting out everything unnecessary for C.W. and cutting back to phone, just waiting for warming up.

The switches on bottom of Xmitter are for controlling any particular portion of the "rig" to simplify trouble hunting. In the event of any sizzling, the main switch cuts out everything. Hi!

In the foreground can even be seen the ever-ready soldering iron.

This outfit has worked phone all over N.Z. and several QSO's with VK's all QSA5 and on C.W. several W.F.G.D.K. and F. M.

Antenna is Zepp.-fed 132-ft. flat-top, 10 gauge copper.

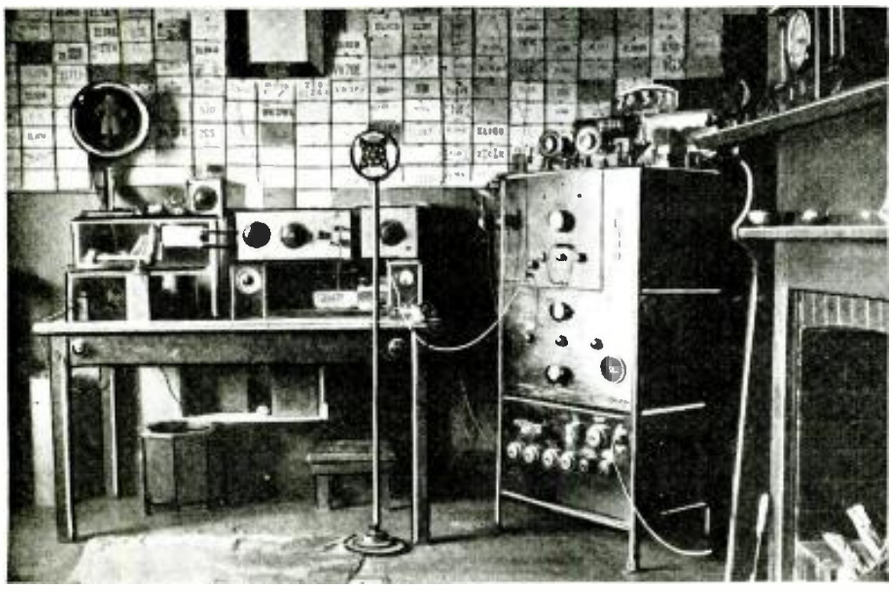
Well sir, I think that is all and I trust it is worthy of your collection. It has won an N.Z. competition, the prize being an 80-meter Xtal (now in use).

Should the rig be lucky enough to be published and give some future ham a bit of an idea, I would be repaid for sending it in.

Regarding your magazine, *Short Wave Craft*, it's the best thing we get in N.Z. but for some reason or other one is not certain of securing a copy. However, I have a good many copies here and wouldn't part with one. The same goes with *Radio-Craft*, which is also hard to get and hard to part with.

HERBERT F. VINCENT, ZL3BD,
High St.,
Waimate, N.Z.

(Thanks very much for your letter and we are always glad to hear from our friends in foreign countries. You have certainly accumulated a great array of short-wave apparatus and we can well imagine that you derive a lot of pleasure from your station. In your location you should experience exceptionally fine reception conditions. Apparently you do enjoy excellent reception in New Zealand, judging from the fine display of "veri" cards on the wall of your radio den. Write us again sometime when you develop some new apparatus.—Editor.)



From "Down Under" in New Zealand comes this fine array of radio apparatus which is owned and operated by Herbert F. Vincent, ZL3BD.

WORLD-WIDE SHORT-

A New Ultra-High Frequency Tube

● THIS month's crop of magazines had a new one from which we can report. It is a French magazine called *L'Industrie Francaise Radio ,Electrique*—an industrial magazine intended mostly for the "trade."

In the issue at hand, there is an interesting description and picture of a German oscillator tube which has just been introduced by the Telefunken Co.

The tube is very peculiar in appearance as a glance at the photo shows. It is designed to oscillate on frequencies as high as 600 megacycles. At the normal plate potential of 400 volts the tube has a plate dissipation of about 30 watts. The internal capacity between elements is exceptionally low due to the odd way in which it is constructed. This tube is known as the type 149Y

Two French Converter Units

● WE REPORT from a new magazine, this month—that is, a new magazine to these columns. This is called *Machines Parlantes et Radio* and is published in Paris, France.

A very interesting article appeared in a recent issue on the subject of converter units for short-wave receivers. Two converters were described. This first is an autodyne, using a triode tube such as the 56, 76, and similar types. As shown in the circuit, this converter uses a single coil L which is tuned by condenser CV to a frequency either higher or lower than that of the incoming signal by an amount equal to the wavelength to which the broadcast set is tuned.

While this causes the converter to be detuned from the station picked up, the detuning is quite small on short waves.

The values of the parts are indicated on the diagram. The coil L which tunes the converter may be an ordinary regenerative, plug-in, short-wave coil in which the regeneration is accomplished through a coil connected to the grid coil and the aerial coupling is accomplished by means of a tap on the grid coil.

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

The second converter is a more modern type using a pentagrid converter tube and two sets of tuning coils for station selection and oscillator tuning. The aerial coil is tapped for aerial coupling while the oscillator has two coils, one for tuning and the other for feedback.

The aerial circuit in this converter is tuned to the actual frequency of the short-wave station being picked up thus overcoming the difficulties of the autodyne type converter.

The values are indicated on the circuit for the benefit of any experimenter who is interested in this unit. The coils may be standard plug-in or switch-controlled coils containing selection and oscillator coils made for an intermediate frequency of about 540 kc.

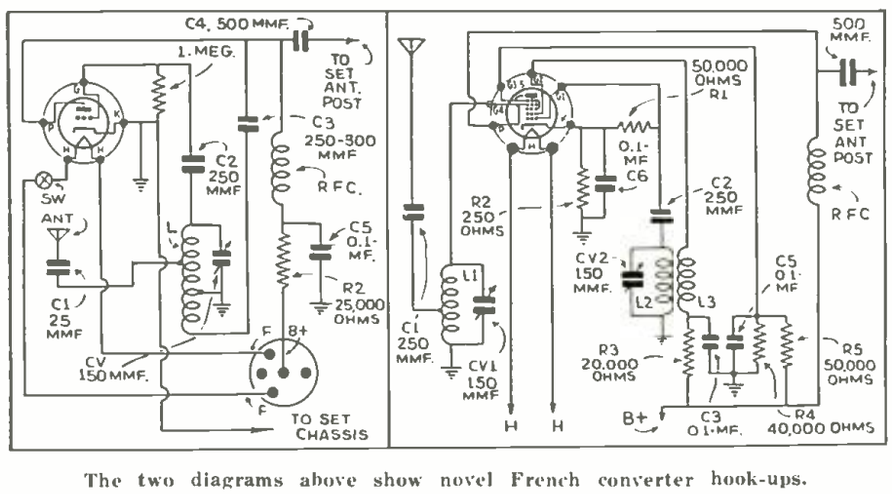
New S-W Coils

● PLUG-IN coils have been made in many ways, from simple tube bases to elaborate ceramic forms with special ribs and handles for easy removal from the socket.

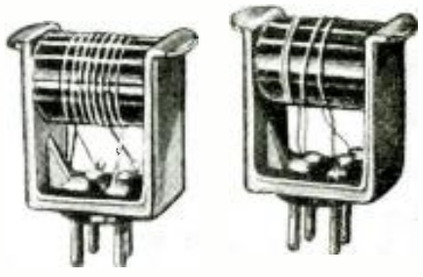
A simple effective style of plug-in coil was described in the latest issue of *Popular Wireless*. As shown, the coil forms are mounted in molded insulated frames with the plug-in pins on the bottom.

The forms themselves are ribbed, so that the insulation losses are reduced to a minimum. The wire is wound in small niches in the ribs, to prevent shifting or loosening. The regeneration coil is wound in a slot at the end of the grid winding.

Three coils cover the wave-band from 14 to 100 meters.



The two diagrams above show novel French converter hook-ups.



These new plug-in coils hail from England, the forms being ribbed so that insulation losses are reduced to a minimum.

A German S-W Transceiver

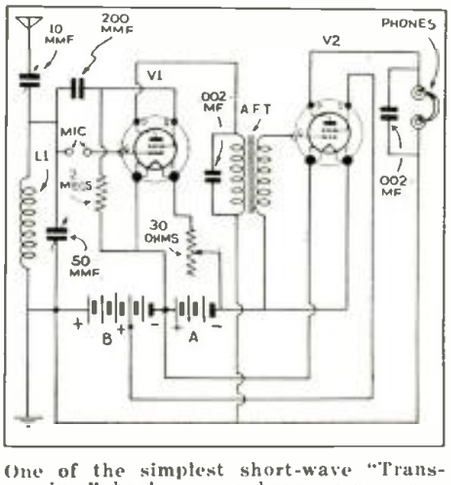
● ONE of the most simple arrangements for making a short-wave transceiver appeared in the latest issue of *Bastelbriefe der Drahtlosen*, a German radio magazine.

The circuit, as shown here, consists of a regenerative detector and an audio frequency amplifier. For reception purposes, though, the regenerative detector is of special design. The input from the aerial is fed to the screen-grid instead of the control-grid in the usual way. The aerial tuning circuit is in the screen-grid circuit, between the grid and the "B" supply. The usual control grid, then, is left open and has little effect on the operation of the receiver. Thus, the detector acts as a triode tube, even though it is a screen-grid type.

For transmitting, the microphone is connected in the control grid lead, between the grid and aerial end of the tuned circuit. Thus, the control-grid acts as a modulating grid for the triode oscillator. An examination of the circuit will show how this action is obtained.

A stage of A.F. amplification permits the signals to be strengthened for reception purposes.

The transceiver can be tuned to any wavelength, by tuning the 50 mmf. condenser. For transmitting purposes, of course, the tube must be oscillating strongly.



One of the simplest short-wave "Transceiver" hook-ups we have ever seen.

A French Transmitter-Receiver

● TO give an idea of the type of equipment used for amateur transmission and reception in France, today, we are reprinting a circuit of a combined transmitter and receiver operating from the same power supply, which was published in *L'Antenne*, a French publication.

WAVE REVIEW..

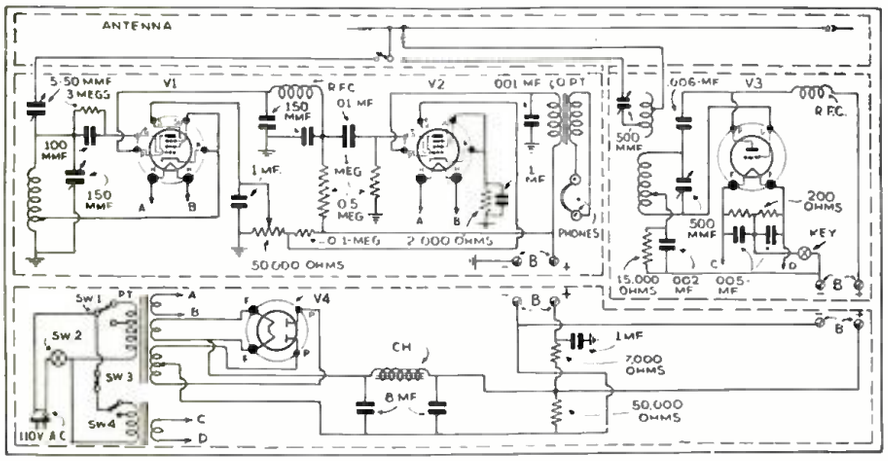
Edited by C. W. PALMER

A glance at the circuit will show the arrangement. The unit at the left is the receiver which consists of a regenerative detector and a pentode A.F. amplifier. Cathode regenerative coupling is used with screen-grid adjustment of the regeneration.

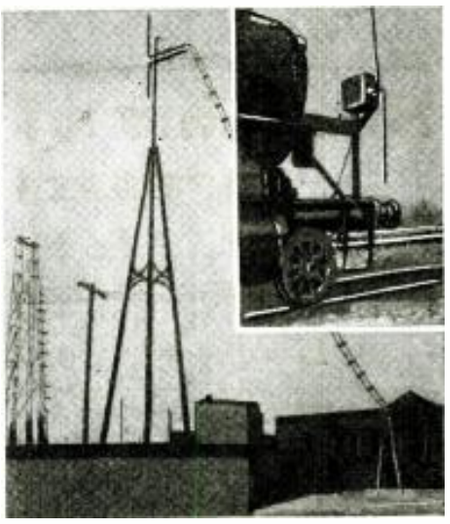
The unit on the right of the circuit is the transmitter, which is a single-tube circuit, coupled to the aerial through a coil and condenser arrangement to permit the highest possible output.

The unit at the bottom is the power supply, which contains two transformers. One of these is a combined high and low voltage unit for supplying the "B" supply to the tubes of the transmitter and receiver while the other is a special filament transformer for the transmitting tube.

The values of the parts, with the exception of the coils are marked on the diagram. However, this circuit is printed to show the trend in amateur equipment in France and is not intended for a practical transmitter to be used in this country.



This diagram shows a French circuit for a combination Transmitter-Receiver.



Unique short-wave transmitting and receiving system used in France for signaling to moving trains, instead of using semaphores.

transmitters in the experimental set-up had a power of 300 watts, though such power is not needed to cover the short distances involved.

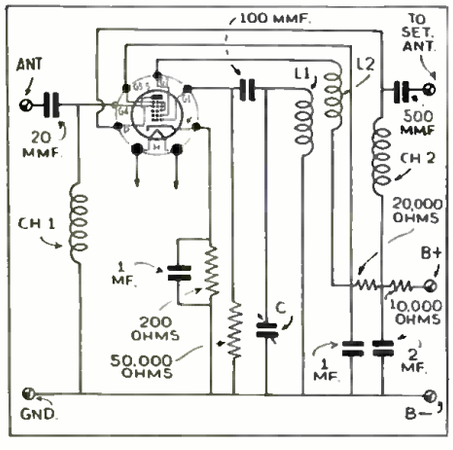
Wavelengths of 6 and 8 meters are used for the transmitting and receiving circuits respectively, so that duplex communication is possible.

The appearance of the dipole aerial on a locomotive and at one of the signal towers is shown in the accompanying illustration.

A Simplified Converter

● AS WE have explained before in these columns, short-wave converters to be used with broadcast receivers are much more popular in Europe than they are in the U.S. This is probably due to the fact that there are less "good" all-wave receivers available there than there are here.

A simply designed converter was described in *Funk Magazin*, a radio publication printed in Vienna. This converter uses a pentagrid tube of a type similar to the 2A7 and 6A7. It uses only a single tuning condenser which adjusts the frequency of the oscillator section of the tube. The translator section, which is usually tuned is aperiodic in this unit. While this reduces the selectivity of the converter, it greatly simplifies the construction and even more the "padding" of the two sections of the tuning condenser.



It is pretty difficult to beat this hook-up for a simplified short-wave converter.

The values of the parts are indicated, but must be changed to suit American parts, if anyone wishes to try this unit. The coils L1 and L2 can be made according to instructions for the oscillator coils for any converter which uses a pentagrid converter tube. The choke coil Ch1 must be a high quality unit and not have any "dead" spots in its tuning range.

Ultra-Short Waves for Train Control

● A NOVEL use has been made of ultra-short-wave equipment in France, according to *Le Haut Parleur*, a magazine published in Paris.

The locomotive is equipped with a duplex transmitter and receiver permitting simultaneous transmission and reception of voice. Along the lines at strategic points are installed transmitters and receivers tuned to the same frequency of the equipment on the train.

This radio apparatus is used to signal the engineer, instead of the usual semaphore arms, lights, etc.

The advantage of the radio method of signaling is at once apparent. Conditions ahead can be signaled to the engineer in detail instead of the limited stop and go signals previously used.

The receivers used are of the super-regenerative type with fixed tuning. The

Do You Like These Digests of Foreign Articles on Short Waves? The Editors would like to know what sort of Circuits you like best in this Department.

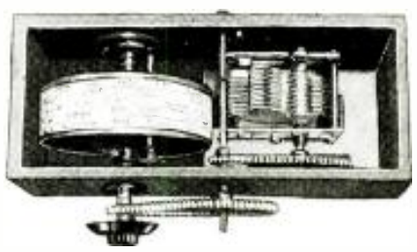
A New Calibrated Dial

● ORDINARY dials used for short-wave and all-wave sets, where the calls or frequencies covered by the different scales are indicated on a circular or semicircular scale, nearly all suffer from the disadvantages of illegibility and overcrowding.

In a recent issue of *Wireless World*, a new dial was described which overcomes these difficulties. As shown in the illustration here, it consists of a drum having a scale wound spirally around its flat circumference and a mechanism to move the drum axially at the same time as it rotates.

The station call letters or frequencies are printed on the scale. The drum is geared down so that many revolutions are needed to move the condenser from maximum to minimum. An idea of the vernier action can be obtained when it is realized that with a drum only 4 in. in diameter and having eight revolutions to one-half revolution of the condenser shaft supplied a scale that is about 8 ft. long.

This dial should be a boon to short-wave listeners.



A very ingenious short-wave tuning dial system, using a drum upon which the dial scale is wound spirally.

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

New Line of "Metal Tube" Receivers Introduced

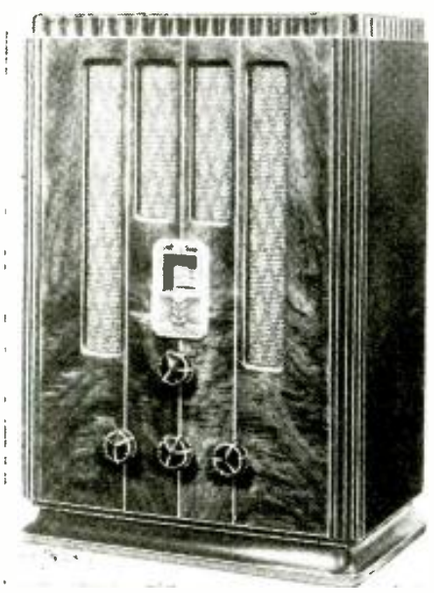
● A NEW radio line, embracing eight receivers featuring 100-percent metal tube complements has just been announced. These sets, which include four consoles and four table models, are the first in the history of the industry to incorporate the new metal tube developed by the "House of Magic."

Developed, designed and manufactured by one of the largest companies in the country, the sets incorporate five major developments, in addition to many improvements over conventional types of radio receivers.

All offer both *standard* and *short-wave* reception features and several have extended tuning ranges for *ultra short waves*. One has five bands, two have four bands, two have three bands and three have two bands. Outstanding among the developments is the new metal tube, used entirely in these new sets. Other exclusive advances are the sentry box, the permaliner, the stabilized dynamic speaker and the sliding-rule tuning scale.

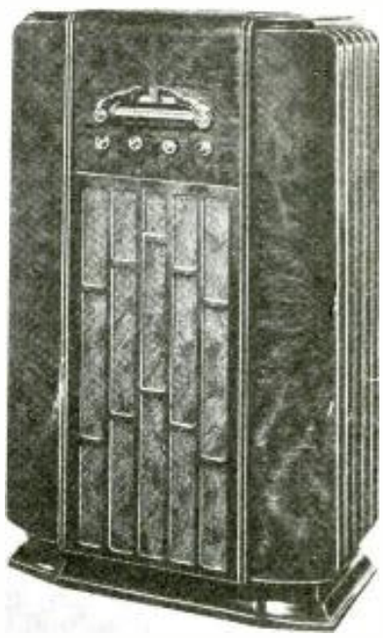
The Metal Tube—The new metal tubes are not only much smaller and more sturdy than conventional glass tubes, but offer many improved electrical characteristics. They provide their own shielding and, in addition, the metal shell is a better heat conductor and radiator than glass. They are particularly advantageous in the field of *short-wave* reception. The short leads of the tubes permit greater amplification at the higher frequencies and the more effective shielding insures greater stability. Another important advantage of the metal tube is the reduction of space in the receiver ordinarily needed for tubes. Be-

(*Continued on page* 364)



Another table model receiver using 6 "metal tubes" with a different type dial. It has A.V.C. and 2-point tone control.

Table model 4-band receiver, max. frequency 19,500 kc.; uses 8 "metal tubes."



New 5-band receiver, which uses 12 of the new "metal tubes" with fast- and slow-tuning dial control. The highest frequency is 40,000 kc. No. 313.

New 6-Tube Set

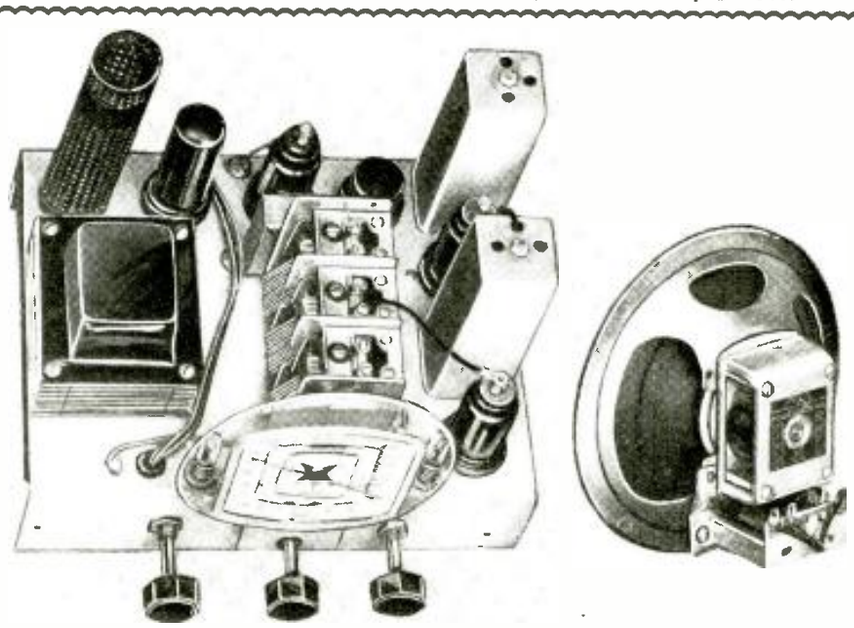
● THE neat-looking receiver shown at the right together with its dynamic speaker is one of the new Allied Radio Corp. models which uses 6 of the new "all metal" tubes. This set is an all-wave superhet, having a continuous range of 17 to 565 meters.

The metal tubes used are: 1—6J6, 1—6F5, 1—6K7, 1—6F6, 1—6A8 and 1—5Z4.

In addition to the metal tube models, this company will continue to present a number of the latest type glass tube receivers. Receivers having all the way from 4 up to 9 tubes will be presented and a goodly part of this array of new receiving sets will utilize the new metal tubes.

The receiver shown at the right is fitted with one of the newest type dials, which has the important short-wave broadcasting bands clearly indicated on the dial.

At right—New "metal tube" receiver designed by Allied Radio Corp. It uses 6 tubes and has a range from 17 to 565 meters. No. 314.



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

A Novel 4-Tube A.C.-D.C. Receiver

by Guy Stokely, E.E.*

A well-designed 4-tube receiver that works on 110 volts A.C. or D.C. No. 311.

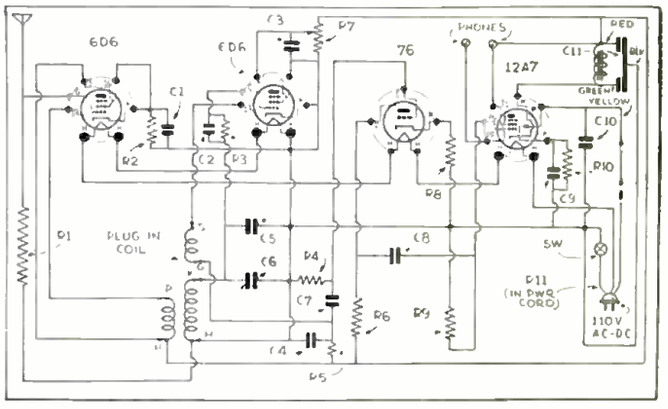
● THE Eilen 5A receiver has been developed to meet the demand for a *powerful*, sensitive, and efficient short-wave receiver that *will* produce the results demanded by the discriminating short-wave fan, manufacturers state. The use of the dual-purpose tube, the 12A7, used in conjunction with three single-type tubes, results in the same performance as is obtainable from five of the ordinary single-type tubes.

The circuit chosen for this model utilizes a 6D6 "high-gain" type tube as untuned R.F. amplifier, a type 6D6 as screen-grid regenerative detector, a type 76 first audio frequency amplifier stage, and a type 12A7 tube, functioning as a power pentode audio output stage and rectifier. The use of the R.F. amplifier isolates the detector stage from the antenna system, rendering it nonsusceptible to changes in its constants and also eliminates the usual antenna series condenser and its associated bothersome adjustments.

The 6D6 tube is well suited for use as the R.F. amplifier. Differing from most screen-grid tubes, its plate current-grid voltage characteristic curve gradually tapers out (remote cut-off) with increasing grid bias, instead of coming to a more or less abrupt ending (sharp cut-off). Due to this feature it is able to handle rather large R.F. voltage inputs. The suppressor grid and cathode are tied together and connected to the chassis through the bias resistor R2 (500 ohms) and its by-pass condenser C1 having a capacity of 0.01 mf. A screen-grid voltage of approximately 115 volts is used, resulting in the maximum gain from this type of tube.

The R.F. output voltage generated across L1 is electromagnetically coupled into the grid circuit of the detector. The use of this type of coupling (3 winding coils) gives a much greater degree of selectivity than is obtainable from the more common 2 winding coils. The grid-leak and grid-condenser system of detection is used due to its high level of sensitivity. A grid-leak value of 2,000,000 ohms used in conjunction with a grid condenser of 0.00025 mf. was chosen and allows the attainment of an unusually smooth regeneration control.

In parallel with the main tuning condenser C5 (0.00014 mf.) there is a small midget *band-spread* condenser C6, having a maximum capacity of 15 mmf. The amateur code or foreign broadcast bands are well spread out on this control, thereby eliminating the critical tuning adjustments present on many of the present type of short-wave receivers. The suppressor grid and cathode connect direct to the chassis, the necessary bias being furnished by rectified grid current flowing through R3. Regeneration control is obtained by means of the potentiometer R7 (75,000 ohms) and its by-pass condenser C3 (0.01 mf.). (*Continued on page* 365)



Hook-up of 4-tube all-electric S-W set.

*Eilen Radio Laboratories.

A New 6-Tube Dual-Wave Superhet

by Irving Rosenberg*

A 6-tube Dual-Wave Superhet that will appeal to many. It uses plug-in coils. No. 312

● THE Eagle Playboy is a 6-tube dual-wave superheterodyne, utilizing plug-in coils for the various wave-bands. Its range is from 10 to 550 meters, with suitable overlap on each of the coils. The receiver develops amazing sensitivity and volume on the short-wave bands, the foreign short-wave stations rolling in on the speaker with volume equal to local broadcast stations and with remarkable clarity.

The set is designed for 110 to 120 volt A.C. 60-cycle operation and uses low current, 6.3 volt tubes with a consequent great saving in electric power. The set employs a 6A7 mixer and electron-coupled oscillator, two 6D6 high-gain intermediate frequency amplifiers, a 6C6 second power-detector and a 42 pentode output audio amplifier, resistance coupled. The power supply is built into the chassis and uses an 80 in full-wave rectification, two 8 mf. dry electrolytic filter condensers and the field coil of the speaker as a filter choke, tapped at 300 ohms for bias supply for the 42 amplifier.

The construction of the set is simplicity itself and requires a minimum of parts to produce remarkable results. The intermediate frequency amplifier is peaked at 465 kc. for a minimum of interference from high-wave commercial code stations and image-frequency response. A feature of this receiver is the manual-controlled balancing condenser in the grid circuit of the first detector tube, to facilitate adjustment on the short-wave bands. This control is quite critical on short waves and requires careful adjustment.

After the wiring is completed, some adjustments on the Intermediate frequency transformers may be necessary. If an oscillator is at hand it may be used with advantage.

Adjust the oscillator to 465 kc. with the gang condenser fully meshed, short out the oscillator tuning condenser on the receiver by means of a piece of wire from rotor to stator. Connect the output leads of the test oscillator to the top cap of the 6A7 tube and chassis, leaving the grid lead to tube in position.

Using an insulated screw driver or (*Continued on page* 365)

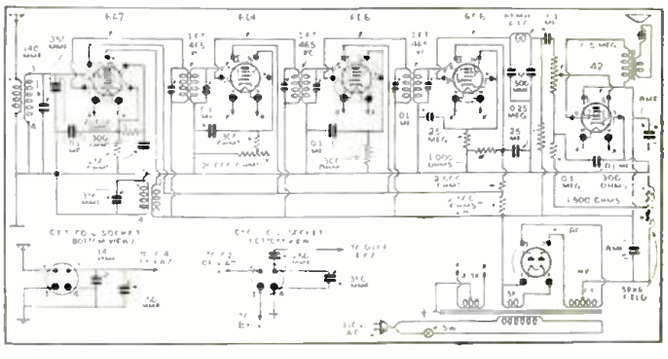


Diagram of 6-tube Dual-Wave Superhet here described.

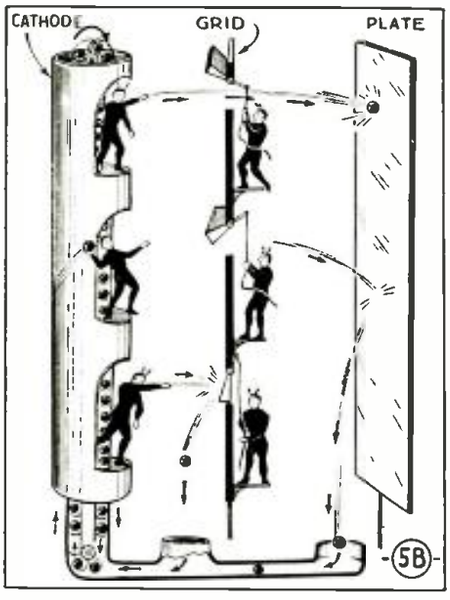
*Technical Dept., Eagle Radio.

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



The simple analogy above is an attempt to show the action taking place in the vacuum or electron tube used in radio circuits. Note that the shutters (corresponding to the grid in the tube) control the number of balls hurled through it toward the target (or plate). In a similar way, the grid in a vacuum tube controls the amount of current passing from the plate to the cathode (or filament).

No. 2—How the Vacuum Tube Works

● THE entire radio industry as it stands today, owes its success and magnitude to the electron tube, or *vacuum tube*, if you prefer; the well-known bulb which is used in every type of present-day radio. The electron tube is not only used today for radio, but in other industries and serves a vast number of other purposes.

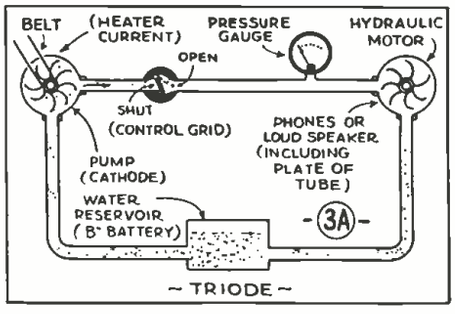
For instance, with the aid of the photoelectric cell (a special form of vacuum tube) or electric eye, color measurements are made and it is possible to match colors perfectly with this instrument, where previously the entire matching of colors was dependent upon the human eye.

It is the vacuum tubes used in radio, however, which we intend to discuss in this lesson. The starting point in the construction or analyzing the construction of the electron tube, is the *source* of electrons, which is technically termed the *cathode*. This cathode is made of a material which when heated gives off a quantity of electrons. In Fig. 1, we see the filament type cathode, wherein the wire used for constructing the filament contains a certain amount of material which will provide (emit) electrons when heated by an electric current passing through it.

If this filament were exposed to the atmosphere and heated it would decompose or "burn out," as it is commonly termed. However, when enclosed in a glass envelope from which all air has been exhausted or removed, this filament will glow for a long time without damage.

In Fig. 2 we have what is termed an *indirectly heated cathode*, which consists of a small tube through the center of which is run the heating wire or resistor. The outside of this tube is usually coated with some metal oxide. When it is heated to a sufficient temperature, electrons are then emitted from the outside coating and it is entirely independent of the heater unit.

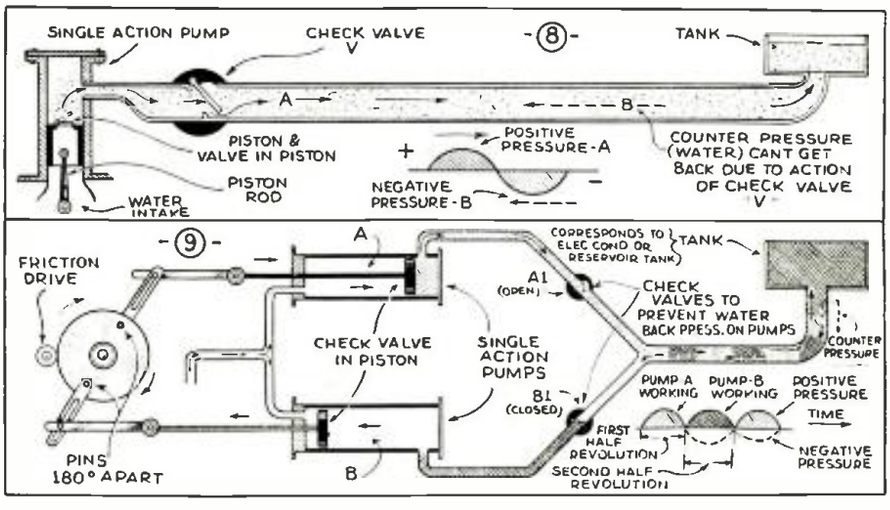
As the electrons are emitted from this cathode they form what is termed an "electron cloud" around the cathode and within the envelope in which it is enclosed. These electrons can only be attracted to some object which is positively charged. Now, if we insert in this tube and around the cathode, a piece of metal or some other conducting material, and charge it positively, we can draw or attract the electrons to it.



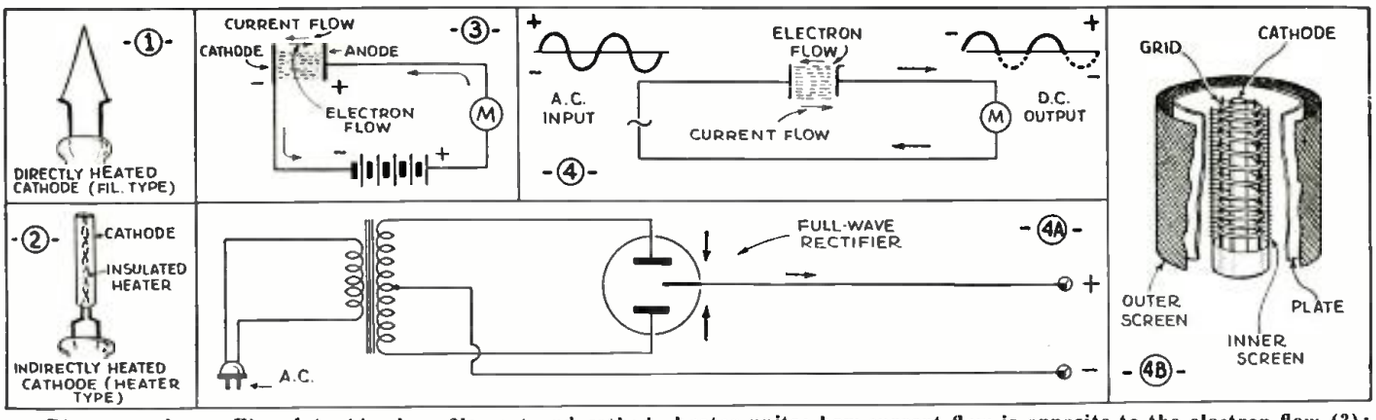
Simple hydraulic analogy to illustrate how the grid in an electron tube acts like a valve to regulate or control the amount of current (water) passing between the plate (motor) and the cathode (pump). The water reservoir in the analog diagram corresponds to the "B" battery or power supply unit in a radio circuit.

In Fig. 3 we show the action which takes place in a tube having a cathode and a plate or *anode*, as the plate is technically termed. By connecting a battery between the anode and cathode with the positive terminals of the battery connected to the *plate*, we attract electrons to this plate or anode. Current will then flow between the anode and cathode, remembering always that the current flow is also *opposite* to the electron flow.

If we insert a meter in series with



Hydraulic analogs showing action of half- and also full-wave rectifiers, the detector tube in a receiving circuit acting as a rectifier. The first diagram shows how a single-action pump and a check valve permits water to pass through the pipe up into the tank on each half stroke, while any counter water pressure is prevented from passing back into the pump by the check-valve. The second diagram shows how two half-wave rectifiers (pumps), with the aid of two check-valves cause a "full-wave" pressure to be developed in the main water line. When one is not working, the other is.



Diagrams above—Figs. 1 to 4A, show filament and cathode heater units; how current flow is opposite to the electron flow (3); rectification of A.C. passing through an electron tube (4); hook-up of full-wave rectifier tube (4A); detail of tube elements (4B).

the circuit we will find that it will show the amount of current flowing in the circuit. This tube, as shown in Fig. 3, is known as the *diode* or one having *two elements*. If we remove the battery from the circuit and connect the negative side of the battery to the plate and the positive side to the cathode, no current will flow, because the negatively charged plate will reject the electrons.

Effect of A.C. on Tube

So far, we have considered a constant polarity of voltage applied between the cathode and anode. Now, if we were to apply an alternate voltage between these two elements (see Lesson 1 for explanation of alternating current electricity), the plate will be alternately charged *positive* and *negative*, which means that current will only flow through the circuit during the period when a positive voltage is applied to the anode. When the anode side of the circuit becomes negative, *current does not flow*. In Fig. 4 we illustrate what is termed *rectification*.

The input circuit is indicated as alternating current while the output circuit shows current flowing in only *one direction* during half of the time of the input cycle. We have flowing in the output circuit then, an interrupted direct current or what would otherwise be termed *half-wave* rectification. All tubes of the diode type are therefore termed half-wave rectifiers. The 281 is an example of this type of tube.

By using two anodes we can obtain *full-wave* rectification. This is shown in Fig. 4A. A rectifier of this type is termed a full-wave rectifier and an example is the 280 tube.

Returning to Fig. 3 we can readily understand that as we change the degree of positive potential (voltage) applied to the plate, we will change the volume of electrons which are attracted to it. A low potential will attract a small amount of electrons, while a high potential or high voltage will attract a greater number of electrons. An important point to bear in mind is that a negative potential repels electrons, while a positive potential attracts them. (Unlike charges attract and vice versa.)

This is the second lesson in the Radio Amateur Course, which has been especially prepared for the readers of SHORT WAVE CRAFT. Future lessons will take up "inductance" and "capacity," and explain how oscillatory circuits work.

How the "Grid" Works

To have a better control over the amount of current flow in the plate circuit of the vacuum tube, we may insert a third element, known as the *grid*. Tubes having three elements are termed *triodes*, the prefix "tri" meaning three. This grid consists of a form of screen between the anode and cathode through which electrons must pass in order to reach the plate.

This grid being located nearer to the cathode or source of electrons, will have a greater effect upon the electron stream when it is charged either positively or negatively. In Fig. 5, we have the same circuit as in Fig. 3, excepting for the addition of the grid. Because of the great effect this grid has upon the electron flow, it is called the *control grid*.

We may now apply either a positive or a negative potential to this grid and obtain a change in plate current or a change in the number of electrons reaching the plate, because if the grid is charged negatively, it will tend to repel or retard the flow of electrons between the cathode and the plate. This grid can be made so negative (biased) that it will entirely cut off the flow of electrons, reducing the plate current to zero.

As this grid becomes more *positively* charged, an *increase* in the flow of electrons to the plate will take place. That is, providing the potential (voltage) of the grid is not as great as that of the plate. As this grid becomes entirely positive, relative to the cathode, it will then collect a certain amount of elec-

(*Continued on page* 369)

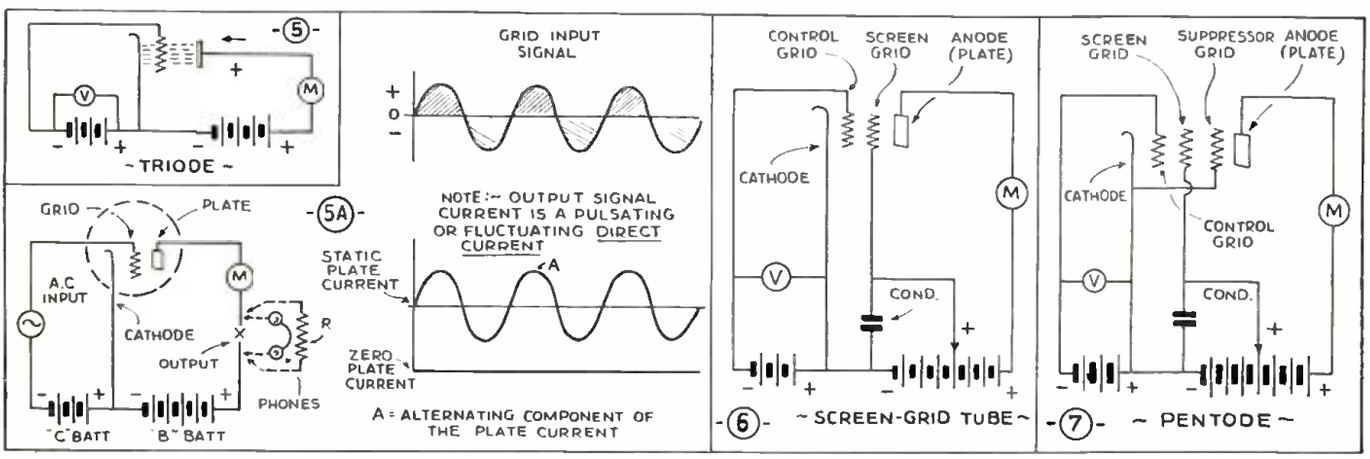
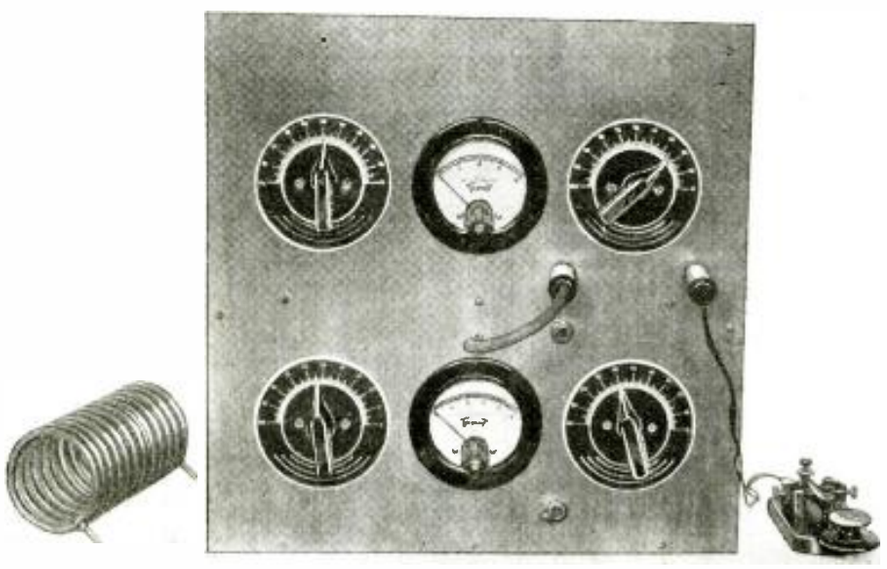


Fig. 5 shows action of triode tube; 5A, how A.C. input is changed into a rectified, pulsating direct current by an electron tube; 6, arrangement of the elements in a screen-grid tube; how elements are arranged in a pentode at Fig. 7.

The RK 23-31 HAM



Note the neat appearance and simplicity of construction in this up-to-the-minute "Ham" transmitter.

● THERE has no doubt been a great advancement in the design of amateur transmitting stations and a corresponding improvement in "Ham" operating practice. Tuning over any one of the many "Ham" bands, we notice that the majority of them sound like *commercial* stations operated by *real operators*. We wish to take time out right now to doff our hat and bow low to our friends the "Hams," for it is a pleasure to "work" them, listen to their fine clean-cut signals and copy their "FB" fists.

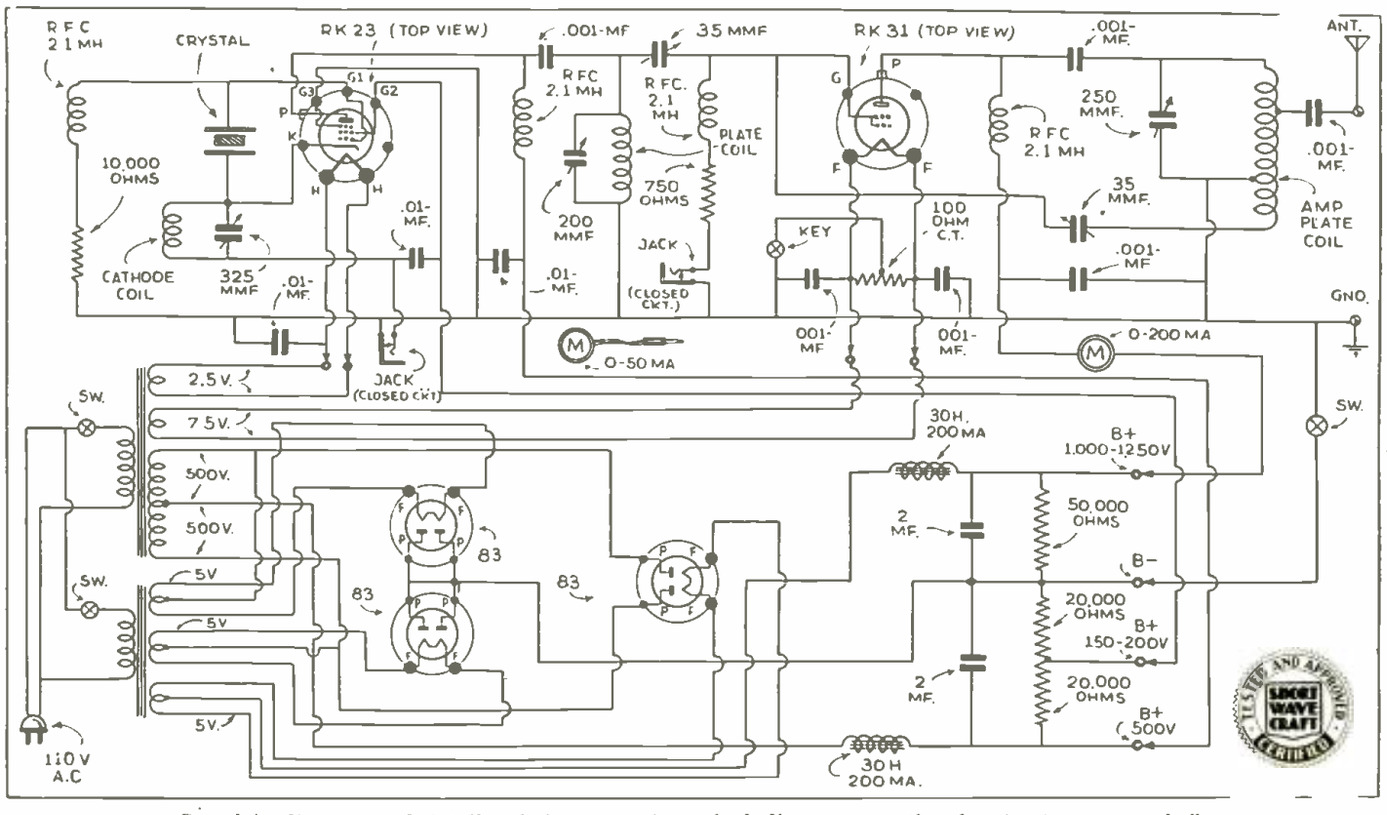
On the other hand, and it must be the *left* hand, we notice that there are still a good many stations having poor notes and operated with little consideration, apparently, for the other fellow. If a hobby is worth following, it is worth taking the "YL" to the movies one night less per week and putting the thus saved funds into our transmitter, making it a 1936 proposition instead of a 1925 *relic!*

At the current low prices of amateur equipment, we offer this transmitter as an example of what can be accomplished for a modest sum of money. The Wizard transmitter described last month is also an excellent example of an efficient transmitter which you can build at a reasonable cost.

This transmitter was designed for the fellow who makes a hobby of operating his "Ham" station. It is compact, has an output that will compete with those found on any of the bands, can be operated on all of the popular "Ham" bands and will give years of service. The dyed-in-the-wool experimenter will no doubt be interested in it, but he usually has a pretty good "rig." It is the fellow operating a station as a hobby who usually puts little time and money into his rig and who consequently has a poor note and needs just such a transmitter as this one.

Transmitter Occupies Small Space

The entire RF portion is mounted on a panel only 14 inches square and the depth is only 7 inches. Two tubes are used, one is an RK 23 which is a screen-grid pentode, with an output of over ten watts; the other is a brand new addition to the ever-growing tube family, and is known as the RK31. This is a



Complete diagram and details of the transmitter, including a suggestion for the "power supply."

Transmitter

By George W. Shuart, W2AMN

triode designed to operate with zero grid bias as a class "B" audio amplifier and is excellently suited to R.F. amplification.

We are all familiar with the 46 class "B" tube and this one is its big brother. Although the 31 exhibits none of the idiosyncrasies that the 46 was famous for, it operates just as stable as any of the well-known 75-100 watt triodes, such as the 203A. The great advantage of the 31 is that it requires *no external bias!* It appears possible to obtain over 75 watts output on the 80 and 40 meter bands and over 60 on twenty meters, without overtaxing the tube in the least.

The RK 23 is connected in the commonly termed "tritet" circuit and results in a real low-power crystal-controlled oscillator and a power amplifier. *all in one tube!*

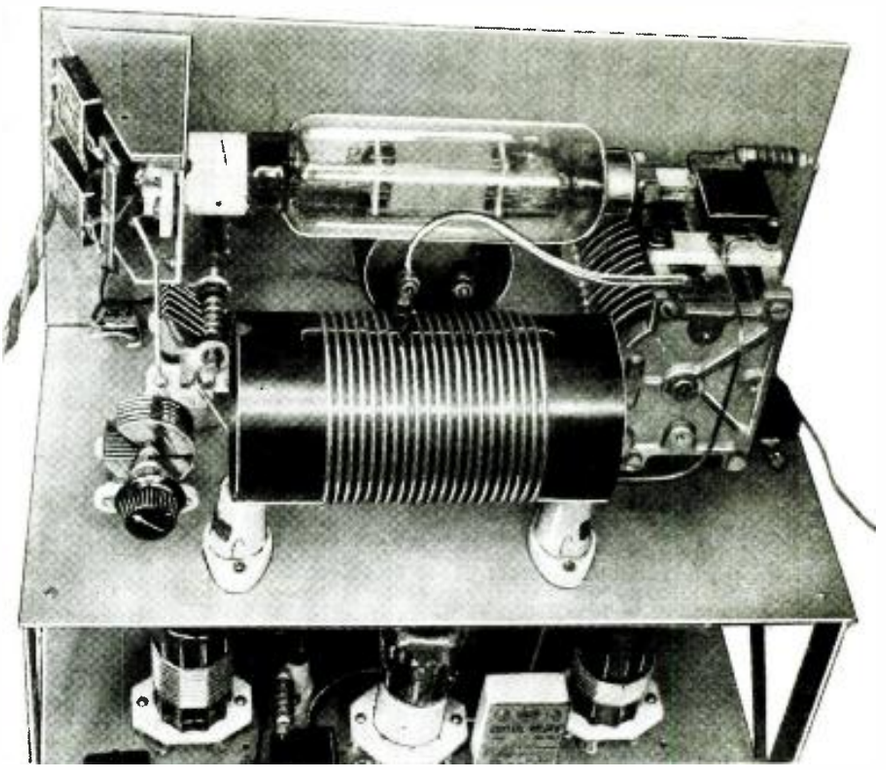
Here is a real "Ham" transmitter, up-to-date in every respect, uses the latest tubes, is crystal controlled, compact and very simple to operate. Outputs as high as 80 watts have been obtained very easily. This transmitter is ideal for the man who operates a radio station as a "hobby" and wishes to have a set which is both solid in construction and stable in operation. Only two tubes are used; an RK23 oscillator-amplifier and an RK31 class "B" triode as the final R.F. amplifier.

The output of the 23 can be tuned either to the crystal frequency, with no signs of instability, due to self-oscillation, or it can be tuned to the second harmonic of the crystal and still provide enough excitation for the 31.

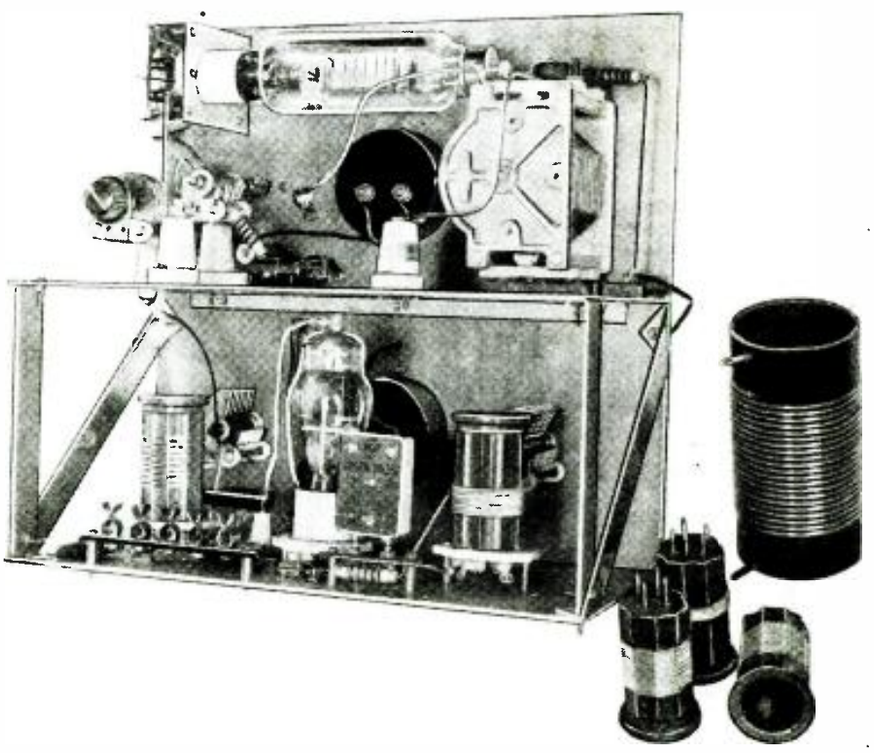
When operated on the 80 meter band with an 80 meter crystal the plate circuit is tuned to 80 and the amplifier is also tuned to 80. When operated on 40 meters the plate circuits of the 23 and 31 are both tuned to 40 meters. A 40 meter crystal can be used for 40 or 20 meter operation. On 40 the plate circuits are both tuned to 40 and on 20 they are both tuned to that band, the 31 always works as a straight amplifier.

The plate voltages to the 23 and 31 are parellel fed through an R.F. choke, in order that the tuning condensers could be mounted directly on the panel without insulation.

(*Continued on page* 367)



This view shows how the power tube is mounted horizontally, together with the placement of its associated parts.

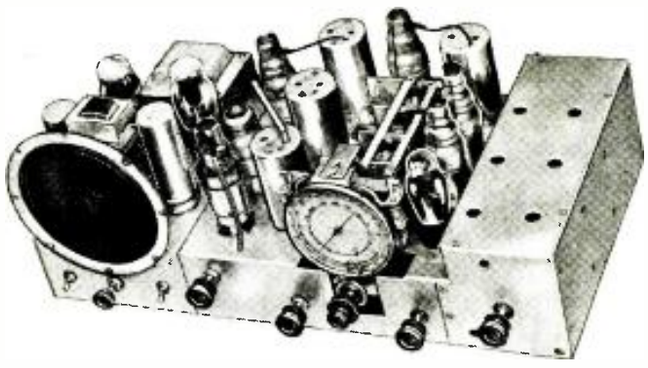


Rear view showing the oscillator-amplifier compartment at the bottom and further constructional details of the amplifier portion, with the large plug-in coil removed.

"Professional 9"—A Superhet in Kit Form

For Ham and Fan

By Frank Lester, W2AMJ*



The above photo shows the front view of the completely assemhled Lafayette "Professional 9"—a dandy receiver for the ham as well as the fan. Right: This photo shows chassis view of the Lafayette "Professional 9" receiver. No. 315.

● UNTIL recently, when the popular amateur receivers were of the tuned R.F.-regenerative type, there were plenty of good kits on the market, and the ham who wanted to assemble his own set had a wide choice of models. Today, however, with the superheterodyne in universal favor, the amateur who likes "to roll his own" finds, to his surprise, that the market offers very little in the way of worth-while kits. And this in spite of the fact that amateur activity is now greater than at any time in the history of the game!

Of course, there are many excellent factory-built receivers to be had, but even hams who can well afford to buy them inquire about kits because they obtain both pleasure and valuable experience in assembling and wiring a knock-down outfit The hitch in this connection is the difficulty experienced by the average ham in lining up the R.F. signal circuits. Unless a good service oscillator and a reliable output indicating device are available, this is a pretty messy job, and the builder is never certain that the receiver is working at peak effectiveness. Regenerative receivers were not subject to this shortcoming for the reason that their circuits contain no fixed-tune elements.

The answer to this problem is the pre-assembled and adjusted tuning unit. This idea is embodied very successfully in the Lafayette "Professional 9," a modern amateur receiver supplied in complete kit form, with a tuning range from 9.7 to 560 meters. The entire R.F. system, including a husky band switch and the twelve coils used in the pre-selector, mixer, and oscillator circuits, is furnished as a single, wired unit, which simply bolts onto the right side of the chassis and is connected by a few short leads to the accompanying three-gang tuning condenser and associated tubes.

This unit makes the assembly, wiring, and adjustment of the set as simple as that

(*Continued on page 373*)

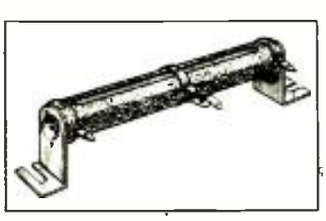
*Engineer, Wholesale Radio Service Co., Inc.

NEW APPARATUS FOR THE HAM

Midget "A" and "B" batteries. (H7)

Midget A and B Batteries. (H7)

Two new midget batteries have been introduced by the Burgess Battery Co., designed especially for portable use. In the photograph we have a 45-volt "B" battery and a 3-volt "A" battery. The "A" battery measures 1 3/32 by 2⅛ by 3¾ inches, and weighs only 8 ounces. The "B" battery measuses 1 5/16 by 3 1/16 by 4 1/16 and weighs just 14 ounces, and will give 22 hours of intermittent service.



Wire-woond resistors. (H8)

Wire-Wound Power Resistors. (H8)

This new I.R.C. wire-wound power resistor shown in the photograph is just one of a family, consisting of various sizes and ratings. It is wound on a non-hygroscopic ceramic base and protected by the new I.R.C. cement coating. This particular one happens to be variable, inasmuch as the slider attached to it can be set to any particular value of resistance within the range of the unit. These are ideally suited, as voltage dividers and bleeders, for "ham" power supplies.

New V-cut crystal. (H9)

V-Cut Quartz Crystal. (H9)

A large manufacturing Co. has just announced a new quartz crystal and holder for the transmitting amateurs. A new cut known as the V-Cut has been developed for very low temperature coefficient. In fact, the temperature coefficient is two cycles or less per million per degree of Centigrade. The holder is of the pressure-air-gap design, allowing the center portion of the crystal to vibrate freely, while the edges are held firmly in place.

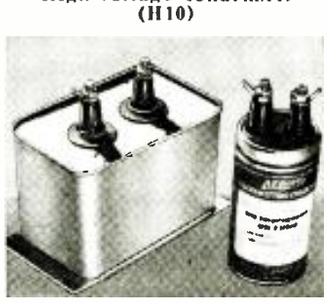
New H.V. Transmitting Condenser. (H10)

These transmitting condensers are hermetically sealed in porcelain cases and are made with a working voltage of 2500 volts and 4000 volts, and have capacities from .003 mf. up to and including .01 mf. These are manufactured by the Leichner Electric Company. The dielectric consists of the highest grade India ruby condenser mica obtainable, and insures long life and protection against puncture.

High Voltage Filter Condensers. (H11)

In the photograph we see two types of oil-impregnated, oil-filled transmitting condensers. These are manufactured by the Aerovox Corp., and are made in the following voltage ratings: 1,000, 1,500, 2 000, 2,500, 3,000, 4,000, and 5,000, and they can be obtained in either round or rectangular metal cans. Oil-impregnated condensers have a much higher-working voltage rating and, conse- *(Continued on page 381)*

High-voltage condenser. (H10)



Filter condensers. (H11)

New Burgess "A" battery. (H12)

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 (21540 to 15800 kc.).

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

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

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

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

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

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

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

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. 7:30-9:30, Sat. and Sun. till 10:30

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, INOO-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.

15410 kc. PRADO
-B- 19.47 Meters
RIOBAMBA, ECUADOR
Irregularly on Sun. 4:30-6 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, 10 a.m.-5p.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
6-10 a.m.

15220 kc. ★PCJ
-B- 19.71 meters
N.V. PHILIPS' RADIO
EINDHOVEN, HOLLAND
Sat. and Sun. 7:30-10:30 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., exeept Sunday

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

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

(All Schedules Eastern Standard Time)

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

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

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

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 a.m.-5 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.

11811 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

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

11715 kc. ★
-B- 25.61 meters
"RADIO COLONIAL"
PARIS, FRANCE
6-9 p.m.
10 p.m.-12 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

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

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.
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

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.

9600 kc. ★CT1AA
-B- 31.25 meters
LISBON, PORTUGAL
Tues., Thurs., Sat. 3:30-6 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
Sunday 12:30 a.m.-2:30 a.m., 4:30-8:30 a.m., 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
11 a.m.-6:50 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
3:15-7:30 a.m. except Sun. also Fri. 10:30 p.m.-2 a.m.

9570 kc. ★W1XK
-B- 31.35 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
SPRINGFIELD, MASS.
Relays WBZ, 6 a.m.-12 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.

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 5:25-11 p.m.
Sun. 4:15 p.m.-12 m.

9518 kc. ★VK3ME
-B- 31.54 meters
AMALGAMATED WIRELESS, Ltd.
G. P. O. Box 1272L,
MELBOURNE, AUSTRALIA
Wed., Thurs., Fri., Sat.
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

9500 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.

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.

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

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

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

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

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

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

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

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

7000 kc. 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.

6660 kc. ★TIEP
-B- 45.05 meters
LA-VOZ DEL TROPICO
SAN JOSE, COSTA RICA
APARTADO 257. Daily 7-10 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. OAX4B
-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
8 p. m.-12 m.
Sun. 3-10:30 p. m.

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

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

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

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

6120 kc. ★YDA
-B- 49.02 meters
N.I.R.O.M.
BANDOENG, JAVA
10:40 p.m.-1:40 a.m., 5:45-6:45 p.m., 5:30-11 a.m.

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

6112 kc. YV2RC
-B- 49.08 meters
CARACAS, VENEZUELA
Sun. 9:30 a.m.-10:30 p.m., Daily except Sun. 11 a.m.-1:30 p.m., 4-9:30 p.m., Tues., till 10 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, 4-10 p.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. ZHJ
-B- 49.41 meters
PENANG, MALAYA
Daily 7-9 a.m.
also Sat. 11 p.m.-1 A.M. (Sun.)

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

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

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

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

6060 kc. ★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. VQ7LO
-B- 49.50 meters
NAIROBI, KENYA, AFRICA
Mon.-Fri. 5:45-6:15 a.m., 11:30 a.m.-2:30 p.m. Also 8:30-9:30 a.m. on Tues. and Thurs. Sat. 11:30 a.m.-3:30 p.m. Sun. 11 a.m.-2 p.m.

6060 kc. W3XAU
-B- 49.50 meters
NEWTOWN SQUARE, PA.
Relays WCAU, Philadelphia
7 p.m.-10 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. YDA
-B- 49.67 meters
N.I.R.O.M.
TANDJONGPRIOK, JAVA
10:30 p.m.-1:30 a.m., 5:30-11 a.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.

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. ★COC
-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. 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.
Tues. and Fri. at 8:10 p.m.
Sun. at 7:40 a.m., irreg. Tues. and Thurs.

5970 kc. HJ3ABH
-B- 50.25 meters
BOGOTA, COLO.
APARTADO 585
7-11 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.

(All Schedules Eastern Standard Time)

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

5940 kc. TGX
-B- 50.5 meters
SR. M. NOVALES,
GUATEMALA CITY, GUAT.
Daily except Sun., 8-10 a.m., 1-2:30 p.m., 8 p.m.-12m.

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

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

5850 kc. ★YV5RMO
-B- 51.28 meters
MARACAIBO, VENEZUELA
5:15-9 p. m.

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

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

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

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

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

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.

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

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, KGHD, KGHE	Portable-Mobile In State of Wash.	2490 kc.
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	Laston, 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.	
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.

"WHEN TO LISTEN IN" Appears on Page 375

FOR TELEVISION STATIONS SEE PAGE 366

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

Hot Arguments For and Against "No-Code" License

Great Interest Shown Among "No-Code" S-W Men

Editor, Short Wave Craft:

● A HEADING in the current issue of *Short Wave Craft* reads: "Should We Have Code-Test for 6-Meter License?" As this problem which now exists before the radio public is of great interest to me I have watched for the comments and letters published in your magazine regarding it.

It is my sincere belief that code should not be a requisite, although an examination of technicalities should.

Certainly we seek progress in the short-wave field, this progress calls for *engineers*, be they amateurs or professional. For some time I have been attending radio meetings in both the service field of regular broadcasting and in the field of short waves, and I have definitely concluded that the *broadcast* men are more technically inclined than the short-wave hams, more desirous of knowing the "How" and "Whys" and spend more time in studying and keeping up to date on radio developments.

While the above paragraph may cause considerable "hell-fire" I believe it states a truth, as averages go. A few nights ago while at a short-wave meeting a noted radio engineer, no other than McMurdo Silver, gave an hour's lecture. Such lack of interest was shown that the presiding chairman had to ask for silence more than once. This thing could never have happened at a meeting of Broadcast Service Men, as I have seen them held spellbound for two hours by a speaker of much less renown. It is by such instances as these I have drawn my conclusions and made the above statement.

If the broadcast engineers, experimenters, or fans are technically inclined or wish to experiment on these short waves where there is plenty of room, and where the voice will no doubt be the system of communicating, who should stop them? They are the fellows who will put it ahead.

In the past I have experimented on the short waves and have passed code tests but have never established a ham station, as it is not the *communication* angle that interests me, but the *technicalities!* I shall do much in the near future to attempt improvements on the ultra-short wave sets. I hope that you are able, through your magazine, to help all who wish to experiment below 5 meters by arousing interest enough to convince the Federal Communications Commission that they should grant "no-code" licenses for experimental purposes.

E. L. DEETER,
7234 Wise Ave.,
Richmond Heights, Mo.

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.

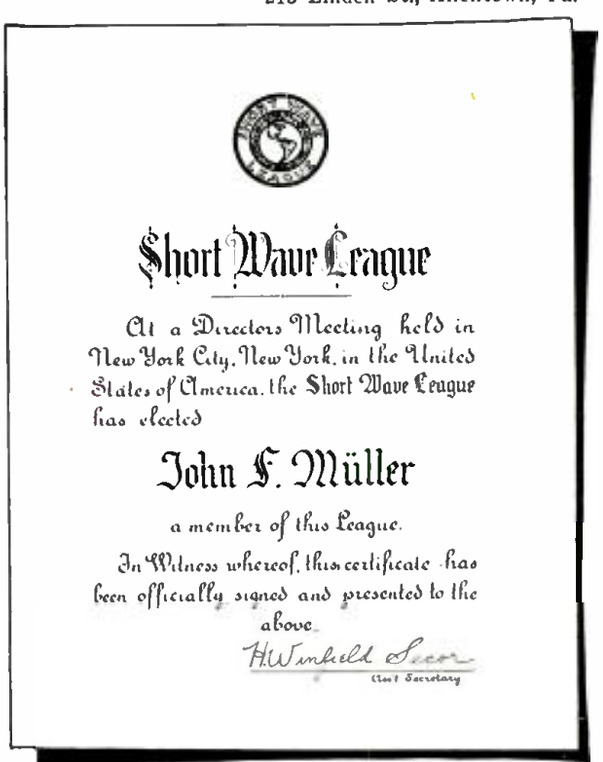
Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for $2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 99-101 Hudson St., New York.

Wants "No-Code" 5-Meter License

Editor, Short Wave Craft:

● HAVE just read your June issue and have noted among others the "smart" code argument sent in by the "lid" who signs himself W9DJX. I wonder if he thinks he's getting anywhere by favoring the code below 5 meters? I guess he knows the difference between "E" and "S" in *code*, also knows the big difference between a binding post and a variable condenser. This, as all intelligent hams know, is the art of operating a transmitter, Hi. Any amateur financially fixed, can purchase for himself a high-powered rig, and a code machine with which he can learn the "dits and dahs."

But look on the other side of the proposition. How about the poorer fellow who is radio-minded and cannot buy all the different so-called "code teachers," well, he'd have to be thrown aside, I guess. But we won't let these be cast aside. These small-time boys could do good and will do good provided they are given the band to work in, with a rig that *does not require a license!* Now we all know that 5-meter reception is scarce nowadays, and could be pepped up considerably provided the code be done away with. With 5-meter phone one cannot work distance, but look at the enjoyment that would be derived from it by the class of fellows just mentioned. All this talk of heterodynes and whistles and shrieks and howls that would interfere with other meter phones is a lot of hooey, not saying anything about that infernal "key-pounding" that takes place almost every time one sits down to enjoy broadcast DX. Just imagine the increase in the amount of sales done by a dealer that would be the result of more 5-meter phone work. I think that the fellows who have their tickets and are "ops" don't want to give in to the codeless license because they themselves had to do a wee bit more work in learning the code. I would call this JEALOUSY in capital letters. They got their tickets, O.K., but now give us a chance. They didn't gain or lose anything by learning it and neither will we. In closing I'll sign my 73's in voice, not "dits and "dahs." (To the codeless ticket boys, only.) "Hi." FRANCIS KMETZ,
213 Linden St., Allentown, Pa.



Short Wave League

At a Directors Meeting held in New York City, New York, in the United States of America, the Short Wave League has elected

John F. Müller

a member of this League.

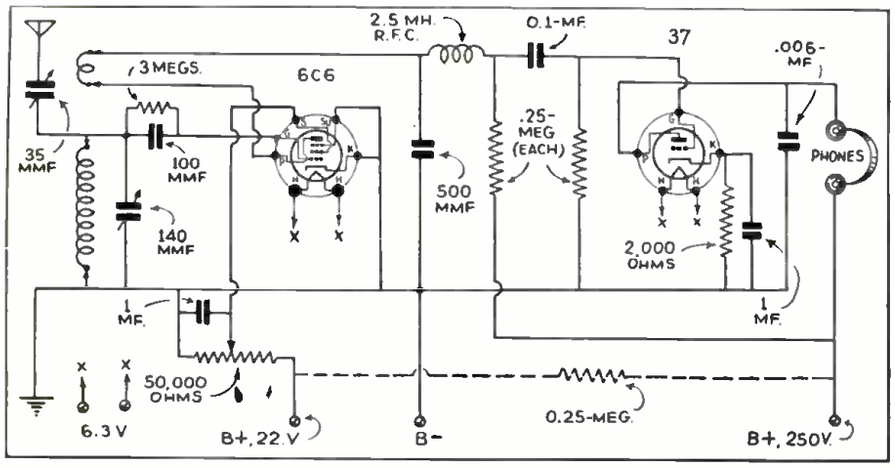
In Witness whereof, this certificate has been officially signed and presented to the above.

H. Winfield Secor
(Asst Secretary)

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 how to obtain certificate.

• • • Short Wave



2-Tube regenerative receiver.

2-TUBE RECEIVER DIAGRAM

Harry Stewart, Detroit, Mich.

(Q) I would like to have you print a diagram of a small receiver using a 6C6 and a 37. The 6C6 should be used as a regenerative detector with the regeneration control connected in the screen-grid circuit and resistance coupled to the 37 audio amplifier.

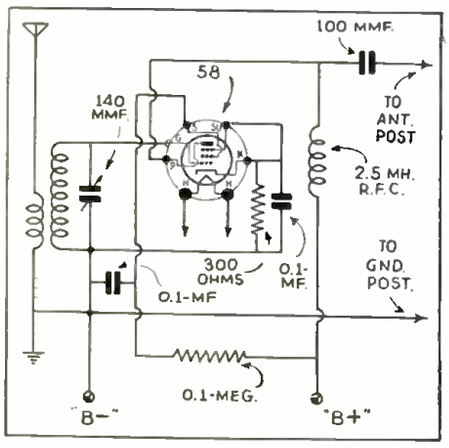
(A) We are very pleased to print the diagram you requested in your letter and it should make an excellent short-wave receiver. The power supply should deliver 250 volts of well-filtered direct current and approximately 22½ volts for the screen voltage or the 22½ and 250 volt taps can be joined with a 250,000-ohm resistor, eliminating the low voltage tap of the power supply. For battery operation, of course, this resistor will be unnecessary.

R. F. AMPLIFIER FOR ALL-STAR SENIOR

John Delaney, Worcester, Mass.

(Q) I have recently built the All-Star Senior and have obtained excellent results with it. I would like to know if the addition of an R.F. amplifier would improve reception. If so, would you be kind enough to print the diagram in the Short Wave Question Box?

(A) The addition of a tuned R.F. stage to any superheterodyne receiver most certainly improves reception. A good superhet should have at least one stage of tuned R.F. We are printing a diagram of such a stage and trust that you will obtain the desired results.



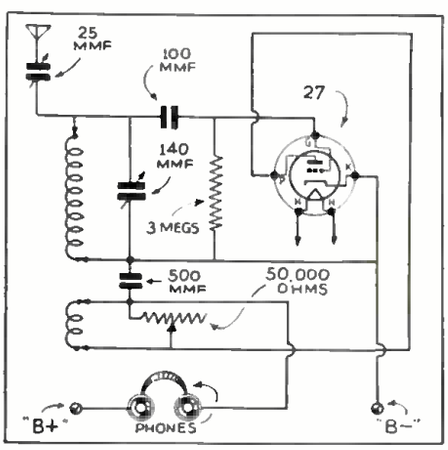
R.F. stage for All-Star Senior.

OSCILLODYNE DIAGRAM

Frank J. Mroczke, Milwaukee, Wis.

(Q) Would you please publish a diagram of the Oscillodyne known as the "1-tube Wonder Set"?

(A) The 1-tube Oscillodyne was undoubtedly one of the most popular receivers ever described in *Short Wave Craft*.



1-Tube Oscillodyne diagram.

This receiver, as you know, is a self-quenching super-regenerator and there will be a hiss heard in the earphones when it is working properly, although when a strong station is tuned in this hiss will disappear or become very weak. The amount of hiss that a station will suppress depends upon the strength of the received signal. Either a 227, 56, 37, or a 76 tube can be used providing, of course, that you apply the correct heater voltage.

DUST STORM AFFECTS RADIO

Ed Baker, San Jose, Calif.

(Q) During a recent dust storm I noticed that the 25-meter band produced unusually strong signals, while stations in the 31-meter band seemed to be weak. I could just about hear the American stations. I am wondering why the dust storm affected the short-wave bands and probably you can offer some explanation in your Question Box. The receiver used was an All-Star 8-tube set using regeneration in the first detector.

(A) It is impossible to say just what is going on because of the fact that no accurate measurements or observations were made in areas not affected by the dust storm. Although, it is quite possible that the dust storm would have some effect on the short-wave reception it is more than likely that the condition was caused by the effect of sun spots and just happened to take place during the dust storm. In order to check this further, it will be necessary for you to get in touch with someone who was living in an area outside of that affected by the dust storm and who may have kept an accurate log of the conditions on the 25- and 31-meter band at that particular time.

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-**

R.F. STAGE OSCILLATES

Lawrence Schoch, Boyertown, Pa.

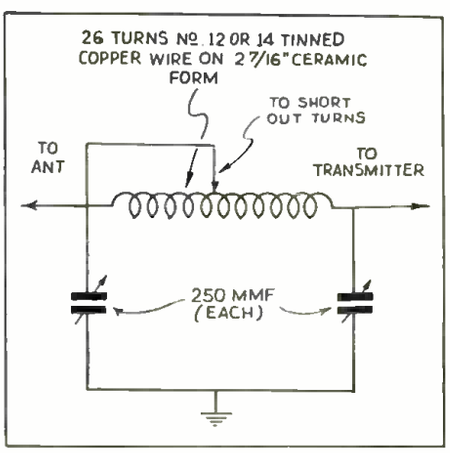
(Q) I constructed the receiver described in the November 1934 Question Box, using a 57 and a 56 and obtained excellent results. Later I added the tuned radio-frequency stage which was described in the January 1935 issue. Coupling it to my receiver, the R.F. stage oscillated instead of the detector and the gain control of the 58 seems to have very little effect. I have checked the connections and I cannot find the mistake. The coils are of the manufactured types for these tubes and the R.F. and detector stages do not track. Will you please tell me what the trouble is?

(A) Undoubtedly your trouble is due entirely to the lack of proper shielding. In all cases where tuned R.F. stages are used they should be shielded thoroughly from the detector stage. If you build the small R.F. stage in a small metal cabinet of some type we feel sure that you will not have the trouble you are experiencing. The reason the two stages do not track is probably due to the difference between the coil windings. It may be necessary to alter the R.F. coil slightly. If the R.F. stage requires less tuning capacity for a given wavelength than the detector stage, remove one or two turns at a time from the R.F. coil until the dials tune nearly the same.

ANTENNA COUPLING NETWORK

Albert Campbell, Keokuk, Iowa

(Q) Will you please publish in the near



Transmitting antenna tuning device.

QUESTION BOX

W. SHUART, W2AMN

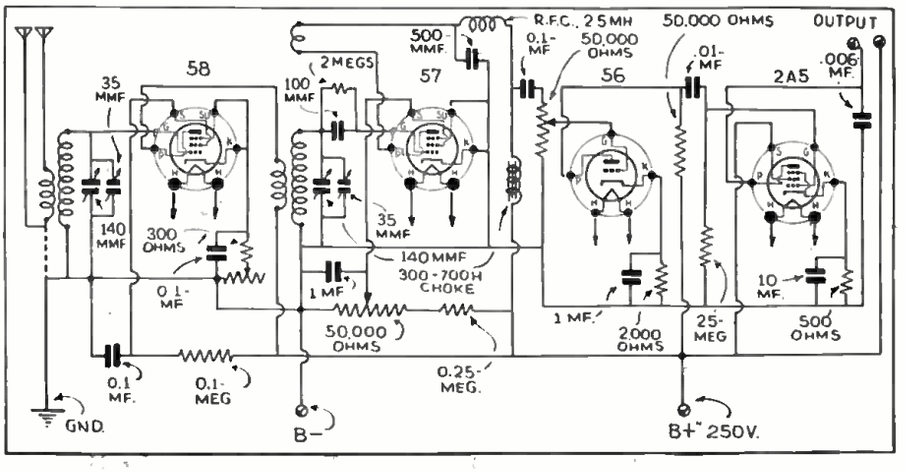
tance may be made in the form of stamps or coin.

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.

future the details of the impedance network for the low-power transmitter described in a previous issue of *Short Wave Craft*?

(A) You will find the diagram you requested printed on this page. The coil consists of 26 turns of number 12 or 14 tinned copper wire wound on a National XR10 coil form. The diameter of the form is approximately 2 7/16 inches. The tuning capacity of the condensers is 250 mmf.

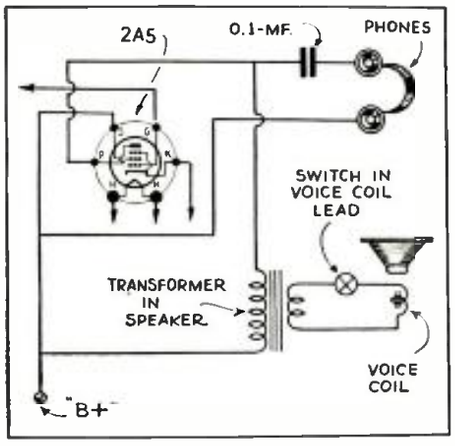


4-Tube receiver with two stages of audio.

CONNECTING EARPHONES TO THE RGH4

George H. Daniels

(Q) I would like to know if earphones could be operated with the RGH4 receiver without using the dynamic speaker at the same time. If so, please print such a diagram in your Question Box.



Connecting earphones to the RGH4.

(A) Earphones can be connected to the RGH4 as shown in the diagram. A single-pole single-throw switch should be connected in series with the voice-coil winding if you wish to turn the speaker off while using the earphones. The speaker must be plugged into the set in order to complete the filter circuit.

(Q) I notice that the 2A5 gets blue occasionally and wonder if this denotes an imperfect tube.

(A) The blue light you see on the glass of the 2A5 does not indicate that the tube is defective. This condition exists with most power tubes.

3-TUBE REGENERATIVE T.R.F. RECEIVER

Allen Lesikai, La Grange, Texas.

(Q) I would like to have you print a diagram in the Question Box of a 3-tube regenerative T.R.F. short-wave receiver using a 58 in tuned R.F. stage, a 27 regenerative detector. This set should use standard 4-prong plug-in coils in both R.F. and detector stages and 140 mmf. condensers for tuning and for the regeneration control.

(A) We have shown the circuit that you request and if you use care in constructing it, you should obtain excellent results. The tuned R.F. stage together with the audio amplifier should bring in the strong signals with volume sufficient to work a small speaker. However, earphones will be necessary where the less powerful stations are concerned.

4-TUBE T.R.F. RECEIVER

Charles M. Bend, Jr., St. Paul, Minn.

(Q) I would greatly appreciate it if you would print a diagram of a 4-tube amateur receiver in your Question Box. I would like to have a 58 tuned R.F. amplifier and a 58 or a 57 detector. Someone told me that a 58 gave smoother regeneration; which should I use? The detector is to be followed by a 56 amplifier coupled to the detector by a National coupling unit. The output amplifier should be a 2A5 resistance coupled to the 56. I will use small variable condensers for band-spread.

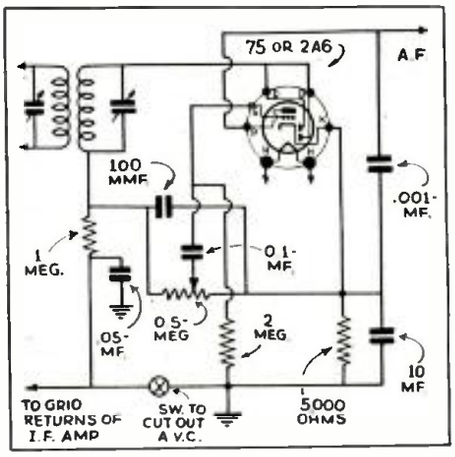
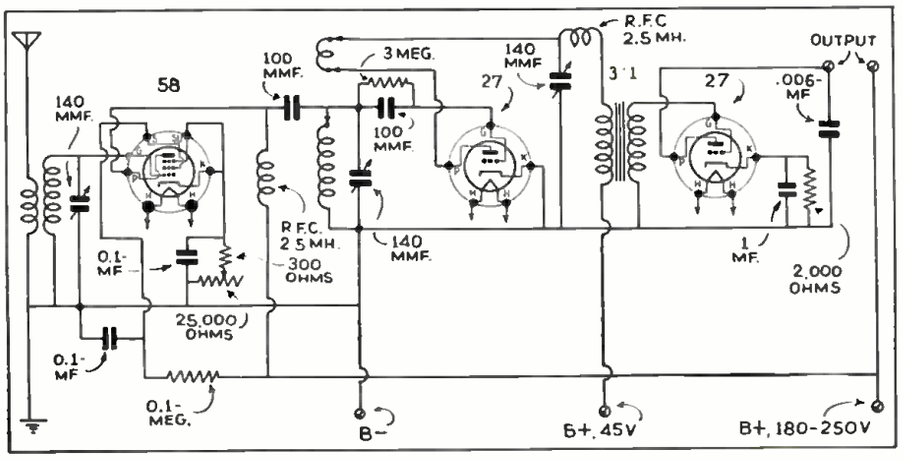


Diagram of A.V.C. circuit.

(A) The 4-tube tuned R.F. receiver diagram appearing on this page should make an excellent amateur stand-by receiver. We have shown two volume controls; one is in the R.F. stage and another in the first audio stage. The use of an extra control in the audio circuit is well worth while because the output of the set can be cut down without disturbing its R.F. sensitivity. Regeneration is controlled by varying the screen-grid voltage of the detector tube, which can be either a 57 or a 58. We prefer the 57, although the 58 seems to work very nicely with no change in the circuit.



3-Tube T.R.F. receiver.

A.V.C. DIAGRAM

James Boland, Portland, Ore.

(Q) Please print in your Question Box a diagram showing how to incorporate A.V.C. (automatic volume control) in the All-Star Senior receiver.

(A) Automatic volume control is a distinct advantage in short-wave superheterodynes where phone reception is concerned. However, it is of little benefit, in fact, quite a disadvantage when receiving C.W. code signals, therefore, in the diagram we have shown a switch which can be used to cut out the A.V.C. action.

Short Wave SCOUT NEWS

Report from Alan E. Smith, M.D., Chester, Vt.

● GREETINGS to all readers of *Short Wave Craft* and to any new friends I may make through this little monthly report.

First, I want to tell you how pleased I am with my Trophy. It is a very handsome piece of work, and is really worth working for. It would add a lot to any listening post or den, with its shiny silver finish.

Second, I would like to make you acquainted with the Quixote Radio Club and its weekly newspaper the *Short Wave Reporter*. This club is run on a non-commercial basis and is exclusively for the service of its members. The newspaper does not carry any advertisements, but devotes itself to NEWS about the short waves, of interest to all short-wave tuners. A "trial" subscription of four weeks for twenty-five cents is offered to all who care to write to P. O. Box 73, Hendersonville, N.C.

Now for my reports of the month:

The usual foreign "locals" were heard with very loud signals during the greater part of the period. Several new stations were heard, and many of the older ones were heard with increased volume, either from increased power or new transmitters.

GSI, Daventry, 15,260 Kc., heard one Sunday, very good signal.

I2RO, Rome, heard on 9,630 and also on 11,810 Kc. Both very good signals. The American Hour is heard well on 9,630 Kc.

CT1AA, Lisbon, heard once on 11,990 Kc., testing.

PHI and PCJ, Eindhoven, seldom heard, and then with poor signal.

COCD. Habana, 6,130 Kc. A new station, first heard early in June. Has strong signal, but being between W2XE and W8XK, is often drowned out. Is heterodyned by HJ1ABE, when latter is on the air, as HJ1ABE has recently moved to 6,130 Kc. When both are on, neither is understandable.

HJ5ABE. Cali, Colombia. Another new broadcaster, first heard early in June. Operates on 14,120 Kc., and is often interfered with by hams, both on fone and cw. Comes in with fair signal. Has an interval signal of three strokes on deep-toned gong.

HJ1ABJ. Santa Marta, 6,006 Kc. Coming in very well. I have heard they have a new transmitter in operation. They have a good-looking veri card.

TIGPH. San Jose, Costa Rica. 5,823 Kc. Heard every night with loud signal. Announces as "Radio Alma Tica."

HJ3ABF. Bogota. 6,180 Kc. Heard many evenings, good signal.

YN1GG. Managua. 6,385 Kc. Heard three evenings. Fair signal. Announces as "La Voz de los Lagos." Have a good veri from them.

HH. Santo Domingo. 14,950 Kc. A recent addition to the chain of phones around the Caribbean. Works WNC. Heard once at 4:45 p.m.

TI5HH. San Ramon, Costa Rica. 5,500 Kc. Heard two evenings in succession at 9:45 p.m.

TIRCC. San Jose. Owned by La Soledad Catholic Church, on 6,550 Kc. Has a fair signal. Heard on Sunday evenings best, but is on daily 6-7 p.m.

TIPG. San Jose. 6,385 Kc. Heard one evening at 10 p.m. Announces as "La Voz de la Victor."

GAS. Rugby. 18,310 Kc. Heard one Sunday working WLA. Then sent program for CBS.

HCK. Quito, Ecuador. 5,900 Kc. Wed. July 17, 10:30 p.m.

Veries received this month, COCD, HJ5ABE, PRF5, YV2RC (has a new good-looking card besides the booklet it sends), I2RO (new type), LKJ-1 (on 9.568 Kc), HC2JSB, PPV (11,560 Kc.). CWG (11,370 Kc.).

Listening Post Report from Tulsa

● DIAL twisting here at this post has been very disagreeable owing to the hot weather, but in spite of the heat, I managed to receive some. I heard all of the "foreign locals" such as: GSG, GSF, GSD, GSE, GSC, GSB, EAQ, 2RO, DJB, DJD, FYA. These were all heard daily and with good volume as a rule.

FYA—Was heard a number of times on 11,875 kc. around 2:00 a.m. to about 3:00 a.m. C.S.T. with a strong signal.

JVM—Heard around 1:00 a.m. C.S.T. on 10,740 kc. daily.

JVF—Irregularly around 6:00 p.m. or 7:00 p.m. C.S.T. on 15.61 megs.

JVE—Irregularly 6:00 p.m. or 7:00 p.m. C.S.T. on 15.6 megs.

KTO—Manila, P.I., on 16.24 megs., 5:30 p.m. C.S.T., irregular.

PLE—Bandoeng, heard at 6:30 p.m. C.S.T. on 18.830 kc., irregularly.

VK2ME—Sydney, heard on 9.590 kc. Sunday mornings up to 1:00 a.m. C.S.T.

I2RO—Rome, heard on what they call the "American Hour" on 9.64 megs. at 5:00 p.m. C.S.T. on Monday, Wednesday and Friday.

FQO—Ste. Assise, on phone, heard at 1:30 a.m. C.S.T. on 12,151 kc., irregularly.

OPM — Leopoldville, Africa — heard on 10,140 kc. three times this month.

HH—Santo Domingo—heard on about 10,056 kc. at 7:40 p.m. C.S.T., irregular.

GBB—Heard on 13.585 kc.

VPD—Suva, Fiji Islands—heard on 13,075 kc. at 11:30 p.m. to 12:30 a.m. C.S.T.

Verifications received this month so far are: PRADO, LSN, DBJ, DJD, DJC, LSX, I2RO.

WADE CHAMBERS,
Tulsa, Okla.

Dr. Alan E. Smith Likes His Trophy

Photo above shows Dr. Alan E. Smith, M.D., of Chester, Vt., and his "Short-Wave Scout Trophy," awarded in the August issue, may be seen reposing on top of his Midwest 16-tube receiver. Dr. Smith has given us a very fine report this month and we again congratulate him on his success in winning the Trophy.

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

Geo. D. Sallade, Sinking Spring, Pa., Reports

● SEVERAL months ago, on April 30 to be exact, I quite accidentally tuned in a station on 14,700 kc. After about two hours of listening I was able to ascertain several facts. First, the "Internationale" was played several times, and second, the entire program seemed to be a patriotic demonstration. I finally concluded that I was hearing a Soviet disseminator broadcasting a "May Day" program. Only twice during the entire program was any identification given, and each time it sounded like "Radio Omsk."

To satisfy my curiosity and possibly obtain a confirmation on such a "rare catch," I wrote a lengthy letter on what I had heard to the Peoples Commissariat for Postal and Electrical Communications at Moscow.

The following is the reply received:

Moscow, the 21st June 1935

Dear Sir:

We beg to refer to your letter of the 1st May addressed to the Peoples Commissariat for Postal and Electrical Communications and handed to us for reply.

In accordance with your request, we hereby confirm your reception of our Omsk Short Wave Station. We may add that this station as a rule works on the telegraph and does not broadcast programs regularly.

Have you ever heard our RNE and RKI, Moscow?

Yours very truly,
Signed R. GIGLIN.

All Union Radio Committee,
Foreign Bureau

Station CEC, located in Santiago de Chili, is now sending out musical programs each Tuesday and Thursday according to an announcement made from that station. The time is 8:00 to 9:00 p.m. E.S.T. and the frequency is 10,670 kc. Very good reception was had on several of these broadcasts. CEC verifies all correct reports. Their address is: Compania de Telefones de Chili, Santiago de Chili, S.A.

From Wm. C. Palmer, Cleveland, Ohio

● THE following is my report for June enclosed. Three powerful short-wave stations from Ireland will soon be on the air. They will be on 13.96 megs., 9.06 megs. and 5.06 megs.

I received a set of Burgess batteries this month regarding the offer made in *Short Wave Craft* to the winner of a trophy using "BB" of which I was very glad to get, as I have used "BB" for the past four years and will always continue to use them, and I highly recommend them for perfect short-wave reception.

Veries received this month: PRF5 and HP5B; EAQ=ISWC of London—special. W8XK, LSX, OPM, OPL of Leopoldville. Belgian Congo, Africa. Amateurs—LU6AP, HI7G. All of the veries I have, have been obtained with the aid of a *Twinplex* receiver and I think OPM and OPL is very good, having picked these up, and verified, on the Twinplex. I would be glad to hear from others, and their results with this receiver. I also would be glad to exchange S.W.L. cards with others.

(*Continued on page* 377)

5 Meter T.R.F. Receiver

(*Continued from page* 336)

The T.R.F. stage uses a 954 screen-grid pentode, the detector uses a 955 triode and either a 41 or a 42 can be used in the output stage, with the 42 providing slightly more volume, which is useful on the weaker stations.

Starting with the R.F. stage—there is nothing unusual about this part of the receiver other than the shielding which, incidentally is very important and the design should be followed very carefully. Different methods of coupling the R.F. stage to the detector were tried and providing a well designed choke is used, the method shown in the diagram gives best results and smoothest operation. The choke was wound with 30 turns No. 28 D.S.C. wire on a ¼ inch round victron rod, with the turns spaced the diameter of the wire. It might just as well have been wound on a 1-watt isolantite resistor; one having a resistance of several megohms would serve very nicely.

The grid coil is mounted on a victron base so that coil can be changed in case the set is used on other bands; small jacks serve to hold the coil in place. The tuning capacity for the R.F. stage is 15 mmf. A smaller capacitor will give more spread, although the R.F. stage tunes rather broad and is not difficult to adjust. Separate controls are used for the R.F. and detector stages in order that construction could be simplified and also enables us to quickly try various circuit arrangements.

The detector circuit is probably the most unusual and will immediately cause great excitement among those who disagree with the principle. Feed-back sufficient to cause super-regeneration, is obtained by tapping the cathode on the grid coil at a point *above* ground potential. After experimenting for a good many years with self-quenching super-regenerators we found that by following the old rule of using a great number of turns and a small amount of tuning capacity does not work out so well with this type R.F. detector. In fact as we increased the inductance and decreased the capacity, the signals became weaker and the sensitivity appeared to be on the wane. By *increasing the capacity and decreasing the inductance, the sensitivity was better and the audio output was raised a good many times!* The ratio of L and C, we found depends a great deal upon the type tube used as the detector. The 955 requires a lot higher "C" circuit than the standard tubes, such as the 56 or 76. There is a definite indication that super-regenerators require a high "C" circuit, however there is no advantage in carrying it too far as the sensitivity begins to fall off rapidly after a certain ratio is passed. The values shown in the diagram give best results with the 955. A small National mica padding condenser is soldered directly to the grid inductor, so that when the coil is changed no readjustment is necessary. The output of the R.F. stage is not coupled directly to the grid end of the detector coil, it is clipped on about one-third the length of the coil—*from the B minus end.*

All R.F. by-pass condensers are of the midget, moulded-mica, insulated type and although the capacity .0001 mf. seems small compared to usual practice, it is correct and recommended by the makers of the tubes. The tuning capacity of the detector is the same as in the R.F. stage (15 mmf.) but due to the parallel loading capacity provides greater band spread, the five meter band being spread over the entire dial.

The sockets are the new National ceramic type, excellently suited to this type of receiver because they can be mounted flush to the metal shield plates. We are informed that there will be a new National socket having a metal base plate, further increasing the shielding effects and which will probably be available by the time this article appears.

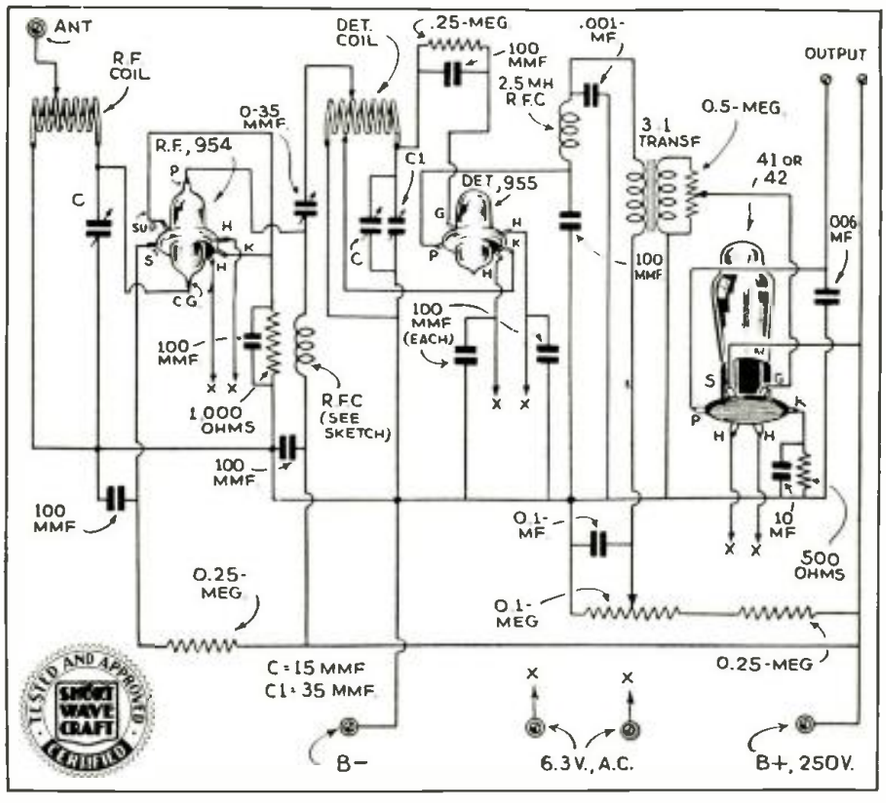
Chassis

The chassis is constructed of aluminum and supports most of the apparatus, how-

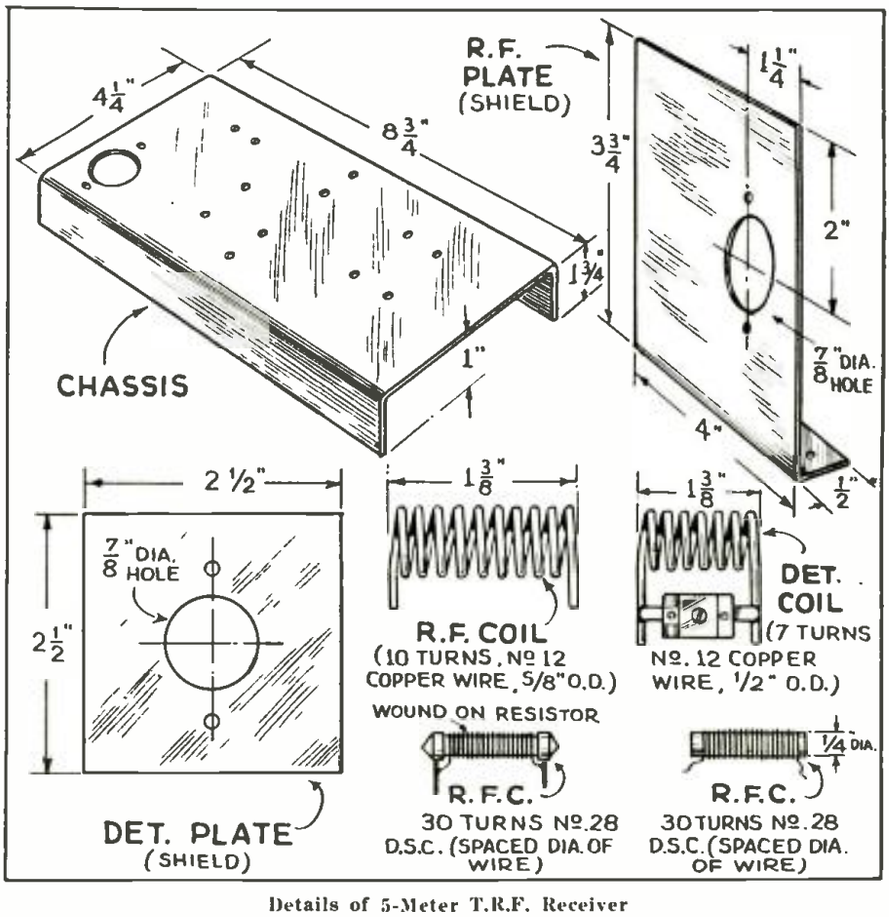
ever the copper partition between the R.F. and detector stages supports the R.F. tube and its associated by-pass condensers. The tube is mounted in the socket so that the plate terminal projects into the detector section, allowing shorter leads. The socket is mounted with the heater terminals towards the rear of the set, making the screen and suppressor terminals on the socket reversed—the suppressor terminal is now the screen and vice versa.

The detector is mounted on a small square piece of copper, similar to the R.F. stage, although short leads require that this be mounted flat-wise. All condensers are grounded directly to the copper plates.

As for results—well, this receiver will bring in stations not heard in the "rush"



Hook-up of 5-Meter T.R.F. Receiver



Details of 5-Meter T.R.F. Receiver

of other super-regenerators. Because of its sensitivity the weaker stations suppress a greater amount of rush and consequently are more intelligible. Because of the A.V.C. action of the super-regenerator stations do not come in with a higher audio level, but the hiss goes down which is just what we need—*less hiss and more signal!*

Parts List—5 Meter T.R.F. Set

2—15 mmf. tuning condensers—National.
2—35 mmf. padding condensers—National.
7—.0001 mmf. mica condensers—Aerovox.
1—.001 mmf. mica condenser—Aerovox.
1—.006 mf. mica condenser—Aerovox.
1—.1 mf. by-pass condenser—Aerovox.
1—10 mf. electrolytic by-pass condenser—Aerovox.
1—1000 ohm, ½ watt resistor—I.R.C.
2—¼ meg. ½ watt resistors I.R.C.
1—500 ohm, ½ watt resistor—I.R.C.
1—250,000 ohm, 1 watt resistor—I.R.C.
1—100,000 ohm potentiometer—Electrad.
1—.5 meg. potentiometer—Electrad.
1—Type 100 R.F. choke—National.
1—Special R.F. choke—see text.
2—Ceramic acorn sockets—National.
1—6-prong wafer socket.
2 flexible couplings—National.
1—3:1 audio transformer.
For chassis details see drawings.
1—Crowe cabinet 9½"x5"x6½", crackle finished.
2—vernier dials—National.
1—954 Acorn tube.
1—955 Acorn tube.
1—41 or 42 pentode tube.
Coil data for 5-meter band—given in the diagram.

Ultra Short-Wave Cheese

(*Continued from page* 326)

the raw material of cheese. The results obtained have been surprising: it was found not only possible to shorten the time previously found necessary to obtain the important rennin fermentation, but also to produce a cheese of an excellent quality.

Despite the fact that each textbook covering the production of cheese relates a number of factors which affect the change of milk into cheese, and despite the fact that the temperature is of great importance for the conversion process, no explanation—in the strict scientific sense—could be given of how the cheese fermentation is speeded up by applying ultra short waves.

The heating effect of ultra short waves on various materials brought into its field is well known, and that the temperature is of great importance is indicated by the fact that the optimum fermentation process is obtained only in the temperature range between 40° to 42° Celsius (104°-108° F.) while no coagulation occurs between 10°-15° Celsius (50°-59° F.) nor about 60°-65° Celsius (140°-149° F.). However, nothing could be found which gave a clue as to what really happens when ultra short waves are applied. There is of course the conjecture that the application of a specific wavelength over an exact limited time, does not only stimulate an at present unknown biological effect, but also promotes in the raw material for the cheese production, special chemical conditions of entirely even characteristics.

Or in other words, the application of ultra short waves helps the rennet fermentation to "grow" easier, and it promotes favorable conditions that all parts of the material to be converted into cheese are "well done" at the same time, thus evolving a process which creates a very even quality, and also a very fine-tasting cheese.

The first experiments were made with a 100-watt transmitter, variable in frequency between 30 and 40 megacycles (10-8 meters): recently an 800-watt transmitter with a 3-meter wavelength was used. The entire process is, as reported by Dr. Korber, far from the point of an absolute control. However, the advantages of the new method of cheese production are so impressive, that no one will be surprised if, in a short time, "short-wave cheese" will be among the foodstuffs nationally advertised.

3-Tube Autodyne Set

(*Continued from page* 333)

to say, all coils must be wound in the *same* direction. The tapped turn connected to the fifth prong on L4 should be counted from the bottom or grounded end.

It should be understood that the number of turns given in the table can be only approximate, as their exact number will vary with the placement of wires and parts of each receiver, the minimum capacity of the tuning condenser, etc. The specifications supplied, however, will be very close. Bear in mind that adding turns to L2 and L4 will *increase* the wavelength or reduce the frequency, while removing turns will *decrease* the wavelength or *increase* the frequency. Any adjustment made on L2 must be duplicated on L4, that is, these two coils must always have the same number of turns, otherwise the tuning system will not "track." No revision of the specified number of turns for L1 and L3 should be necessary as these are not critical.

Adjusting for Best Oscillation

If the instrument does *not* oscillate, include more turns at the tap of L4; move the tap higher up in the circuit diagram, as it were. Reduce the number of turns included by the tap if it oscillates too freely. This connection should be finally set at the point where the set just oscillates throughout the band, with the regeneration control R6 set about halfway.

The functioning of the audio choke L5 is important. While an audio transformer with its primary and secondary connected in series will give satisfactory results, a proper impedance manufactured for the purpose will give better results. If the tuning condensers C1 and C2 are not fitted with pigtail leads, these should be added as reception on the lower wavelengths may otherwise be noisy. All R.F. leads should be grounded at the same point. If aluminum is used a copper strip should be bolted to the chassis for the purpose, as aluminum cannot be entirely relied upon as an R.F. conducting medium, due to poor contact at joints.

To place the set in operation insert a pair of coils in their sockets and allow the tubes to heat up. Now rotate the resonating or bandsetter condensers C3 and C4 until a station is heard or resonance is indicated by the noise-level. Then tune in the stations with the tuning control.

Coil Turns Data

Amateur Bands—C1, C2 = 35 MMF					
Band	L1	L2	L3	L4	Tapped
160 M.	10	55	30	55	3rd turn
80 M.	6	28	20	28	1st turn
40 M.	5	11	9	11	½ turn
20 M.	3	5	5	5	¼ turn
Short Wave—C1, C2 = 100 MMF					
Meters	L1	L2	L3	L4	Tapped
150-200	12	60	35	60	4th turn
70-155	7	30	22	30	2nd turn
30- 75	6	12	10	12	1st turn
20- 35	4	6	5	6	½ turn

List of Parts—3-Tube Autodyne Set

C1, C2—100 mmf. condenser for short wave —35 mmf. for amateur bandspread. Hammarlund.
C3, C4—100 mmf. variable condenser. Hammarlund.
C5—250 mmf. fixed condenser. Aerovox.
C6—.01 mf. fixed condenser. Aerovox.
C7—1 mf. fixed condenser. Aerovox.
C8, C9—100 mmf. fixed condenser. Aerovox.
C10—.01 mf. fixed condenser. Aerovox.
C11—1 mf. fixed condenser. Aerovox.
C12, C13—.1 mf. fixed condenser. Aerovox.
L5—Audio choke—see text.
R1—300 ohms, 2 watts. I.R.C.
R2—50,000 ohms. I.R.C.
R3—10,000 ohm potentiometer (vol cont.). Electrad.
R4—100,000 ohms, 1 watt. I.R.C.
R5—13,000 ohms, 5 watts. I.R.C.
R6—50,000 ohm potentiometer (reg. cont.). Electrad.
R7—5,000 ohms, 5 watts. Electrad.
R8—1 meg. grid-leak. I.R.C.
R9—2,000 ohms. I.R.C.
R10—1 megohm. I.R.C.

A 2-Tube Beginner's Receiver

(*Continued from page* 335)

pose of the filament is to heat the cathode. This means that the current flowing in the filament circuit is independent of the plate and grid, so that raw A.C. may be used in the filament circuit without causing hum. The suppressor grid is connected directly to the cathode at the socket. In using the 6C6 tube in the present circuit, it is desirable to obtain plate voltage as high as possible up to the recommended rating of 135 volts. On A.C. the electrolytic condenser nearest the cathode of the rectifier functions to increase the voltage within certain limits. Thus a condenser having a capacity of 4 mf. will result in a plate voltage slightly higher than the line voltage, 8 mf. will increase the voltage still more, etc., up to about 16 mf. The selected value of 8 mf. has been found most suitable for all-round work. As regards the voltage on the screen-grid, this should be nearly as high as that on the plate, but it is necessary to utilize it from the plate source for best results. Therefore, we employ a 25,000-ohm resistor in series with the screen grid, bypassing this with a .1 mf. cartridge condenser. If too high a resistor is used at this point it will decrease the volume materially.

Regeneration Control

The tickler of the plug-in coil is connected in the plate circuit in the conventional manner for obtaining regeneration and it is shunted by means of a potentiometer. The best value for this potentiometer is about 75,000 ohms, although the set will work fairly well with a resistance at this point as low as 25,000 ohms or as high as 200,000 ohms. Connected between the movable arm of the potentiometer and ground is a small fixed condenser, the value of which may be from .0001 to .002 mf. depending upon the characteristics of the plug-in coils employed. With the Hammarlund coils specified, the value of .002 mf. was found to give best results for the smooth and even control of regeneration.

The antenna trimmer condenser at C1 is a necessary adjunct to the circuit since it improves selectivity on broadcast reception and permits finer adjustment on short-wave reception. This circuit does not require an external ground, since the ground connection is obtained from the power line. However, a small .1 mf. condenser connected as shown by the dotted lines can be used in series with the ground if the constructor insists on having one.

Range of 17 to 560 Meters Covered

Through the use of the five plug-in coils, it is possible to cover the complete band from 17 to 560 meters. Those who wish to go lower or higher than this, may do so through the use of specially constructed coils.

In assembling the set, the sockets are secured to the chassis as a first step. The tube shield base is fastened on with the same screws as hold the 6C6 socket. Next the filter choke is mounted over one of the extra socket holes as shown. The main tuning condenser is secured to the chassis at the center, while the regeneration control-switch is fastened to the panel at the left and the *band-spread* condenser is fastened to the panel at the right. The dual earphone jack is mounted on the rear chassis wall, also the antenna trimmer.

Coil Data

Meters	Grid Turns	Length of Winding	Wire Size	Tickler Turns
17-41	9	1¼"	No. 16*	4
33-75	18	1½"	No. 18*	6
66-150	38	1⅝"	No. 24*	11
135-270	81	1¾"	No. 26†	18
250-560	140	2⅜"	No. 29†	30

Coil diameter 1½ inches, 2½-inch winding space
*Tinned Bare
†Enameled

Latest TUBE DEVELOPMENTS

New Tube Developments

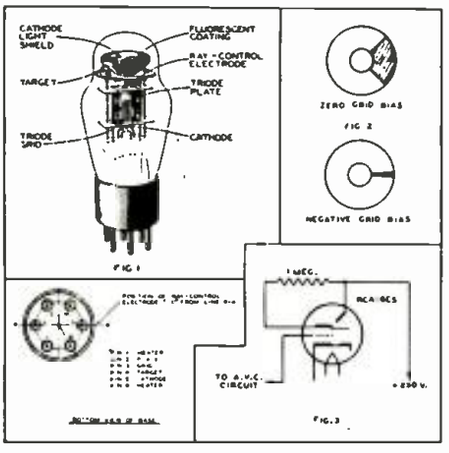
RCA-6E5—Electron-Ray Tube (Indicator Type)

● THE 6E5 is a high-vacuum, heater-cathode type of tube designed to indicate visually the effect of change in the controlling voltage. The tube, therefore, is essentially a voltage indicator and as such is particularly useful to facilitate exact tuning of a radio receiver.

The visible effect is observed on a fluorescent target located in the dome of the bulb. For different controlling voltages, the pattern on the target varies through a shaded angle from 90° to approximately 0°. Exact tuning is indicated by the narrowest shaded angle obtainable.

The RCA-6E5 provides a convenient and non-mechanical means to indicate accurate tuning of a receiver to the desired station.

In the basic design of an electron-ray tube, a hot cathode provides a source of electrons. These are attracted to a positively-charged target coated with a fluorescent material. Electrons impinging on the coated target cause it to glow. The extent of the fluorescent area can be controlled by means of a third electrode placed between cathode and target. The pattern developed on the fluorescent target depends on the contour of the target



New tube which gives visual indication of changes in control voltage.

as well as on the position and shape of the third electrode.

Details of the physical arrangement of electrodes are illustrated in Fig. 1 which shows a cut-a-way view of the RCA-6E5. The third electrode is identified as "ray-control electrode," and is an extension of the triode plate. The visible effect producted by different voltages on this electrode is shown for two adjustments by the shaded areas of Fig. 2. The voltage on the ray-control electrode is determined by the voltage applied to the grid of the triode connected as a d-c amplifier. A series resistor of one megohm is placed between the triode plate and the high-voltage supply to which the target is directly connected, as shown in Fig. 3.

The effect of the series resistor is to reduce the voltage applied to the triode plate, and consequently to the ray-control electrode, under conditions of decreased triode-grid bias (increased triode-plate current), for conditions of increasing triode-grid bias (decreasing triode-plate current), the triode-plate voltage increases and approaches the value of the supply voltage. In the practical use of the 6E5 as a tuning indicator, controlling voltage applied to the triode grid is obtained from a suitable point in the a.v.c circuit.

The *bulb* of this tube becomes hot under certain conditions of operation. Sufficient ventilation should be provided to circulate air freely around the tube to prevent overheating.

The *heater* is designed to operate at 6.3 volts a.c. The transformer winding which supplies the heater circuit should operate the heater at its recommended rating for full-load operating conditions at average line voltage.

The *cathode* of the 6E5 should preferably be connected directly to the electrical mid-point of the heater circuit. In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

Tentative Data (6E5)

Heater Voltage (AC. or D.C.)		6.3	Volts
Heater Current		0.3	Ampere
Plate-Supply Voltage		250 max.	Volts
Target Voltage		250 max.	Volts
Typical Operation:			
Plate- and Target-Supply Voltage	200	250	Volts
Series Triode-Plate Resistor	1	1	Megohm
Target Current (Approx.)	4.0	4.5	Milliamperes
Triode-Plate Current for Zero Triode-Grid Voltage	0.2	0.25	Milliampere
Triode-Grid Voltage for Shadow Angle of 0° (Approx.)	−6.5	−8.0	Volts
Triode-Grid Voltage for Shadow Angle of 90° (Approx.)	0	0	Volts
Maximum Overall Length			$3\frac{5}{8}$"
Maximum Diameter			1-9/16"
Bulb			ST-12
Base			Small 6-Pin

"Phantom Cell" Works without Light Beam

● THE Lumenite Phantom Relay cell is an electrostatic device operated by the approach of any body or object, without the use of photoelectric or other light rays.

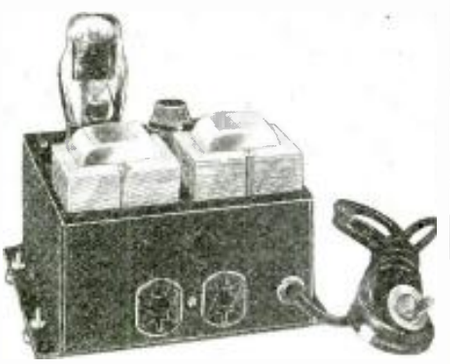
This cell is housed in a black steel case, the approximate size of which is 6" by 8". It is supplied with a power cord and two outlets for normally "on and off" power loads. The Antenna Control Knob, for balancing the unit, transformers and amplifier tube are mounted on top of case.

Inside this case are the special condensers, contact-making relays, resistances and other equipment that are required to complete the operating characteristics of this cell. Phantom relays are designed to operate on 115 volt A.C. 25 to 60 cycles, 115 volt D.C. or on dry-cell batteries.

The antenna lead is brought out to what eventually constitutes the control point, such as window screen, wall safe, door knob, etc. The case is grounded to any convenient point, such as water pipe, radiator, etc. The load to be operated, such as light, alarm bell, buzzer, etc., is connected to the desired outlets in the case.

The function of the antenna system is to control the impedance of the grid circuit. When a person approaches or places his hand in proximity of the antenna, the capacity of his body changes the impedance of the grid circuit in such a way as to cause a more positive charge upon the grid, thereby causing the magnetic contact relay to energize and operate the load devices.

This phantom relay has many interesting uses such as alarms being sounded; animated advertising activated by passers-by or by the touch of a spot on the window from the outside, etc.



The Phantom Cell—the approach of a body causes a bell to ring, etc. No. 318.

New Metal Tube Receivers

(*Continued from page* 342)

cause this tube is smaller and made of metal, the working parts can be built very close to the base, thereby shortening the wire leads within the tube and providing better control of high frequencies. Also, the lead wires within the tubes are more widely separated. Hermetically sealed in steel against air and gas by Thyratron welding, there is no leakage.

The Sentry Box—The sentry box is a subassembly containing the radio-frequency circuits of the receiver. It selects and aligns the receiver with the various tuning bands. Its design has made it possible to eliminate connecting leads almost entirely, except those necessary for vacuum tube connections. This has greatly simplified the under-chassis wiring. The coils are mounted directly on the selector switch, assuring the shortest possible paths and connections.

The Permaliner—The permaliner is a new type trimmer capacitor. Sealed against moisture and dirt, it is unaffected by temperature changes, and assures proper and permanent alignment of the circuits of the receiver.

Sliding-rule Tuning Scale—The sliding-rule tuning scale is a horizontal rotary scale printed on an opaque cylinder, upon which only one scale is visible at a time. It protrudes slightly into the front of the panel and may be seen plainly from either a standing or sitting position. A vertical pointer, operated in each case by the right-hand knob on the receiver, indicates the frequencies. The scale is softly illuminated over its entire length. A turn of a knob on the extreme left brings a new scale into a visible position and aligns the receiver to another reception band.

Stabilized Dynamic Speaker—The new stabilized dynamic speaker is projection-welded—a process which fuses all parts of the metallic framework into one integral piece, thereby insuring accuracy and permanency of alignment of every part of the speaker, and improving it both electrically and mechanically; electrically because there are no magnetic obstructions or losses due to gaps in joints; mechanically because all parts remain rigid and true throughout the life of the set. The voice coil at the end of the cone operates in a limited cylindrical air space and never varies from its path. This makes possible more faithful reproduction, longer life and greater stability.

Cabinets—The cabinets of the new radio receivers were styled by Ray Patten, in collaboration with a group of the foremost furniture designers in the country, and present a new mode in modern design.

Leroy May's Station

(*Continued from page* 338)

Vacuum tube volume indicator for controlling input to transmitter.

Power supply 250 volts, for pre-amplifiers, auxiliary receiver, relays, etc.

Auxiliary receiver, 5 tube, autodyne regenerative.

Couple of blank panels for more "junk" later.

Receiver: It is a McMurdo-Silver type 5-B, with 8-inch dynamic speaker (mounted on speech rack).

Antennas: Various. Some short. Some long. At present I am using one in attic and working on 14 mc. phone.

LEROY W. MAY, JR., W5AJG-W5COC,
1511 Garrett Ave.,
Dallas, Texas.

(Certainly a crackerjack station, Leroy, and we are glad to award you the prize of one year's subscription to Short Wave Craft for the photo and description of your dandy station layout.—Editor)

Walter Doerle's "Third" Article!—In the NEXT Issue!

A Novel 4-Tube A.C.-D.C. Receiver

(*Continued from page* 343)

This control has a tapered resistance characteristic and gives a vernierlike control to this adjustment. In case regeneration control is not smooth with this type of control, the remedy is to reverse the connections to the two outer terminals. Feedback is accomplished by the coil L3, connected in the plate circuit of the detector stage.

The audio-frequency component of the output voltage generated across R5 (250,000 ohms) is resistance-capacity coupled into the grid of the 76 first audio amplifier. The by-pass condenser C4 (0.00025 mf) tends to prevent the entrance of R.F. voltages into the audio frequency amplifier. Bias for the 76 tube is obtained by means of the resistor R8 (2500 ohms). A gain of approximately 7 is realizable from this stage. The output of this stage is resistance-capacity coupled into the pentode section of the 12A7 tube. Bias for the power stage is supplied by the resistor R10 (4,000 ohms). The by-pass condenser C9 (10 mf.) insures distortionless amplification from this stage. The pentode section of this tube has a very high amplification factor and produces considerable signal output.

The filaments of this receiver are connected in series, the current being limited to the proper value by means of the resistor R11. This resistor is built into the line cord in the fashion common to A.C.-D.C. receivers. The rectifier section of the 12A7 furnishes the means of converting the A.C. house lighting voltage into a form suitable for use in the receiver. A single section filter using a 30 henry filter choke and a dual section filter electrolytic condenser having a capacity of 12-16 mf. is ample for removing all traces of A.C. hum from the receiver. Tunable hum effects are prevented by means of the by-pass condenser C10 (0.01 mf.).

The tuning control uses a high ratio, illuminated, airplane-type dial. Both the switch, regeneration control, and bandspread condenser are adjusted from the front of the cabinet.

A New 6-Tube Dual-Wave Superhet

(*Continued from page* 343)

balancing tool, start with the first I.F. plate condenser and adjust for maximum response in the loudspeaker or on the output indicator. Next, the grid condenser of the same transformer is adjusted and finally the last two I.F. transformers are adjusted in rotation in a like manner.

It is best to go over this procedure three times in order to insure a proper balanced condition at 465 kc. For those who do not possess a test oscillator, the set can be satisfactorily lined up by ear with the following procedure: A weak signal is tuned in on the 49-meter band and the plate condenser of the first I.F. transformer is adjusted for the loudest signal without oscillation. Next the grid condenser of the same transformer is adjusted for a like condition. It will be necessary to adjust the first detector balancing condenser during the balancing adjustment to provide for maximum response. The remaining I.F. transformers are balanced in a like manner in rotation. The balancing procedure should always start with the first I.F. transformer, then following to the second and third transformers to attain desired results.

After balancing adjustments are made, the set is ready for operation.

Required Parts

1—Drilled EAGLE chassis and base
1—Crowe airplane tuning dial
3—Hammarlund I.F. trans. 465 kc.
1—EAGLE power transformer
2—Hammarlund coil shields
4—Tube shields
2—Wafer sockets, 4-prong
1—6A7 wafer socket and tube

2—6D6 wafer sockets and tubes
1—6C6 wafer socket and tube
1—42 wafer socket and tube
1—80 wafer socket and tube
1—5-prong speaker socket
6—EAGLE coils, range 10-225 meters
2—Broadcast coils, 210-550 meters
1—Dynamic speaker, 1800-ohm field
1—Two-gang .000365 variable cond.
1—Single .00014 variable cond.
5—Fixed cond. cap. 1-400 v. tubular
1—.00025 mf. mica cond.
2—.0005 mf. mica condensers
1—.01 mf. tubular cond.
1—.25 mf. 400 v. tubular
2—8 mf. electrolytic cond. 525 v. peak
1—Potentiometer 500,000-ohm w. switch
1—Potentiometer 20,000-ohm resist.
3—300-ohm 1-watt resistances
2—25,000 ohm 1 watt
1—100,000 ohm 1 watt
1—2000 ohm 2 watt
1—1000 ohm 2 watt
1—2500 ohm 2 watt
1—R.F. choke 85 M.H.
1—Line cable and plug
1—Ant. Gnd. twin post
2—Multiple resistance mount. strips
1—Pilot-light for airplane dial
4—Molded bakelite knobs
Hardware, solder, lugs, etc.

Television Stations

(*Continued from page* 352)

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.

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.

The RK 23-31 Ham Transmitter

(*Continued from page* 347)

Front Panel Layout

Looking at the front panel we have the cathode tuning condenser in the lower left corner, a 0-50 milliammeter to the right of it, and the plate tuning condenser further to the right. Between the meter and the plate condenser is the switch used to cut off the plate voltage to the oscillator. All the parts below the shelf are associated with the 23 oscillator. The amplifier is above the shelf and the plate condenser is on the left and the 0-200 milliammeter in the center and the neutralizing condenser on the right. To the right of the neutralizing condenser dial is the jack used for *keying* the transmitter. The two jacks grouped together are for reading the plate current of the oscillator and the grid current of the amplifier. The plug is connected to the 0-50 m.a. meter, which is used for this purpose. The oscillator plate current is read in the cathode circuit so that both jacks need not be insulated from the panel.

Appearance from Rear

Looking at the back views we find that the cathode coil is on the right side and the plate coil on the left with the RK23 in the center. The RK31 is mounted horizontally with the base over the plate coil of the oscillator, so that the R.F. feed wire between the 23 and the grid of the amplifier would be no longer than necessary. The variable excitation-control condenser is located behind the neutralizing condenser. A variable condenser for R.F. coupling allows the proper amount of excitation to be obtained on the various bands. When mounting the tube flat-wise the *narrow side of the plate should be up* with the filament prong toward the panel both for short leads and so *that the filament won't sag and touch the grid.* Also do not make the plate clip, which supports one end of the tube, too tight or have it press against the top plate of the tube, because when the glass envelope expands and the tube lengthens there will be a strain on the glass which is liable to be disasterous.

Tuning the "Rig"

Tuning this "rig" is very simple if the following suggestions are followed. When operating the transmitter on the crystal frequency set the cathode tuning condenser at mid-scale (these adjustments hold true only for the coil data given) turn on the oscillator B voltage and adjust the oscillator plate condenser for minimum plate current. Then with the 31 filament lighted and the amplifier B voltage off—close the key circuit and put the ground clip on the 6th turn from the neutralizing condenser end of the amplifier coil; the neutralizing condenser should be set to full capacity. While rotating the plate tank condenser back and forth, adjust the neutralizing condenser until swinging the plate condenser has a *minimum effect* on the oscillator plate current. Now open the key circuit and apply the B voltage to the amplifier. Close the key and immediately adjust the plate condenser until the plate current is at a minimum value. Then plug the 0-50 m.a. meter into the grid current jack and adjust the oscillator cathode and plate condensers for *maximum* grid current (with the excitation condenser set at half-capacity) the grid current will probably drive the meter off scale. But when the antenna load is connected it will drop to about 40 m.a. In all cases when operating on the Xtal frequency the grid current should be 40 mills. For forty meter operation the same procedure is followed except that the plate of the oscillator is tuned to forty meters and the ground tap on the amplifier plate coil will be set at the center of the coil.

When operating on twenty the ground

tap is also in the center of the twenty meter coil and adjustments are the same as outlined for operation on 40, except that a 40 meter crystal is used and we tune the oscillator plate to 20 meters. On 20 meters the amplifier grid current will be about 30 or 35 m.a. With the antenna coupled to the amplifier the plate current should not exceed 125 milliamperes for long tube life, whether we are working on 80, 40 or 20 meters, and the plate of the tube should show no more color than a dull cherry red.

We have operated this transmitter for about two months and, Boy! does it get out! With the aid of an RCA "V-cut" crystal it sounds like a temperature controlled commercial transmitter — no frequency drift and as "clean cut" as any rig we have ever operated.

Parts List for 23-31 Transmitter

1—14"x14"-3/32" thick Electralloy panel I.C.A.
2—7"x14"-1/16" thick Electralloy panels—I.C.A.
1—325 mmf. midget variable condenser-Hammarlund.
1—200mmf. midget variable condenser—Hammarlund.
1—35 mmf. midget variable condenser—Hammarlund.
1—35 mmf. double-spaced midget condenser—Hammarlund.
1—.00025 mf. TC-225-B transmitting condenser—Hammarlund.
3—.01 mf. mica condensers, 1000 volt—Aerovox.
4—.001 mf. mica condensers, 1000 volt—Aerovox.
2—.001 mf. mica condensers, 5000 volt—Aerovox.
1—10,000 ohm 10 watt resistor—Aerovox.
1—750 ohm 25 watt resistor—Aerovox.
1—100 ohm center tapped resistor—Aerovox.
4—2.1 m.h. R.F. chokes—Hammarlund.
1—7-prong large isolantite socket—Hammarlund.
3—4-prong isolantite sockets—Hammarlund.
5—4-prong plug-in coil forms—Hammarlund, XD53.
1—80 meter plug-in transmitting inductance—Wholesale Radio—see text for details.
1—0-50 ma. meter Triplett—bakelite case.
1—0-200 ma. meter Triplett—bakelite case.
2—Single closed-circuit jacks—I.C.A.
1—Single open-circuit jack—I.C.A.
2—Stand-off insulators—jack type for plug-in coil mounting.
4—Dials and pointers—(4 inch)—I.C.A.
1—S.P.S.T. toggle switch.
1—RK23 pentode tube.
1—RK31 class B amplifier tube.
1—V-Cut crystal and holder.

Coil Data—23-31 Transmitter

AMPLIFIER PLATE

Band	Turns	Wire
80-40	20	No. 12 B&S*
20	12	¼" Copper tuhing†

*Spaced diameter of wire on 3" bakelite tube. Distance between pin-plugs—5½". †2½" inside diameter; total length of coil 5½".

OSCILLATOR PLATE COILS

Band	Turns	Length of Winding
80 meters	26	2 inches
40 meters	15	1¼ inches
20 meters	8	1¼ inches

Wound with bare tinned No. 18 gauge copper wire.

OSCILLATOR CATHODE COILS

	Turns	Wire
80 meters	14	No. 18 D.C.C. Close wound
40 meters	6	No. 18 D.C.C. Close wound

Oscillator coils are all wound on Hammarlund XP-53 coil forms, 1¼ inch diameter, 4 prongs.

$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 (Sept. 15 for the December 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.

The Radio Amateur

(Continued from page 345)

trons from the stream and return them to the cathode, causing current to flow in the grid circuit.

In receiving circuits the output of the vacuum tube depends upon the plate current change. that is, the increase and decrease in amplitude or, more simply stated, the magnitude of the change. So, we can readily see that by using this control grid, which is located close to the filament, we can effect great changes in the current flowing in the plate circuit of the vacuum tube with relatively small changes in the potential of the grid and thus obtain considerable amplification in radio circuits.

In Fig. 5a we show what happens when A.C. is applied to the input circuit of a triode, biased (bias usually means applying a fixed negative or positive charge, independent of the signal voltage, to the grid of the tube) so that the plate current is of fairly low value, but nowhere near the cut-off point. We show the input signal to the grid as alternating current, where it rises above and falls below the zero mark. As the input signal swings the grid more positive, or better stated—less negative—the plate current begins to rise above what is commonly termed the "no-signal" (static) plate current value; that is, the normal value of plate current with no applied signal.

This constitutes one-half of the cycle of the input signals. On the other half of the input-signal cycle, the grid becomes more negative, causing the plate current to fall below its normal no-signal value. (See previous explanation under "How the Grid Works.") Now, in the plate circuit, we have apparently the same wave form as the input signal. The input signal was A.C.; however, A.C. does not flow in the plate circuit of the tube. This fluctuating replica of the input signal is termed the *alternating component* of the plate current. ("Plate current" is the current flowing through the circuit from plate to filament, or heater, when the electron stream is established by heating the filament.)

If we were to connect earphones in series with the plate circuit, we would be able to hear the incoming signal reproduced and amplified in the plate circuit, that is if it was of low enough frequency to come within the range of the human ear.

The fluctuating plate current or the alternating component of the plate current would cause the diaphragm of the earphone to vibrate due to the varying current flowing through the phones and the change in the magnetic pull on the diaphragm.

So long as the voltage of the incoming signal does not exceed the value of the bias battery, there will be no grid current flowing, because the grid will never go completely positive. On the positive half of the input signal the grid, in reality, becomes just *less negative.*

If we were to insert a resistor (R) in series with the plate circuit, the fluctuating current flowing through this resistor would cause a voltage drop across the resistor, varying directly with the plate current. The ratio of this *varying* voltage drop to the input signal voltage, is known as the *gain* of the tube or the *voltage amplification.*

Tubes Have Capacity Between Elements

In all types of vacuum tubes, we have in reality a number of small condensers in that there is a definite electrical capacity, for instance, between the plate and the grid, between the grid and cathode, and also between the plate and cathode, for the simple reason that each of these elements can be likened to the plates of a small condenser (current absorber). The grid to cathode capacitance is termed the *input capacitance.* The *output capacitance* is the capacity between the plate and cathode. In many very "high-gain" circuits, it is necessary to neutralize the plate to grid capacity in order that energy will

not be fed back from the plate circuit to the grid circuit.

The Screen-Grid

This can be accomplished either by external methods of *neutralizing*, which will be explained in a later lesson, or by inserting a shield or a screen between the plate of the tube and the grid. This is commonly termed the *screen-grid* and tubes having a control grid and a *screen-grid*, together with the anode and cathode, are termed *tetrodes*.

This screen-grid is so designed that it will effectively shield the plate from the grid. While the plate to grid capacity of a triode may be as great as 8 mmf., the plate to grid capacitance of a screen-grid tube may be reduced to a value as low as .007 mmf. This screen must be constructed so that it will not materially obstruct the flow of electrons between the cathode and plate; therefore, it is made in the form of wire mesh.

It also must not be negatively charged because the flow of electrons would also be impeded. Therefore, a positive potential is in most cases applied to the screen-grid in order to accelerate the flow of electrons to the plate. This screen being an electrostatic shield must be by-passed with a condenser to the cathode in order to be *grounded*, in so far as high frequency currents are concerned.

The voltage applied to the screen is usually lower than the plate voltage. The stream of electrons going to the plate being greatly accelerated by the screen-grid, may strike the plate at such a terrific speed that they will dislodge other electrons, which may be attracted to the screen, which is the nearest positively charged element. This is known as *secondary emission* and limits the output capabilities of the tube. This condition can be overcome by inserting between the screen and the plate another element which will not obstruct the flow of electrons to the plate but prevent them from returning to the screen.

In order to accomplish this, the third grid or *suppressor* is usually connected directly to the cathode in order that electrons dislodged from the plate may continue back via the suppressor to the cathode.

In some tubes such as the types 34 and 39 this suppressor is connected directly to the cathode of the tube internally. However, tubes such as types 57 and 58 have a separate pin on the base for this suppressor grid, in order that in special circuits a *positive* or a *negative* voltage may be applied to it. The values, of course, will be dependent upon the circuit requirements. In large transmitting tubes of the *pentode* type (pentode is a name given to all tubes having 5 elements), this suppressor is positively charged to the order of 30 or 40 volts.*

*Some excellent books covering the electron theory and the operation of electron tubes are:
"Electrons at Work," by Charles R. Underhill.
"Radio Receiving Tubes," by Moyer & Wostrel. The RCA Tube Manual also contains a wealth of information covering the operation of various types of vacuum tubes.
"Principles of Radio Communication," Prof. John H. Morecroft.
"Modern Vacuum Tubes and How They Work," by Robert Hertzberg.

211-D 50 WATT TRANSMITTING TUBES

● The 211-D 50 watt transmitting tube here shown is one of the well-known Western Electric line of heavy duty transmitting tubes. These tubes have a standard 50 watt base and the tube is interchangeable with the type 211 and 211-A tubes.

The 211-D transmitter tube has the following characteristics:

Filament volts, 10; filament current, 3 amperes; normal plate voltage, 750 to 1,000; average plate current, 65 milliamperes; plate impedance, 3,500 ohms; normal R.F. power output as an oscillator, 50 watts; as an amplifier, 100 watts. (No. 317.)

The "Police Alarm" S-W Receiver

(*Continued from page* 331)

"Gnd" connection to the set. Then following from right to left along the rear edge of this subpanel, you see the two filament clips (2.5 volts A.C.), the .00025 mf. grid-condenser C, the 5-megohm grid-leak R mounted on top of it, and finally the two clips respectively for the 45-volt and 90-volt B+ screen-grid and plate leads to the tubes.

On the extreme left of this subpanel are the "Phones" clips and near the front panel is the 5-to-1 ratio audio transformer.

Then traversing back across this subpanel is the 27 audio-amplifying tube, the tickler and secondary coils (L2, L1 with the *regeneration shield* between them) and the '24-A detector tube as shown with the flexible lead from the grid-condenser and leak to the cap on the control grid of this tube. Remember the screen-grid connection to this tube is the "G" terminal on the tube socket.

Minor Constructional Details of Importance

The eye quickly catches that which appears to be extraordinary and it is with this point in mind that your attention is drawn to some "made-at-home" features. Thus first for consideration, is the "half-stripped" tuning condenser—Station Chooser C1. This variable condenser had 19 plates, 2½" in diameter, but to make it a .00025 mf. all but five rotor plates were left intact. The others were politely ejected and you too will find it very easy to remove condenser plates from too-large condensers, with a few strong twists of pliers gripping them. Also pulling out these unnecessary plates nearer the control panel makes for better elimination of body capacitance effects.

The *regeneration shield* next falls in line for our argument, which is shown as a right-angled piece of thin metal between the two coils L1 and L2. This is easily made from a small piece of sheet-tin cut 2¾"x3½". It is mounted with the 2¾" dimension vertical and bent in the longer dimension so that the sides of the angle are 1½" and 2". The 2" side slides between the ⅛" spacing between coils L1 and L2.

This right-angled shield is fastened to one end of a 4" length of ¼" dowel-wood by means of a small wood screw. The other end of this dowel has a small knob on it which proves quite effective for moving this shield to and fro so that best regeneration conditions result. Then a 4" length of very flexible-stranded wire is soldered with one end to the shield and the other end to Gnd. or cathode connection of the audio tube, which in turn is grounded.

The Bandspread condenser is made with five pieces of material—three of sheet-tin and the other two of ¼" dowel-wood. The two stationary plates are cut 2"x2½" with a ½" bent from the longer dimension. Two ¼" holes are punched through the centers of the ½" side and these stationary plates are bolted to the subpanel with ½" spacing between them.

The plate which slides between these two is cut 2"x1½". This allows the shorter-dimensioned edges to be inserted in "saw-cut" grooves in short lengths of ¼" dowel, which for convenience sake will be called "spacers." The top spacer is squared-up from the round stock, a coping-saw cut is made about half-way through and then this 2" length grooved piece pressed over the upper edge. Thus the top spacer prevents this movable center plate from touching either of the secondary plates. And for the bottom spacer, this is a 4" length of ¼" dowel dressed down and grooved similarly for 2" of its length. The bottom edge of the movable plate is pressed in the groove. The remaining 2" of the dowel projects through a ¼" hole in the control panel and the knob fastened on the end.

As with the regeneration shield, a 4"

length of very flexible-stranded wire has one end soldered to this moveable plate and the other end soldered to the rotor connection of the large tuning condenser C1. The two stationary plates of this home-made *bandspread* condenser are connected by means of a small "jumper-wire" to each other and then a lead from this jumper to the stator connection of C1. This makes the *Station Chooser* and *bandspread* condensers connected in parallel.

The antenna coupling condenser C2, best shown in the photo to the extreme right of the screen-grid tube, is made of two plates of sheet-tin cut 1½"x1¾". Then an edge of ¼" is bent at right angles, making the condenser area 1½"x1½". These plates have an ⅛" hole punched through the center of the folded edges, and then mounted on the subpanel with a ⅛" space between them. To one plate is also fastened a clip (same screw holding plate and clip) which permits of an antenna lead-in to be connected to the set. The other plate is connected to the grid-condenser and leak as shown by the "Police Calls" receiver circuit diagram.

The coils L1 and L2 are made thus: 20 turns of No. 18 D.C.C. copper wire are close wound on 2¾" diameter wooden or cardboard tube forms. L1 form is 1½" wide and L2, 1½" also. Both forms are held to the subpanel by use of 6/32 machine screws. And as has been stated, the spacing between these forms is ⅛" and must be adhered to if results are going to be consistent with the physical dimensions of the condensers C1, bandspread and regeneration shield. Also in winding these two coils, the wires are wound in the same direction around each form.

For constructing the radio frequency choke coil (R.F.C.), the following method was used and it produced the job in jiffy time. A drill brace was clamped in such a manner in a small bench-vise so that the handwheel was free to turn in a horizontal position. A 3" length of ¼" dowel was chucked up in the bit-holder, No. 36 D.C.C. copper wire was started very close to the outer end of the dowel and by turning the handwheel with one hand and letting the wire feed from the spool of No. 36 through the fingers on the other hand, very little time was required to run 1000 turns of wire onto the dowel. This winding was close-wound like that on a spool of thread for a distance of 2". Thus when completed, the choke winding was 2" long and had about 5 layers with 200 turns per layer. The finishing loops on the ends were hitched back on themselves, thus preventing the turns from unravelling.

Testing and Operating the Set

Here's a typical "police call":

"Calling car 17. Patrol your district. Keep eyes open for green sedan. Has three men. Wanted for night raid on downtown jewelry store."

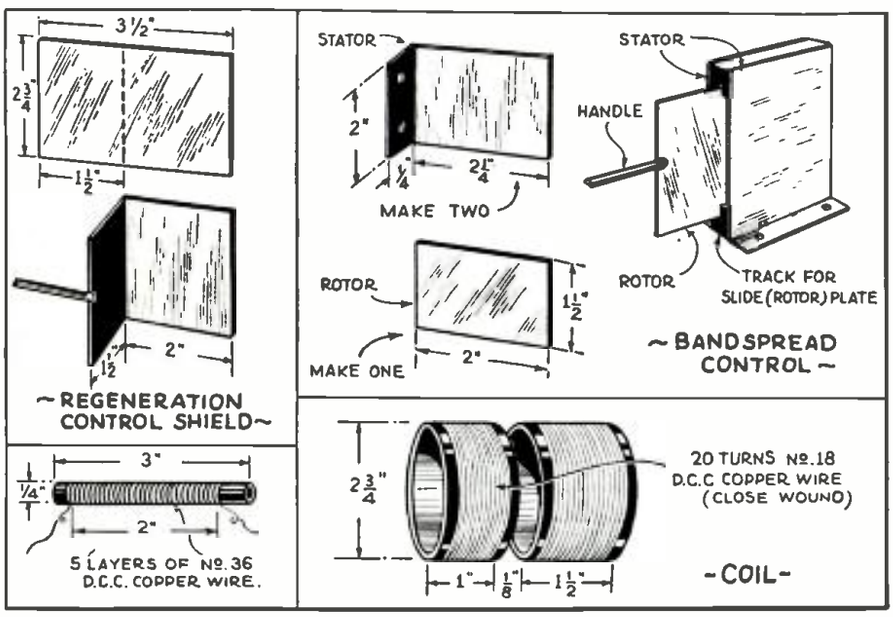
When your set has been built according to the foregoing description, this is the procedure you should use in getting best results. The tubes are in the sockets, the *Station Chooser* condenser rotor plates turned about halfway into the stator, the regeneration control handle pulled toward you so that the shield is all the way out from between the coils L1 and L2. By means of power supplied to this set, say from the filament transformer (110-2.5 V.) and "B" eliminator arrangement, or by means of leads from a modern broadcast-receiver power-unit, let the tubes warm up and listen in the headphones. Some puttering will go on, but soon the tubes will come to a stable point of operation. And as they do so, you probably will hear the set break into oscillation or squeals. Let this not trouble you, but push in the regeneration control slowly. Soon a position of the shield is reached where the squeals hush down to that of a spring zephyr blowing or the roar of the sea in a conch shell. This is the best condition of operation in which you should keep your set while listening for announcements.

Turn the large knob slowly and if a strong squeal is heard, that indicates in most instances that a police radio station is on the air. Then slowly move the *band-*

spread control forward or backward so that the pitch of the squeal decreases to zero and at the same time move the *regeneration* control in or out from between the two coils as this controls the feed-back energy. Thus in more simple terms, the *bandspread* permits of finer tuning and the *regeneration* of best operating point, commensurate with signal intensity.

List of Parts—"Police Alarm" Set

Control panel 7"x12"
Subpanel 7"x12"
Subpanel cleats ¾"x2"x7"
8 Fahnestock clips
.00025 mf. variable condenser C1
.00025 mf. fixed grid condenser C
.5 mfd. by-pass condenser C3. Aerovox.
5-megohm grid-leak R. IRC.
5-to-1 audio transformer
2 UY sockets
Coil forms—1½" length and 2¾" dia.
1" length—¼" dowel
6"x6" piece of thin sheet-tin
45' No. 18 D.C.C. copper wire
600' No. 36 D.C.C. copper wire
7 ft. rubber-insulated hook-up wire
12—¾" length round-head wood screws
20—¾" length 6/32" round-head machine screws
4" dial, ¼" shaft
2 small dials ¼" shaft
8" flexible pigtail wire
Control-grid clip
Tubes '27, 24-A
Filament transformer (110-2.5 volts)
Good "B" eliminator or 2—45 volt "B" batteries
Headphones



Details of "Police Alarm" Receiver

"Professional 9"—A Superhet in Kit Form

(*Continued from page* 348)

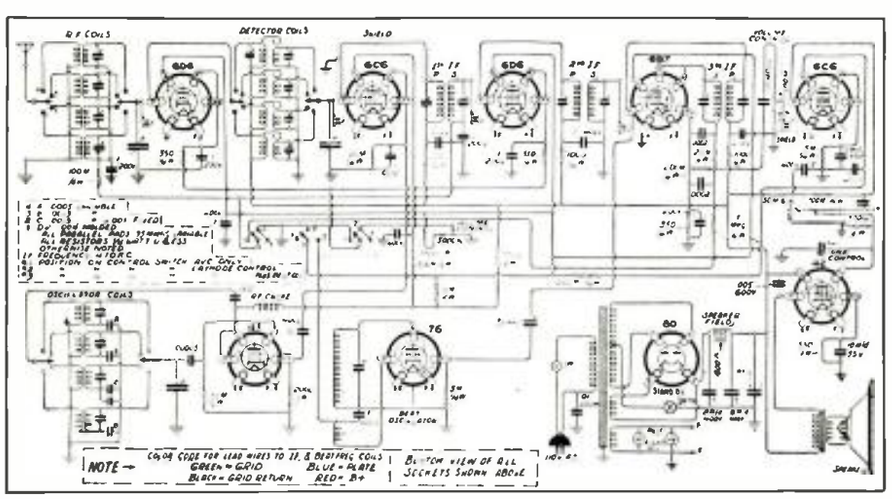
of a five-tube "blooper." All worries about *tracking* and proper *tuning overlap* are eliminated, and the construction of the receiver becomes a pleasure instead of a headache.

The receiver itself is a thoroughly up-to-date nine-tube superhet. A stage of radio-frequency amplification on all bands assures maximum sensitivity and selectivity and minimizes image-frequency interference. This stage, using a 6C6, is followed by a 6C6 mixer, a 41 local oscillator, 6D6 first I.F. amplifier, 6B7 second I.F. amplifier, diode detector and automatic volume control tube, 6C6 A.F. amplifier, 42 power output tube, 76 beat frequency oscillator for C.W. reception and phone carrier "hunting," and 80 rectifier.

The use of a 41 as the local oscillator is a bit out of the ordinary. This tube results in a high conversion value and produces strong oscillation at the highest frequencies within the range of the receiver.

The average sensitivity of the receiver is less than one microvolt, the selectivity seven kilocycles.

The mechanical construction of the set has been worked out very carefully, to make home assembly quick and painless. The dynamic speaker, the power supply and



Wiring diagram of the Lafayette "Professional 9" receiver.

the audio output stage are mounted on a separate, demountable chassis unit, which normally is bolted to the left side of the tuner chassis. If desired, this unit may be placed a short distance from the latter, it only being necessary to lengthen a few leads. As these carry only direct or audio currents, no complications develop.

With the band switching and audio units in place, the receiver chassis overall measures 22½ inches long, 10 inches high, and 11½ inches deep. A heavy, black crackle-finished steel panel is supplied with the kit; a heavy steel cabinet, shown in the accompanying illustration, is available at slight extra cost.

Eight knobs on the front of the receiver give the operator complete control of the sensitive circuit. These knobs are all plainly marked by legible etched plates, so the owner doesn't have to take a week off and memorize their functions! Under the speaker grille on the left, are: A.C. line switch; tone control, which is a small variable condenser, not a resistor, across the grid of the audio output tube; and stand-by switch, which opens the B minus side of the power pack and kills the receiver during transmission periods.

The other knobs are grouped under the vernier tuning dial, and are backed by a handsome etched plate. Above the earphone jack is the audio volume control, a potentiometer working into the grid of the first A.F. tube. Then comes a three-position switch, with the following circuit controls: automatic volume control, manual volume control, and manual control plus beat-frequency oscillator. The first position is most generally used for DX phone reception, the second for ordinary work, and the third for C.W.

To the right are the R.F. volume control and the band switch. The latter has four ranges, as follows: 9.7 to 30 meters, 30 to 75, 75 to 200, and 200 to 560. After a couple of evenings with this set, even the most obstinate plug-in-coil fiend is forced to admit that the band switch is a great convenience and permits rapid scanning of all bands.

Smooth band-spreading on all parts of all four bands is made possible by a unique double-drive dial, equipped with a double knob. For quick tuning the low ratio drive of 25:1 is used; for accurate band-spreading, a 125:1 ratio drive is thrown in. This is a slick arrangement, and has elicited many favorable comments from hams who already used the set.

As the chassis is supplied all formed and drilled, and detailed assembly, wiring, and adjusting data are included, any amateur who can use a screwdriver and a soldering iron can put this set together and enjoy good results from it immediately. The finished set has a distinctly professional appearance, of which the builder will be very proud.

Balloons Raise S-W Antenna

(*Continued from page* 326)

jack was not available at the time, the difficulty of getting the cable up through the 175-foot stack proved a poser.

It was finally decided that five balloons, each 16 inches in diameter, and filled with hydrogen, would raise an ordinary chalk line up through the stack. The balloons only rose to a height of 140 feet and after considering that the cooler draft of air inside the stack had contracted the gas in the balloons somewhat, it was decided to burn a few oil-soaked rags in the bottom of the stack. The warm air did the trick!

A heavier line was spliced onto the cord and allowed to run out through the top of the stack. How do you think the balloons were cut loose from the cord after a sufficiently heavy line was drawn up through the stack? Simple! A police sharpshooter shot the balloons down and when the cord settled to earth, a heavier rope was pulled out through the top of the stack and finally a stranded copper wire cable was drawn into place, to serve as a permanent anchor for the police radio antenna.—*Courtesy "Broadcast News."*

New Vario-denser and Push-post

● A SMALL adjustable condenser of the pre-set type which can be adjusted easily with a screw-driver is greatly in demand by all short-wave experimenters, for use in both transmitters and receivers. Of course, such a condenser should have mica dielectric or insulation. One of the accompanying pictures shows the X-L Vario-denser, this particular model being adjustable from 1.8 to 20 micro-microfarads. The condenser has a bakelite casing, all metal parts being made of phosphor-bronze, nickel plated, making the condenser dust and moisture proof.

The adjusting screw has a sufficiently fine thread so that micrometer adjustments of the capacity can be readily made with a screw-driver. Soldering lugs are provided at either end of the casing.

The smaller cut shows the X-L "push-post," a bakelite insulated binding post which is pushed down with the thumb in order to insert a wire in the hole in the post. As soon as pressure is released on the bakelite top of the post, the spring inside of it causes the wire to be gripped firmly.

Left—the X-L spring-operated push-post which grips the wire as soon as pressure is removed. Below—the X-L vario-denser, just the thing for S-W experimenters.

When to Listen In

By M. Harvey Gernsback

(All Schedules in Eastern Standard Time)

DAVENTRY

● DURING September this station in England will operate as follows: Trans. 1, 2:15-4:15 a.m. on GSB and GSD. Trans. 2, 6-8:45 a.m. (6:30-8:45 on Sundays) on GSF and GSG. Trans. 3, 9-10:45 a.m. on GSF and either GSG or GSE; 10:45 a.m.-12 noon on GSE and either GSF or GSB. Trans. 4 (part 1), 12:15-4 p.m. on GSD and GSB; a third transmitter may be operated experimentally on GSI or GSL during part 1 of this transmission. (Part II) on GSB and GSD from 4:15-5:45 p.m. (Sundays 3:15-4:45 p.m.). Transmission 5, 6-7 p.m. on GSC and either GSB or GSD; 7-8 p.m. on GSC and either GSB or GSA. Trans. 6. 10-11 p.m. on GSC and GSL.

GERMANY

The German stations have made another change this month. In the broadcast for South and East Asia from 12:30-2 a.m. the transmitters now employed are DJA and DJN instead of DJB and DJQ. The N. America program from 5:05-10:45 p.m. now takes place on DJC.

BOUND BROOK

W3XAL now operates on 17780 kc. daily from 8-10 a.m. and on 6100 kc. on Monday, Wednesday and Saturday from 4-10 p.m.

DAYLIGHT SAVING TIME

On the last Sunday in September Daylight time ends in many places in the U.S.A. Several Sundays later it will end in Europe. At this time many stations will make changes in their operating schedules and it will repay listeners to check up on schedules during this period.

DON'T MISS THE NEXT ISSUE!

Many fine "Features" are in preparation for the November issue—Features which you dare not miss—whether you are a "FAN" or a "HAM"!

World Globe No. R-16

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

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

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

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

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

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

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

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

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

De Luxe World Globe No. R-16

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

POLITICAL INFORMATION

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

PHYSICAL INFORMATION

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

CONSTRUCTION

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

MOUNTING

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

SCALE OF MILES

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

With this beautiful globe is included the 32-page illustrated booklet entitled, "The Story of the Globe." The World Globe No. R-16 is moderately priced. Height—39¼". Shipping weight (ball and globe) 30 lbs. PRICE **$31.75**

World Globe No. L-7

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

World Globe-Atlas No. P-8

This combination world globe and atlas holder adds appearance and dignity to any room—it is very attractive. The globe measures 8" in diameter. It has a full, graduated, movable meridian, finished in statuary bronze and gold. Its stand is richly decorated in a walnut finish. With this world globe is included at no additional cost, a new 221-page world atlas. Height—13¾". Shipping weight—5 lbs. PRICE **$4.25**

Gentlemen:

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

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

P. C. ELLIS, Supt.
Laboratory, 19th and Campbell Sts.
Kansas City, Missouri

World Globe-Atlas No. R-12

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

World Globe-Atlas No. R-12

ORDER YOUR GLOBE TODAY!

SHORT WAVE CRAFT SWC-10-35
99 Hudson Street, New York, N. Y.

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

( ) World Globe No. P-8 @ $4.25
( ) World Globe No. R-16 @ $31.75
( ) World Globe No. L-7 @ $2.60
( ) World Globe No. R-12 @ $6.85

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

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

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

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

Short Wave Scout News

(*Continued from page* 356)

Date (June)	Time	MC.	Call	Country	Remarks
13	7:00 a.m.	15.20	DJB	Berlin, Germany	Very good
13	1:30 p.m.	12.00	RNE	Moscow, U.S.S.R.	Fair
14	1:50 p.m.	11.71	HJ4ABA	Medellin, C. I.	Poor
14	2:10 p.m.	10.33	ORK	Brussels, Belgium	Very poor
16	9:30 a.m.	15.37	HAS3	Budapest, Hungary	Fair
16	8:55 p.m.	13.95	HJ3ABC or HJ4ABG	Colombia, S. A. (Experimental)	Good
17	7:45 p.m.	8.21	HCJB	Quito, Ecuador	Very good
			All Hands Were Very Cool on This Day		
18	6:45 p.m.	6.05	W9XBO or TO	Ill. off at 7 p.m.	Very good
19	10:30 p.m.	6.13	COCD	Havana, Cuba	Fair, relays CMCD
23	1:40 p.m. to	12.83	CNR	Rabat, Morocco (Working each other)	Good
23	2:00 p.m.	11.95	FTA	St. Assise, France	Very good
24	9:00 p.m.	6.71	TIEP	San Jose, Costa Rica	Rotten.
25	9:30 p.m.	6.36	W10XFN	Rapid City, S. D.	Fair
25	9:15 p.m.	6.40	WTR Army Stns.	Albrook Field, Canal Zone, C. A.	Very good
25	9:18 p.m.	6.40	WO9	Mitchell Field, N. Y.	Good
28	9:30 p.m.	6.42	W3XL	Bound Brook, N. J.	Very good
29	7:20 p.m.	7.05	VP3MR	Demerara, S. A. British Guiana	Fair
(July)					
6	8:10 p.m.	14.80	JVH	Tokyo, Japan (in English Program)	Fair

O. L. P. from Detroit, Mich.

● I RECENTLY purchased a good receiver, an RME-9D. Very good results have been obtained with the RME-9D, to wit:

DJD—11.76 meg., daily, R-9, 12 to 10:30 p.m.
DJC—6.02 meg., daily, R-7, 12 to 10:30 p.m.
DJA—9.57 meg., daily, R-7, 5 p.m. to 9:30 p.m.
2RO—9.61 meg., irreg., R-6, 2 p.m. to 8 p.m.
EAQ—9.87 meg., daily, R-7, 5 p.m. to 7 p.m.
GSD—11.75 meg., daily, R-9, 12 to 11 p.m.
GSC—9.58 meg., daily, R-7, 6 p.m. to 11 p.m.
HJ1ABE—5.93 meg., daily, R-6, 5 p.m. to 10:30 p.m.
YV5RMO—5.85 meg., daily, R-7, 5:30 p.m. to 11:30 p.m.
PCJ—15.22 meg., irreg., R-8, 8 a.m. to 11:30 a.m.
JVM—10.71 meg., daily, 4 a.m. to 7 a.m.
HJ1ABI—6.06 meg., daily, 5:30 p.m. to 7:30 p.m.
HJ3ABH—6.01 meg., daily, 7 p.m. to 10 p.m.
HJ2ABA—6.17 meg., daily, 7 p.m. to 10 p.m.
HJ1ABB—6.45 meg., daily, 5 p.m. to 10 p.m.
PRF5—9.51 meg., daily, 5:30 p.m. to 7:30 p.m.
DFL—10.85 meg., irreg.

Heard all U.S. short-wave stations. Also foreign amateurs on 20 meter phone:

EA4AO, FNDR, VP6CS, X1G, X1Q, X2CT, HI7G, HP1A, lots of G's, VE1CR, VE2PE, CO2WZ.

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

News from Washington, Pa.

● HEREWITH a report covering June 10-July 10. Following is the report:

VPD—13,770 kc.—Suva, Fiji. This station comes in very well every morning. They come in strong, but it is hard to understand the speech. The music is perfectly clear though.

WO9-PE2—These are airport stations. I am pleased to say that these stations verify. Verifications have been received from these stations in the past month.

HBL—9.505—Radio Nations in Geneva. Verification received from this station on July 6. Report took 34 days to reach us.

Radio Nations (HBL). This station broadcasts a weekly talk to Australia every Monday morning from 12:00 midnight on. They either broadcast on 9,595 or 11,385 kc. The latter is usually used. Report was sent for verification. They debated the possibility to test on 14,535, but they did not test on this frequency.

W10XFN—6.350 kc.—Rapid Sity, S. D. The base station for the stratosphere balloon test with W3XL on Monday, Wednesday and Friday. In latter part of program code is usually used. The power used is 200 watts.

CT1AA—9,600 kc.—Lisbon, Port. This station is on one hour earlier as a result of daylight saving time. Sked-3-6 p.m.

HJA3—7,522 kc.—Barranquilla. This station was heard as a commercial on June 20. 10:15 p.m. Has never been heard since, although I tune for them at that time.

YV5RM—Maracay. This station, which I mentioned in my last report, has been heard calling hams several times lately.

TI2CT—app. 47 meters—San Jose, Costa Rica. This station is heard about almost every evening. Sometimes early and sometimes late. Heard best in latter part of evening, however.

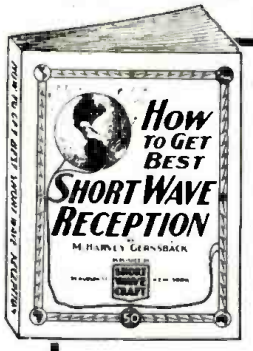
COCD—6.130 kc.—Havana, Cuba. This new Cuban was picked up for the first time on June 26. They relay the bcb station CMCB. Sked as I caught it is 9:30-12:00 p.m. They sign off with the Good-night Melody. There is a S.A. broadcast station that calls hams every evening and they interfere with them.

GBC—12.780 kc. This Rugby station was heard at 5:05 a.m. on July 1 calling CSJ.

(*Continued on page* 379)

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?

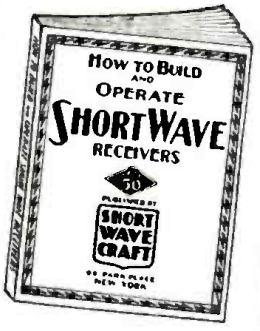
The reason is intimate knowledge of short waves and how they behave. Here are the chapters of this new book:

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



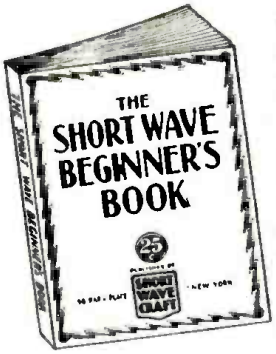
THIS is the best and most up-to-date book on the subject. It is edited and prepared by the editors of SHORT WAVE CRAFT, and contains a wealth of material on the building and operation, not only of typical short-wave receivers, but short-wave converters as well. Dozens of short-waves sets are found in 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 stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

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

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

Partial List of Contents

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

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

The Transposed Lead-in for reducing Static.

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

How to Use 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.

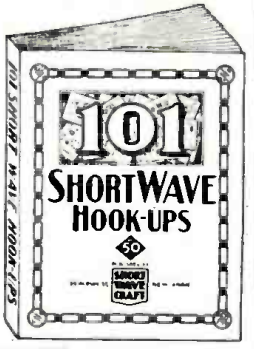
Wave length Bicycle Chart.

Wire Chart—to assist in the construction of coils.

25c **75 Illustrations, 40 Pages. Stiff, flexible covers**

101 SHORT-WAVE HOOKUPS

Compiled by the Editors of SHORT WAVE CRAFT



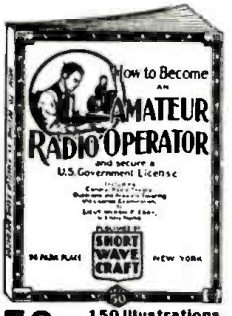
EACH and every hook-up and diagram illustrated is also accompanied by a thorough explanation of what this particular hook-up accomplishes, what parts are required, coil-winding information, values of resistors, etc., in fact, everything you want to know in order to build the set or to look up the data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

To be sure, all of the important sets which have appeared in print during the past few years are in this valuable book. Sets such as the Doerle, Dimmore, the "19" Technidyne, Oscillodyne, Denton "Stand-by," Megadyne Trinley 2, "Globe-Trotter," 2-Tube Superhet, Minidyne, "Loop" Receiver, "Doerle" 2-tube Battery, "Doerle" 3-tube Battery, "Doerle" 2-tube A.C., "Doerle" 3-tube A.C., Doerle "Signal Gripper," Duo R.F. 4-tube Receiver, The Sargent 9-33 Tapped Coil Receiver, Globe-Girdler 7, The 2-Tube "Champ"—2 Tubes Equal 3, Ham-Band "2-Tube Tee-Wee" Wyeth All-Way 8, Denton Fernatune 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 pre-eminent in this line. For many years he was instructor of radio telegraphy at the R.C.A. Institute. He is a member of the I.R.E. (Institute of Radio Engineers), also the Veteran Wireless Operators' Association.

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

Partial List of Contents

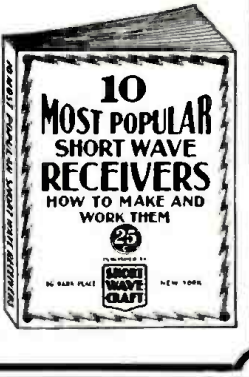
Ways of learning the code. A system of sending and receiving with necessary drill words is supplied so that you may work with approved methods. Concise, authoritative definitions of radio terms, units and laws, brief descriptions of commonly used pieces of radio equipment. This chapter gives the working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

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

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, hookup 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.



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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 R. W. Secor.

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

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

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

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

COUPON TODAY!

DJQ. This German station has been seeping through every once in a while. Heard best before they begin morning program when they play the music box. You can hear that and identify them that way.

DFB—17,520 kc.—Nauen, Germany. This station was heard in the morning of July 4. They called and talked to YVQ. A report was sent for verification.

RNE—12,000 kc.—Moscow, U.S.S.R. This station is on daily from 2-6 p.m.; heard best about 5 p.m.

HIH—San Pedro—6,818. This station has come in better the last two weeks than it has ever come in.

HJ5ABD—Cali, Colombia. This station operates on the 20 meter phone band. The exact frequency is not known, but they are on the lower part. They operate irregularly.

CHARLES B. MARSHALL, JR.
26 Victoria Street,
Washington, Penna.

Short-Wave Station Log from New York City

CALL	LOCATION	TIME LOGGED (E.S.T.)	Kc.	METERS	SIGS.
		July 1, 1935			
W8XK	Pittsburgh, Pa.	2:00 p.m.	15.210	19.72	R9
W3XAU	Philadelphia, Pa.	4:00 p.m.	9.590	31.28	R8
W3XAL	Bound Brook, N. J.	4:30 p.m.	6.100	49.18	R9
		July 4, 1935			
GSD	Daventry, Eng.	6:00 p.m.	11.750	25.53	R8
GSC	Daventry, Eng.	6:30 p.m.	9.580	31.32	R7-F
		July 6, 1935			
VE9GW	Bowmanville, Can.	12:30 p.m.	6.090	49.22	R9
	Rem. Relaying WTAM.				
W8XK	Pittsburgh, Pa.	5:30 p.m.	11.870	25.27	R9
	Rem. Relaying WTAM.				
DJD	Zeesen, Germany	6:00 p.m.	11.770	25.50	R8
DJC	Zeesen, Germany	6:25 p.m.	6.020	49.83	R7-F
EAQ	Madrid, Spain	7:15 p.m.	9.860	30.40	R8
	Rem. Special broadcast in SWL's in Alvada, Ohio.				
	Pontoise, France	7:45 p.m.	11.725	25.50	R6-F
		July 7, 1935			
EAQ	Madrid, Spain	5:35 p.m.	9.860	30.40	R8
	Rem. World wide news reports.				
		July 8, 1935			
W8XK	Pittsburgh, Pa.	11:00 p.m.	6.140	48.86	R9
CJRO	Winnipeg, Can.	11:00 p.m.	6.160	48.75	R8
	Rem. Signed off at	12:00 mid.			
W9XF	Chicago, Ill.	12:00 mid.	6.100	49.18	R9
	Rem. Station identification was given many times at beginning of program in different languages. A word of appreciation was announced to all SWL's for the consistent reports received on their programs.				
		July 9, 1935			
W8XK	Pittsburgh, Pa.	11:00 a.m.	15.210	19.72	R9
		July 10, 1935			
GSD	Daventry, Eng.	6:00 p.m.	11.750	25.53	R9
GSC	Daventry, Eng.	6:00 p.m.	9.580	31.32	R8-F
EAQ	Madrid, Spain	6:40 p.m.	9.860	30.40	R8
	Rem. Second Spanish news.				
I2RO	Rome, Italy	6:55 p.m.	9.635	31.13	R8
COC	Havana, Cuba	8:00 p.m.	6.010	49.90	R8-F
W3XAU	Philadelphia, Pa.	8:30 p.m.	6.060	49.50	R9
W8XK	Pittsburgh, Pa.	9:00 p.m.	6.140	48.86	R9
	Rem. Identification sign, "Stars and Stripes Forever." Continued on that Freq. until 1:00 a.m. (EDST)				
YV6RV	Valencia, Ven.	9:30 p.m.	6.520	46.01	R8
	Rem. The time was given by chimes. Many announcements were made, each separated by three or four chime notes				
	Station signed at	9:35 p.m.			
DJD	Zeesen, Germany	10:00 p.m.	11.770	25.50	R8
DJC	Zeesen, Germany	10:00 p.m.	6.020	49.83	R9
DJX	Zeesen, Germany	10:00 p.m.	9.540	31.45	R8-F
W2XAF	Schenectady, N. Y.	11:00 p.m.	9.530	31.48	R9
	Rem. Signed off at	11:00 p.m.			
		July 11, 1935			
W3XL	Bound Brook, N. J.	12:00 mid.	5.425	55.00	R9
	This call was not 3XAL. Freq. was announced by station. Signed at 12:00 mid.				
		July 12, 1935			
HJ1ABE	Cartagena, Col.	12:30 a.m.	6.115	49.05	R9
	Freq. was announced by station. Address is P. O. box 31, Cartagena, Col., S. A.				
W1XK	Springfield, Mass.	1:00 p.m.	9.570	31.36	R9-F
	Freq. announced by station.				
W3XR	Bell Tel. Labs., Inc., Meadham, N. J., *Testing*.	1:05 p.m.	about 11,500 kc.		R9

Rem. means remarks and follows station data.

The letter F after report means "Bad Fading." For instance R8-F would indicate the station's report at its BEST, and perhaps fading completely out at times.

By the way COC Havana, Cuba, announced their freq. as 6,130 kc.(?)

The receiver used here is a Lafayette Super, All-Wave (550 to 23 mc.), 6 tubes, AVC, AC-DC. Antenna is exactly 132 foot, inverted L.

KEN L. SARGENT,
Apartment 7C,
302 W. 51st St.,
New York City.

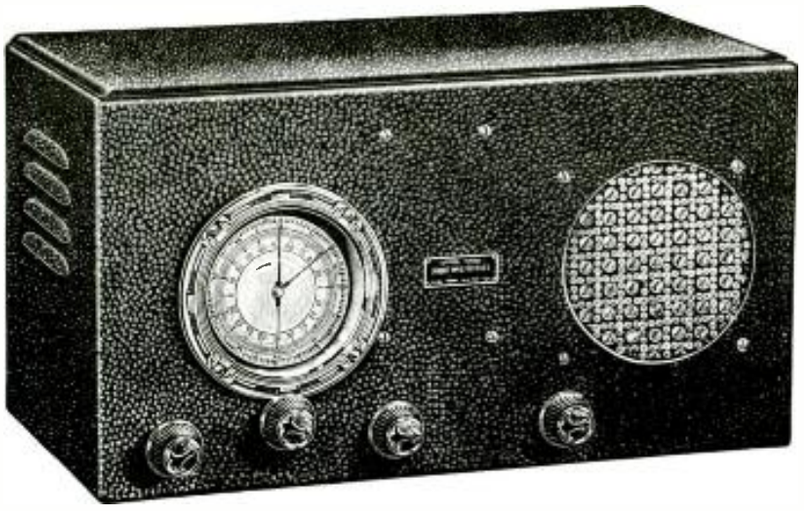
Report from Oliver Amlie, Phila., Pa.

● I WONDER how many listeners of *Short Wave Craft* heard the American hour from 3ME (VK3ME) July 4, from 5-6:30 a.m., E.S.T. 3ME put on a special program for all American listeners, opening with *The Stars and Stripes Forever* and closing down with same at 6:30 a.m. by Philadelphia orchestra; also it rained in Australia. This post received the full program with a R7 signal strength, also 3LR with an American hour program from 5-6 a.m.; both 3ME-3LR were logged at same time, and programs were very good.

3ME is still on the air from 5-7 a.m., E.S.T., Wednesday to Saturday, opens with good morning, good afternoon and evenings and closes down with same, and "God Save the King."

3LR is still on air from 3 to 8 a.m. best from 3-4 a.m. and 5-6:30 a.m., E.S.T., opens with 15 minutes of jazz music, calling, this is 3LR testing, meters given, and starts regular program 3:15 a.m. Chimes at 5 a.m. and close down with "God Save the King" and news.

(*Continued on page* 381)



at last! CONTINUOUS BANDSPREAD *on all bands*

THE OFFICIAL

DOERLE BANDSPREAD

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

NATION-WIDE *TESTIMONIALS* PRAISE THIS SET

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

Dear Sirs:
Just a line or so to give you an idea of what my Doerle A. C. 5 hauled in during a 2 weeks listening test. All of the G and D stations were received also TIEP, W9XF, PRADO, HJ4ABE, W8XAL, W2XE, W8XK, CJRO, YU2RC, CJRX, COC, HJ4ABB, HJ1ABB, YU5RMO, YP3RC, WCRCT, CT1AA, W1XAL, W9XAA, W1XAZ, EAQ, WE9GW, HC2RL, HJ3ABD, KEJ, HJB, HP5B, HJ1ABD, WNB, YUIRC, HIZ, JYK, FYA, YU4RC, OA4AD, RNE, PHI, RKI, WNC, YNA, COH, PRF5, WON, XEBT, W2XAF, LSI, 12RO, IRM, JYS, UK3LR. All stations come in with strong carriers with a QSA4-5—R9 plus. "Hams" in 48 states and foreign countries besides practically all Police Radio Stations were received.
Frances Kmetz, 213 Linden St., Allentown, Pa.

Gentlemen:
The Doerle "AC-5" arrived all O.K. Had it going in about ten minutes after unpacking. It sure seems to be fine, we enjoy it very much. I am new at short-wave tuning but the bandspread dial makes tuning a real pleasure. I only have a short wire aerial so cannot give you any long list of stations received, but have received many foreign stations. I think Rio De Janeiro about the best distance at about 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. Delbrugge, Rose-Mary Dahlia Gardens, Martins Ferry, Ohio.

Original letters plus others may be seen at our office.

Complete Price
$27.57 WITH TUBES
Nothing Else to Buy

- 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

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..... **$27.57**
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: 10-35
I enclose ..... dollars ..... cents, for your new Doerle 5-Tube De-Luxe Short-Wave receiver on a five day free trial basis. I am to prove to my own satisfaction that it will give me world-wide reception and that your guarantee means exactly what it says. If, at the end of five days after receipt of radio, I am not perfectly satisfied, I will write you accordingly, whereupon, you will send shipping instructions. Upon receipt of the radio, you will refund me the full purchase price. I agree to pay express charges one way, and you the other.

C.O.D. SHIPMENT. I enclose ..... dollars..... cents deposit, balance of ..... dollars..... cents C.O.D.

PRINT Name .....
Address .....
Town ..... State. .....

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IMPORTANT BUYING GUIDE FOR RADIO DEALERS, SERVICE MEN, EXPERIMENTERS AND SHORT-WAVE FANS

32 Pages. Two Colors. Profusely Illustrated
Up-to-the-minute catalog containing low prices which save you money. Contains radio sets, parts, public address equipment, short-wave receivers, etc., etc.

Name the item—it's in the catalog

Send post card or letter. Book sent by return mail. See pages 360 and 362 for our other "ads."

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

VPD Suva, Fiji Island, 13,075 frequency, Mon. to Sun., 7 days per week, starting July 5, opening with *Song of the Island* at 6 p.m., Fiji time, and close 7 p.m. with "God Save the King," E.S.T.; 12:30 a.m. to 1:30 a.m. Signal strength R7 and 8.

VK2ME opens with Chimes and kookaburra, and closes with the same. Time on air 12 mid. to 3 a.m. Monday morning.

Brecksville, Ohio, Post Report

Date	Time	Call	K. C.	Location	Remarks
June 23	6:45 a.m.	PHI	17.775	Huizen,Holland	Loud, faded some.
23	7:50 a.m.	GSG	17.790	Daventry, Eng.	Loud, but faded.
23	8:00 p.m.	DJD	11.770	Zeesen, Ger.	Very loud.
23	7:50 p.m.	GSD	11.750	Daventry, Eng.	Very loud.
28	8:50 p.m.	KKP	16.030	Kohuku,Hawaii	Fair.
July 9	8:10 p.m.	DJD	11.770	Zeesen, Ger.	Very choppy.
10	7:30 p.m.	DJD	11.770	Zeesen, Ger.	Very, veryloud & clear
10	7:35 p.m.	GSD	11.750	Daventry, Eng.	Very loud. Faded some
10	7:40 p.m.	FYA	11.720	Paris, France	Steady, but weak
10	7:45 p.m.	GSC	9.580	Daventry, Eng.	Very loud. Some noise.
10	8:20 p.m.	DJC	9.540	Zeesen, Ger.	Very loud and steady.
10	8:25 p.m.	COH	9.428	Havana, Cuba	Loud, but distorted
11	7:20 p.m.	IRO	11.800	Rome, Italy	Fair. Frequency announced. *New.
14	2:50 a.m.	GSF	15.140	Daventry, Eng.	Weak and faded.
14	6:30 p.m.	EAQ	9.860	Madrid, Spain	Very loud and clear.
15	6:50 p.m.	GBB	15.190	Rugby, Eng.	Very, very loud. Working Montreal
15	7:00 p.m.	DJD	11.770	Zeesen, Ger.	Exceptionally loud and clear.
15	7:05 p.m.	GSD	11.750	Daventry, Eng.	Very loud. (Knock your ears off)
15	7:10 p.m.	EAQ	9.860	Madrid, Spain	Very loud and clear
15	7:20 p.m.	IRO	9.635	Rome, Italy	Very loud and clear.
15	7:25 p.m.	GSC	9.580	Daventry, Eng.	Very, very loud.
15	7:30 p.m.	WIXK	9.570	Boston, Mass.	Very loud.
15	7:35 p.m.	DJA	9.560	Zeesen, Ger.	Just understandable.
15	7:40 p.m.	DJN	9.540	Zeesen, Ger.	Louder than DJA.
15	8:15 p.m.	COH	9.428	Havana, Cuba	Fair.
17	7:25 p.m.	IRO	9.635	Rome, Italy	Fair.
17	7:30 p.m.	GSC	9.580	Daventry, Eng.	Very, very loud.
17	7:50 p.m.	DJD	11.770	Zeesen, Ger.	Very, very loud.
17	8:00 p.m.	GSD	11.750	Daventry, Eng.	Very, very loud.
19	7:50 a.m.	PHI	17.785	Huizen,Holland	Very loud and clear.
19	8:15 a.m.	GSG	17.790	Daventry, Eng.	Just understandable.
19	7:50 p.m.	GSD	11.750	Daventry, Eng.	Very, very loud and clear.
19	8:00 p.m.	DJD	11.770	Zeesen, Ger.	Very loud. Faded some
19	8:05 p.m.	FYA	11.720	Paris, France	Very loud.
19	8:10 p.m.	GSC	9.580	Daventry, Eng.	Very, very loud.
19	8:15 p.m.	COH	9.428	Havana, Cuba	Very loud, but code interference.

TIME IS EASTERN STANDARD

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

O.L.P. Report from Freeport, Pa.

On the evening of July 3, which was July 4 in Japan, JVM, 0.74 megs. sent over a special program. On the morning of the 4th, DJB on 15.20 megs. sent a special program.

On the evening of the 4th, DJD, on 11.77 megs. had a regular old-fashioned Fourth of July program. At 6 p.m., E.S.T., 2RO, 9.64 megs., had a regular Fourth of July.

HIZ returned to the air with a new transmitter on 6.31 megs. The schedule is daily excepting Sundays 5-6 p.m.; on Saturdays 11 p.m. to 1 a.m.

ANGELO CENTANINO, Box 516, Freeport, Pa.

Frank Hogler, Brooklyn, N.Y., Reports

VPIA, on 13.07 mc., Amalgamated Wireless Ltd., Suva, Fiji Islands, is heard often.

JVH, on 14.60 mc. sent me a card saying that their broadcast period changed from 0130 and 0230 G.M.T. to 0500 and 0600 G.M.T., starting from June 21 with the same frequency and program.

VIZ-3, Rockbank, near Melbourne, Australia, is still heard between 6 and 11 p.m. talking to CJA4, Canada. Freq. 11.50 mc.

VP3MR, Georgetown, British Guiana, was heard around 7.06 mc. daily from 7 to 8 p.m., E.S.T.

CO9WR, Sancti Spiritus, Cuba, has moved to 11.80 mc. and is heard 4 to 6 p.m. and from 9 p.m. on E.S.T.

HJ1ABE, Cartagena, moved to 6.13 mc. and is heard 7:30 p.m. to 9:30 p.m. daily, Mondays 10:30 to 11:30 p.m., E.S.T.

HCJB, Quito, Ecuador, (La Vos de Andes), on 8.21 mc., broadcast daily from 7:30 p.m. to 9:45 p.m., E.S.T., excepting Monday.

FRANK HOGLER, 222 Wyckoff Ave., Brooklyn N.Y.

New HAM Apparatus

(Continued from page 348)

quently, the condenser can be built in a smaller can. For instance, the 1,000-volt round can measures 2 inches by 5⅜ inches for the 1 mf. capacity and 2½ by 5⅜ inches for the 1 mf. capacity. These are available in 1 mf., 2 mf., and 4 mf. units at the above-mentioned working voltages, excepting the 1,000 and 5,000 volt units, which have capacities of either .5, 1, or 2 mf.

The Little-Six Dry Cell (H12)

The Little-Six dry cell recently announced by the Burgess Battery Co. marks quite an advance in battery design. While the Little-Six provides just as much power as the regular No. 6 dry cell, it is 40 percent lighter in weight and takes up 30 percent less space, and under ordinary conditions, 11 watt-hours of service of 1½ volts may be obtained.

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 November issue should reach us not later than September 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 311, Dept. 4, Indianapolis, Ind.

ELECTRICAL SUPPLIES

INSULATION, WIRE, VARnishes, supplies, etc. Send 3c stamp for bulletin. Autopower, 411 S. Hoyne Ave., Chicago.

GENERATORS

TWENTY NEW PRACTICAL changes for automobile generators. See our advertisement at bottom of page 365. Auto Power, Inc.

"HAM" OFFERS & WANTS

FOR SALE WESTON TUBE Checker, RCA Oscilloscope, Clough-Brengle Oscillator, Lafayette push-pull 2A5 amplifier complete with Wright deCoster speaker. All equipment very slightly used and guaranteed in good condition. Michael Watson, Brooks School, No. Andover, Mass.

FOR SALE: COMPLETE 160 M. phone transmitter and FB7 receiver. Photo, description and price to prospective buyer. W9KYD, Ashland, Nebr.

SELL NEARLY NEW TRF SKYrider receiver. Band Switching. Dynamic Speaker. $25.00 complete. Harold Harrison, Brookings, S. Dak.

SKYRIDER 5, 12-200 METERS, complete, perfect, $18.00. Bill Lyons, 4451 Jackson, Chicago.

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

SW3 COMPLETE, SACRIFICE. James Lees, Excelsior, Minnesota.

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.

ANY DIAGRAM—10c; QUESTIONS—5c; 2830 Richmond Ave., Oakland, Calif.

MISCELLANEOUS

OHM'S LAW CALCULATOR—Lightning Slide Rule; solves all problems of Voltage, Current and Resistance, Power, Wire Sizes, etc. Range: 1 micro-amp. to 1000 amps.; 1 micro-volt to 10,000 volts; 1 micro-ohm to 10 megohms; 1 micro-watt to 10 megawatts; wire sizes 0 to 36 B. & S. gauge. Introductory price $1.00 prepaid. The Datanrint Co., Box 322, Ramsey, N.J.

PATENTS & INVENTIONS

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

QSL—CARDS—SWL

QSL CARDS. VERY ATTRACtively printed in two colors, border. 100 cards $1.00 postpaid. Merrill's Print Shop, 918 S. Spring St., Beaver Dam, Wisconsin.

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-E-S-N, 1827 Cone, Toledo, Ohio.

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

QSL's 75c A 100, 2 COLORS, W9DGH, 1816 N. 5th Ave., Minneapolis, Minn.

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

SHORT WAVE COMPONENTS

RADIO BASES 6x8x2 25c, 8x10x2 35c, 10x11x2 50c, 10x18x2 55c, 12x18x2 60c, 10 sizes in stock. Ham bases made to order. Radio Builders Supply Co., 337 So. Clark Str., Chicago, Ill.

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

SHORT WAVE RECEIVERS

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

BLUEPRINT 18 DX CRYSTAL Sets, record 2,100 miles—with years subscription "Setbuilders Data"—25c coin. Laboratories, 151-A Liberty, San Francisco.

. . . SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE . . .

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

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

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

FREE MEMBERSHIP CERTIFICATE

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

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

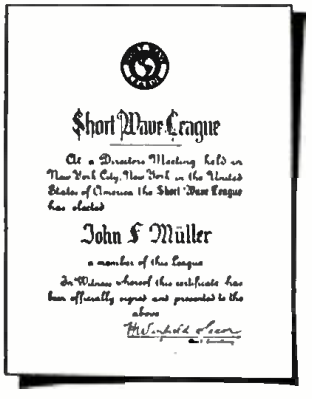


Illustration of engraved free membership certificate

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

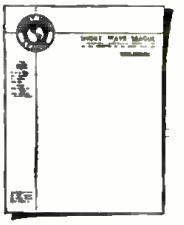
They cannot be bought by anyone unless he has already enrolled as one of the members of the SHORT WAVE LEAGUE or signs the blank on this page (which automatically enrolls him as a member, always provided that he is a short wave experimenter, a short wave fan, radio engineer, radio student, etc.).

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

SHORT WAVE LEAGUE LETTERHEADS

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

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

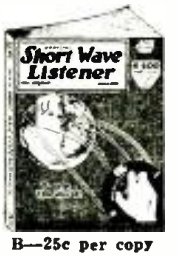


A—50c per 100

OFFICIAL SHORT WAVE LISTENER MAGAZINE

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

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



B—25c per copy

RADIO MAP OF THE WORLD AND STATION FINDER

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

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

GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

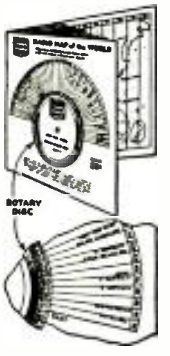
D—Globe of the World ..... Prepaid **$1.25**

SHORT WAVE LEAGUE LAPEL BUTTON

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

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

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



C—25c each

SHORT WAVE LEAGUE SEALS

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

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

SHORT WAVE MAP OF THE WORLD

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

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

D—$1.25 each

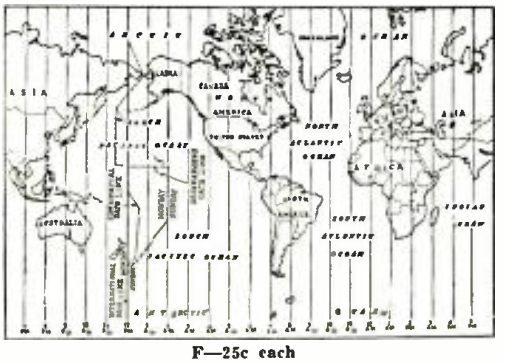
PLEASE NOTE THAT ABOVE ESSENTIALS ARE SOLD ONLY TO MEMBERS OF THE LEAGUE—NOT TO NON-MEMBERS WITH EXCEPTION OF ITEM B.

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

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

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

G—15c for 25



F—25c each

E—35c each

NRA MEMBER U.S. WE DO OUR PART

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 10-35
99-101 Hudson Street, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

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

Gentlemen:

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

.....

.....

.....

.....

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

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

Name .....
Address .....
10-35 City and State .....
Country .....

Index to Advertisers

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

Short Wave Scout Rules

(*Continued from page* 329)

be in the editors' hands in New York City. Entries received after this date will be held over for the next month's contest. The next contest will close in New York City October 1.

The judges of the contest will be the editors of **SHORT WAVE CRAFT**, and their findings will be final. Trophy awards will be made every month, at which time the trophy will be sent to the winner. Names of the contesting **SCOUTS** not winning a trophy will be listed in **Honorable Mention** each month. From this contest are excluded all employees and their families of **SHORT WAVE CRAFT** magazine. Address all entries to **SHORT WAVE SCOUT AWARD, 99-101 Hudson St., New York City.**

FREE BATTERIES TO TROPHY WINNER!

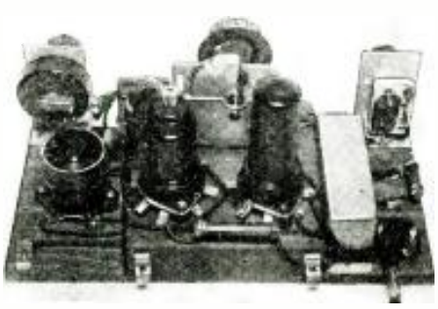
● The manufacturers of the well-known Burgess batteries have offered to furnish FREE one year's supply of batteries—all the batteries that the "trophy" winning set will need for a year—and providing it happens to be a Burgess Battery-powered set. A very fine offer indeed, and the editors are glad to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

ALL-ELECTRIC "AIR-SCOUT" NOW EQUIPPED WITH METAL TUBES

● MANY readers of *Short Wave Craft* are familiar with the All-Electric Air-Scout receiver developed by the well known radio engineer, Mr. H. G. Cisin. The circuit of the Air-Scout originally employed a 37 rectifier and a 37 regenerative detector. In spite of its extreme simplicity, this circuit resulted in an extremely sensitive and powerful little set capable of bringing in many distant stations. However, a forward step was taken by substituting the 6C6 tube for the 37 regenerative detector.

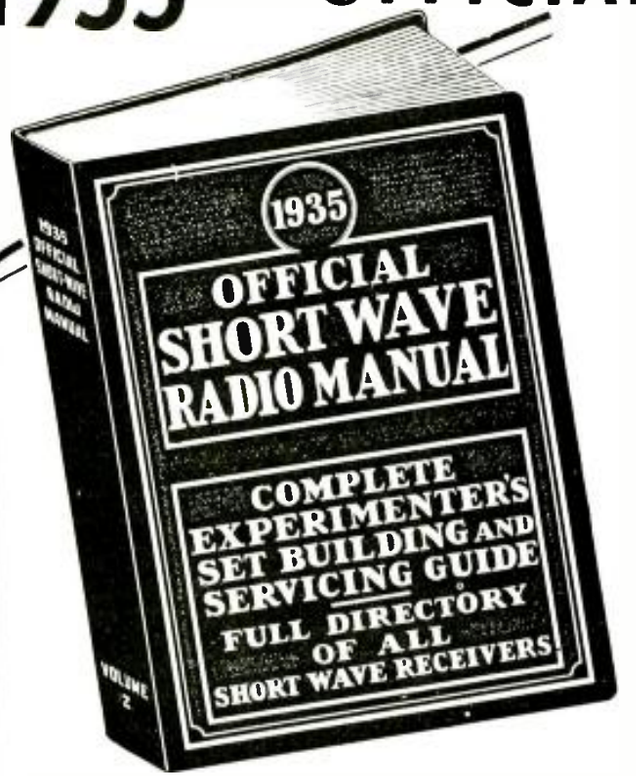
Once again this receiver has been greatly improved, this time through the use of the new *metal* tubes. The high sensitivity of the 6C6 with its sharp plate current cut-off is magnified and intensified in its metal tube counterpart, known as the 6J7. This remarkable little tube has the ability to function with extreme efficiency, even where R.F. signal applied to the grid is relatively low. This means greatly increased efficiency especially as regards short-wave reception. Through the use of the new metal tubes the distance getting range of this set is increased and tuning of the distant stations is also much easier.

This set uses the Cisin A.C.-D.C. universal circuit. This circuit is well adapted for use with the all-metal tubes, since these are of the 6.3 volt filament type. The set is capable of bringing in short-wave stations, standard broadcast entertainment and through the use of a special long-wave unit, it can tune up to 2000 meters.



Appearance of Metal-Tube Air-Scout. (No. 316.)

Here's the new-Big 1935 OFFICIAL SHORT WAVE RADIO MANUAL



When we brought out our 1934 OFFICIAL SHORT WAVE RADIO MANUAL, of which many thousands of copies were bought by short wave enthusiasts, we promised you that a new volume would be published every year.

In keeping with this promise, we now take great pleasure in announcing the 1935 OFFICIAL SHORT WAVE RADIO MANUAL.

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

Like its predecessor, it is a BIG book, in which you will find literally EVERYTHING in short waves—nothing has been left out.

Not only is it a complete manual, but it is a great encyclopedia of short wave facts, information, hookups, photographs, tables, maps, etc., etc. The wealth of material is so great that it would take several pages to list all the valuable data that has been included in this volume.

Similar to last year's volume, the new book has been edited by Hugo Gernsback, Editor of SHORT WAVE CRAFT and H. W. Secor, Managing Editor, and if you are and have been a reader of SHORT WAVE CRAFT, and particularly if you have seen the 1934 Manual, you will know just what you can expect from this, the greatest short wave manual ever put out by Mr. Gernsback.

Here are the star features of the book:

29 ★ Features:

★ 1—**Short-Wave Beginners' Section**—Dozens of new simplified circuits for 1-2 and 3 tube receivers, including famous "Doerle" and "Oscillodyne," etc.

★ 2—**Short-Wave Receivers**—All types discussed with diagrams and pictures—The best types only, which have "stood the test" of actual operating service. Full details for constructing them, etc., "Band-Spreading" the Doerle, 5-tube T.R.F. Receivers, etc.

★ 3—**Battery Short-Wave Receivers**—1-2, & 3 tube sets—all the way up to special 5-tube superheterodyne, designed especially for battery operation.

★ 4—**"5-Meter" Department**—All the latest "dope"—including newest transmitters, "Long Line" oscillators, improved "high sensitivity" receivers. How to arrange best aerial to get greatest distance. 5-meter transceivers, hook-ups, etc.

★ 5—**Short-Wave "Artificial Fever" Apparatus**—also newest therapeutic and other allied applications of ultra short waves.

★ 6—**Short-Wave Experimenter's Section**—filled with Short-Wave Kinks, Short-cuts, etc., of interest to every experimenter.

★ 7—**Ultra Short Waves**—Newest circuits, apparatus, and results obtained in this field.

★ 8—**Commercial "Short-Wave" and "All-Wave" Receivers**—Full Servicing Data for "Set-Owners" and "Service-men."

★ 9—**How to build "Power Supply" Units for Short-Wave Receivers.**

★ 10—**Latest Short-Wave Converters**—With servicing data on Commercial Models.

★ 11—**The Short-Wave Antenna**—Including latest "Noise-Reduction" types, Transposed Lead-In systems, shielded cable, Double-Doublet, etc.

★ 12—**Short-Wave Superheterodynes**—From 3 to 11 tubes—Latest descriptions and diagrams including commercial all-wave superhets.

★ 13—**Phone Transmitters for Amateur Stations**—How to build them.

★ 14—**"Skip" Distance**—Heaviside layer, etc.—explained; physics of Short Waves.

★ 15—**Super-Regenerative Short-Wave Receivers**—latest circuits, etc.

★ 16—**Recording "Foreign" and "Domestic"** Short-Wave programs. All systems in use.

★ 17—**"High Fidelity"**—How to obtain it in Short-Wave Receivers.

★ 18—**The best Short-Wave Questions and answers of the year.**

★ 19—**The best Short-Wave "Kinks" of the year.**

★ 20—**Foreign Short-Wave Review**—Novel circuits, apparatus, etc.

★ 21—**Tubes for Short-Wave purposes**—Including tables of latest tubes for Short-Wave transmitters and Receivers.

★ 22—**Short-Wave Transmitters**—All about the new "Long Lines" Oscillators as well as other "simplified" high-efficiency transmitters, Rack and Panel jobs, Crystal Control, etc.

★ 23—**Multi-Purpose Tubes**—How to use them on Short Waves—Sets in which 2 tubes=4; 3 tubes=6; etc.

★ 24—**"Audio Amplifiers"** for Short-Wave Receivers, Circuits, etc.

★ 25—**"Band-Spread"**—How to spread the stations over the dial for easier tuning.

★ 26—**Plug-less "Mono-Coil" Receivers**—How to build efficient switch-type coils to eliminate plug-in coils; "Clip-Coil" Receivers, etc.

★ 27—**Boosters, Pre-amplifiers and Beat Oscillators**—How they work, with constructional data, diagrams, etc.

★ 28—**Portable Short-Wave Receivers and Transmitters**—Transmitter Power supply from Ford Coils, etc.

AND FOR SERVICE MEN

★ 29—Every short-wave diagram, every short-wave set, whether it is a battery set, whether it is an all-wave set, EVERYTHING, in other words, that has been manufactured in the commercial set line, will be found in this special enlarged section. Hundreds of valuable diagrams, with tube layouts, resistor values, color codes of wiring cables, etc., and the purpose of each tube in each set clearly indicated on the diagram, wherever this information can possibly be obtained.

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NATIONAL

HRO

Communications Type RECEIVER

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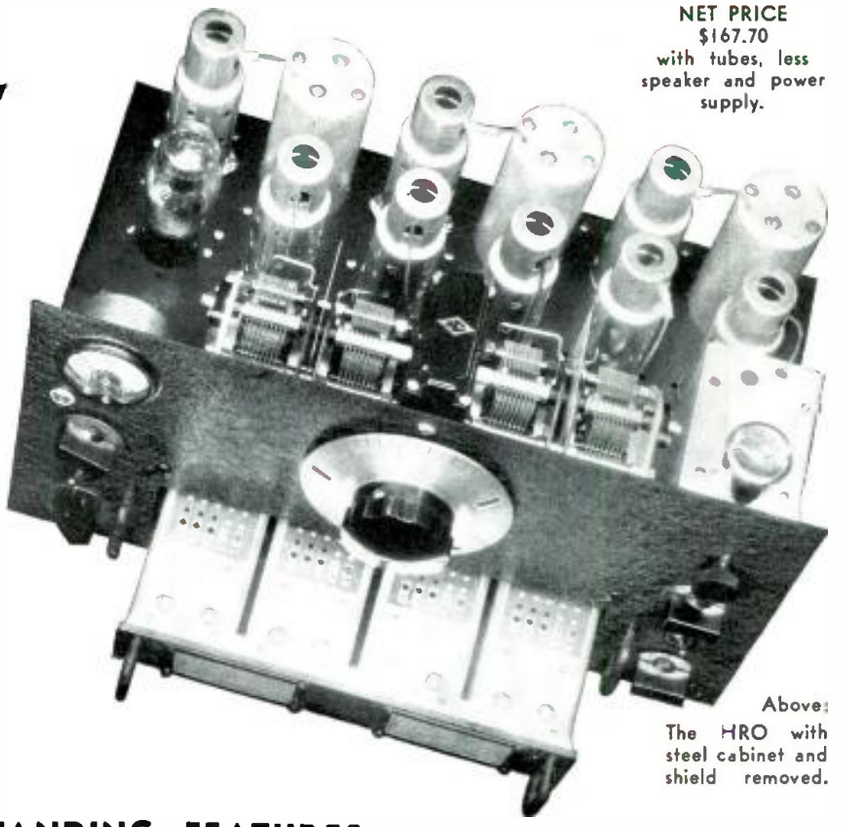
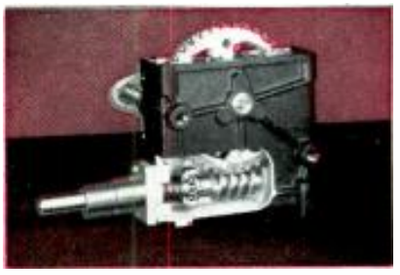


Above: The HRO with steel cabinet and shield removed.



PRECISION-BUILT

The HRO is built for fine performance, not low price. The precision worm drive condenser and micrometer dial alone carry a price of $24.50, ten times the cost of ordinary equipment. With such parts, bargain prices are impossible. It is built for the man who wants the best. Illustrated above is a cut-away view of the drive mechanism of the condenser. Note the ball-bearing thrust, the carefully machined worm and accurately-hobbed, preloaded worm gears. Only such construction can give the precise control necessary with a receiver that has a maximum selectivity of a few hundred cycles (not kilocycles!) The remarkable micrometer dial reads DIRECT to one part in five hundred, which permits permanent, accurate logging of all stations.

OUTSTANDING FEATURES:

- Nine Tubes, not including rectifier.
- Two Preselector Stages.
- Single Signal (Crystal Filter) standard equipment, providing enormous selectivity when conditions require it.
- Ganged Plug-in Coils, with each coil individually shielded.
- Strictly single-control Tuning.
- Calibration for each range mounted on coil.
- Four gang Precision Condenser, with preloaded worm-drive tuning, 20-1 ratio.
- Micrometer Dial, spreading tuning over 500 division, numbered every 10 division, direct reading.
- Automatic or Manual Volume Control.
- Vacuum Tube Voltmeter with Instrument calibrated in S-scale of carrier intensity.
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- Two I.F. stages with Litz-wound coils, air condenser tuned.
- Beat Frequency Oscillator for "Offset" C.W. Tuning.
- Phone Jack on Panel.
- 2½ Volt AC and 6 volt AC or Battery models.
- Relay Rack Mounting available.

PLUG-IN COIL FOR HIGH EFFICIENCY

The HRO employs plug-in coils rather than coil switching, for only by having individual shields, free from unused coils and trimmers can such high performance be realized. The four coils in each set—two stages of preselection, detector and oscillator—are ganged together for swift, easy handling and plug-in as a unit. A switching device on each coil permits change from general coverage ranges to band spread ranges which expand the amateur bands over the entire dial. Individually calibrated curves are mounted on the front of each coil. The illustration below shows a complete coil assembly, together with a coil assembly removed from its case. Note the air-dielectric trimming condensers that are used throughout the H.F. and I.F. stages and the insulation of genuine low-loss R-39. Coils for continuous frequency coverage from 4 to 30 megacycles, plus calibrated band spread on the 10, 20, 40 and 80 meter bands is included with the receiver. Two extra coils to extend the range down to 500 kc. are supplied at extra cost.

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