THE RADIO EXPERIMENTER'S MAGAZINE

August

SHORT WAVE CRAFT

Edited by
HUGO GERNSBACK

1933

New "Loop" Set
needs no Aerial
or Ground
See Page 208

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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Shuart • Denton • Möller • Gross • Palmer

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

Contents for August, 1933

FEATURES IN NEXT ISSUE

A 5-tube S.-W. "Portable" Superhet, by Clifford E. Denton.

7-inch wave apparatus now ready.

An ultra S.-W. converter—permits reception of 5-10 meter waves on ordinary B. C. receiver.

First of a new series of "Beginner" articles, describing how to build an A-1 "Ham" Transmitter, by Leonard Victor, W2DHN.

The "Pentaflex"—using one of the new tubes in a "reflexed" circuit—It makes one tube do the work of two, by J. A. Worcester, Jr.

Certified Circuits

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

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

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

OUR COVER

"Loop" reception of short waves has been in vogue in Europe right along, but it is almost an unknown quantity in this country. The editors have been working on a short wave loop receiver for some time and we are glad to present this excellent article on a cleverly designed loop receiver by George W. Shuart, on page....208

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3410 Verified Foreign Programs Received by these 3 Scott Owners in a Six-month Period

F. L. STITZINGER

This Erie, Penna., SCOTT owner, between January 1st and July 1st, 1932, logged and received verifications of 1588 programs from 41 stations in 22 foreign countries. Mr. Stitzinger's remarkable DX-ing feat included the reception of 387 programs from Pontoise, Paris, France; 131 programs from Barranquilla, Colombia; 101 from DJA, Berlin, Germany; and others from stations scattered all over the world map, including such remote and seldom heard places as Bandoeng, Java; Leopoldville, Belgian Congo; and a host of other interesting and thrilling air treats unknown to owners of less capable radio receivers.

A. G. LUOMA

From his Chicago, Ill., home this enthusiastic SCOTT dial-twirler reached out to listen to 1261 verified programs from 75 stations in 26 foreign lands. Paris, France, was his favorite station, too, being tuned in 277 times. Followed in frequent reception Saigon, Indo-China; Bogota, Colombia; Chelmsford, England; EQA, Madrid, Spain; and a roll-call of stations all the way from Sydney, Australia and Geneva, Switzerland to Kootwijk, Netherlands and Merida, Yucatan. He began DX-ing because of actual enjoyment of programs received instead of for the thrill of long-distance reception alone.

W. C. GANGLOFF

In six months of distance-grabbing on his SCOTT this resident of Cincinnati, Ohio, succeeded in logging and getting verifications from 42 stations, located in 22 foreign countries, of 592 programs. His favorite station overseas was Barranquilla, Colombia, which came in 112 times. Paris, France, was a close second, with 102 verified programs received. Then, stringing along to build up his impressive total came such little-heard stations as Khabarovsk, U. S. S. R. and many another ear-thriller from thousands of miles away. Mr. Gangloff insists that his performance could easily be duplicated by any Scott owner.

15,847 More Foreign Programs — from 320 Stations in 46 foreign lands — were received by more than 200 other Scott Owners to give this POSITIVE PROOF of SCOTT distance-getting ability

Such performance records speak more eloquently of this receiver's merit than bales of laboratory curves and scientific reports so highly technical as to be understood only by trained radio engineers. Not that we haven't plenty such scientific engineering proof to offer—the curves of Scott Receiver performance, *made by recognized independent testing laboratories,* have never been bettered. But unless you're a baker you aren't interested in the kind of plums used in the pudding . . . the proof is in the eating. Likewise, unless you are a radio engineer the technical data regarding a receiver doesn't interest you . . . the proof is in actual performance in the hands of actual owners! That a receiver able to deliver such miraculous distance-getting on the short waves is also a star performer on the broadcast band, with sensitivity, selectivity, and tone quality of richness and fidelity unequalled, is simply an added reason for your wanting a Scott All-Wave Deluxe. Soon there will be under way a great International DX Contest sponsored by the world's leading radio publications, that will bring world-fame to its winner. We confidently hope to see this contest, too, won by a Scott owner. But why should you wait for that further evidence? Rather, get a Scott yourself and go into the contest with the *best* chance of winning!

. . . and these men are "Just Average" Radio Fans — Not Professionals!

Their mighty feats of DX-ing, and those of the more than 200 other Scott owners mentioned, were accomplished under ordinary home reception conditions—probably no better than those you have to contend with. The reason for their remarkable performance was primarily the true ABILITY of their receivers, plus patience and easily acquired skill at tuning that may be learned by anyone. You, and a Scott, can do as well, and have as great thrills!

How Will YOU Decide On An All-Wave Receiver?

Every manufacturer of all-wave receivers can claim his product to be the "World's Best"—and most of them do! But are you convinced? Or do you sensibly demand FACTS and PROOFS? Better get the real "low-down!" For instance, find out how long the manufacturer has been continuously in business . . . ask to be referred to owners of several years' standing . . . learn how fully equipped is the laboratory in which his receiver is built . . . insist upon a check-list of features for comparison with other receivers. We are willing to have you submit our every advertised claim to the most searching investigation . . . in fact, we URGE you to do so, and suggest that you get the data on the Scott All-Wave Deluxe *first,* for it is truly the standard by which all fine radios must be judged.

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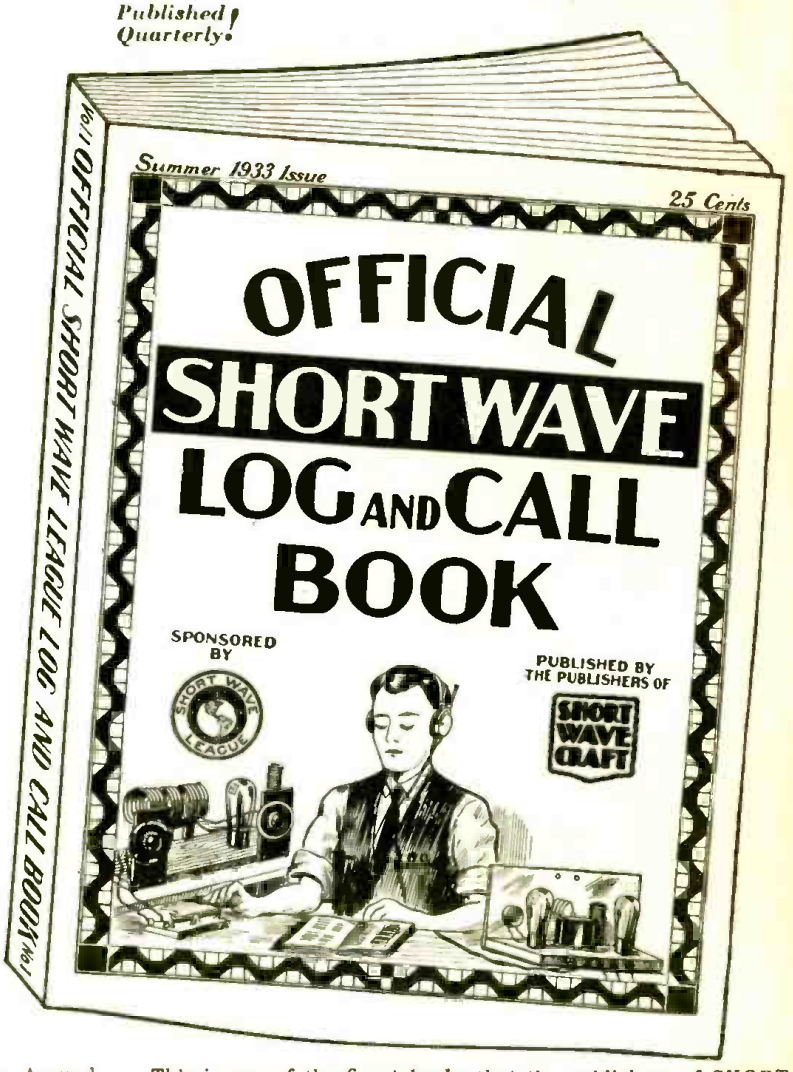
LOG AND CALL BOOK

WE ARE happy to present to the thousands of short wave fans this new Log and Call Book, which enthusiastic readers of Short Wave Craft have been urging us to publish. Here is a book that you will feel proud to possess because it reflects your patience and perseverance in logging distant stations. It is a record you will be proud of in days to come. That, however, is not all. The Log and Call Book is the finest and most complete book of its kind ever published. There is nothing like it on the market now, nor was there ever a book published like it before.

Published Quarterly



PARTIAL CONTENTS

1. It contains the largest listing of short wave stations in the world, a much larger list in fact than the list published in SHORT WAVE CRAFT, or any other magazine. Due to space limitations, no regular magazine can publish **all** the world stations. There are so many short wave stations, such as telegraph stations, experimental stations, ship stations, and others, which normally cannot be included in any monthly magazine list, but frequently you hear these calls and then you wish to know from where they originate. The OFFICIAL LOG AND CALL BOOK gives you this information, besides a lot of other information which you must have.

2. A large section of the book is set aside where the calls can be listed in a proper manner. This log section gives the dial settings, time, date, call letters, location, and other information. Thus, when you hear a station, you make a permanent record which is invaluable.

3. Another section has squared-paper pages on which you can fill in your own frequency (wavelength) curve for your particular receiver. This helps you to find stations which otherwise could never be logged by you.

4. A distance chart showing the approximate distances between the principal cities of the world.

5. A meter to kilocycle conversion chart. Many of the short-wave broadcasters announce their frequency in the latter scale when signing off and many listeners do not know the relation between them.

6. A list of international abbreviations used in radio transmission.

7. The complete Continental code used in all radio work.

8. A list of International Call Letter Assignments; Around the Clock Listing Guide.

9. In addition to this, you will find included a map of the world, with time indications and a host of other useful information which aids you in logging distant stations thousands of miles away.

This is one of the finest books that the publishers of SHORT WAVE CRAFT have ever turned out. You will be proud to possess it.

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SHORT WAVE CRAFT
96-98 PARK PLACE **NEW YORK, N. Y.**

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Short-Wave "Loop" Reception

An Editorial by HUGO GERNSBACK

● IT is curious to note how custom and usage sometimes prevent worthwhile developments. In short waves, experimenters have become accustomed to aerial and ground when, as a matter of fact, it is now believed that there is something better. By this I refer to *loop* reception.

The loop aerial, of course, is nothing new. It has been used since the early days of radio. In the past, however, its use lay chiefly in the broadcast and ship bands, although during a trip through Continental Europe last summer I observed much more widespread usage of the loop than in this country.

Obviously, many advantageous characteristics of loop aerials have been overlooked during the past few years, particularly in the development of high gain tuned radio frequency, superheterodyne and regenerative receivers.

There is no question that the loop offers great advantages. Here is an almost virgin field that awaits development by the short-wave experimenter. The advantages of the short-wave loop as compared to the broadcast loop lie particularly in its size, because the short wave loop may be only a fraction of the size employed for broadcast reception. As yet, no standard short-wave loop has been designed. The editors recently experimented not only with the customary loop, but also with spiral loops and other designs.

Then, there is still another variety, the *double* loop, wherein one of the sections is made movable so as to produce the fullest regenerative effect, or the two loops may be stationary and regeneration controlled by means of a variable condenser. From this it will be seen that loop aerial reception should prove to be a veritable paradise for the experimenter, and it is to be sincerely hoped that loop reception will become more popular from now on.

Of course, existing present-day circuits require some modification for loop reception. This refers particularly to the input circuit of the first tube.

Another important point is that the receiver must be shielded thoroughly in relation to the loop. The reason is that excessive capacity between the loop and the receiver usually destroys the loop's directional effect. This directional property is very important. Most experimenters already know that a loop works best when turned in the direction from which the signals come—that is, facing the transmitter edgewise. The directional effect of the loop is valuable in eliminating interference from other radio transmitters. It often happens that a local short-wave station or one only a short distance away sends out such a broad or powerful signal that a distant station several thousand miles away on a nearby frequency cannot be brought in with the usual aerial and ground combination. The directional qualities of the loop help to relieve this condition, unless, of course, the two stations are in exactly the same direction, which is unusual.

While we are considering the problem of interference, it has been noted that a small loop will cut out *man-made static* to a considerable degree. This man-made static is always a bug-a-boo, and while the new types of transposed aerial lead-ins help a great deal, and are indeed a forward step, loop reception, in many cases, is even better.

Experimenters should try center-tapped loops with balanced input tuning circuits, which hold some excellent promises.

We also have the so-called *shielded* loop. Such loops have been widely used for ship direction finders, army field sets, directional reception and transmission, etc. By a shielded loop is meant one having the wires entirely encased in metal, with only a small section at the top left open. Such loops greatly enhance the directional effect, and also tend to eliminate interference between the loop itself and the receiving set.

One of the reasons that loop reception is not more popular with experimenters is that most of them seem to think that different loops for different wavelengths are required. Of course, that is the best arrangement, but it is not absolutely necessary. It should be possible to build a loop for all wavelengths, and by using a multiple switch, the same as is now in use in the modern short-wave sets, to switch from one wave band to another merely by turning a switch knob. Of course, when trying out *tapped loops*, it is necessary to have shielded connections, but this problem offers no unusual obstacles.

Those experimenters who already own short-wave sets can try loop reception simply by fitting the upright support of the loop to the usual coil form so as to fit into the coil socket. For experimental supports, ordinary broomsticks or dowel sticks work very well. The wire to be used may be the ordinary No. 16 or 18 flexible. The wire is held in place by means of tacks, brass brads, or diagonally cut saw slots.

Loop aerials are excellent, and offer many points of advantage both for receivers and transmitters, particularly those of the portable short-wave types. It eliminates the problem of the long wire and ground with their uncertain characteristics. Short wave sets with loop aerials can be logged and tuned very accurately.

It is certain that during the next few years, loop reception will become very popular, and perhaps standard.

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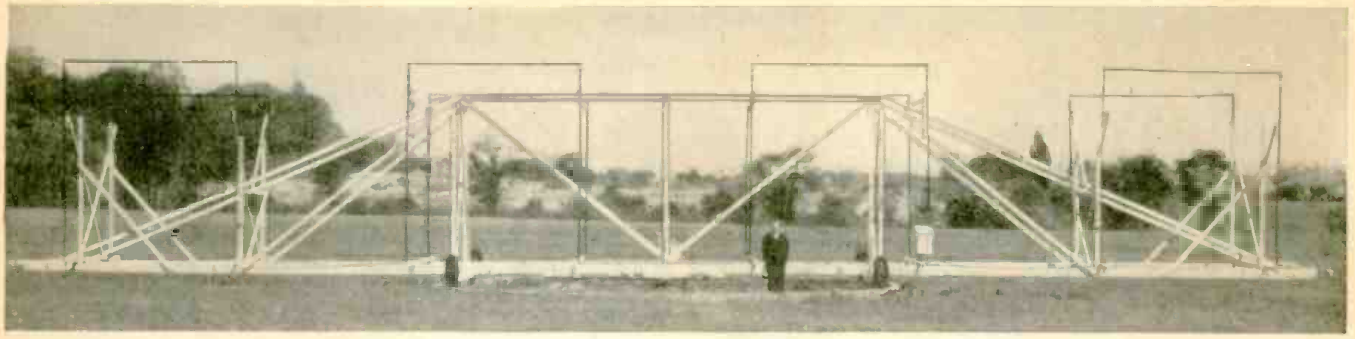


The directional antenna used by Dr. Karl Jansky in detecting galactic radio waves is mounted on wheels and rotated by a synchronous motor, so that it makes one complete rotation every twenty minutes.

Short-Wave Signals from Interstellar Space

● MYSTERIOUS radio waves which appear to come from the direction of the center of the Milky Way have been discovered by Dr. Karl G. Jansky of the Bell Telephone Laboratories and were described by him in a paper delivered before the *International Scientific Radio Union* in Washington, D. C., on April 27, 1933. They are short waves (14.6 meters) at a frequency of about twenty million cycles per second, and

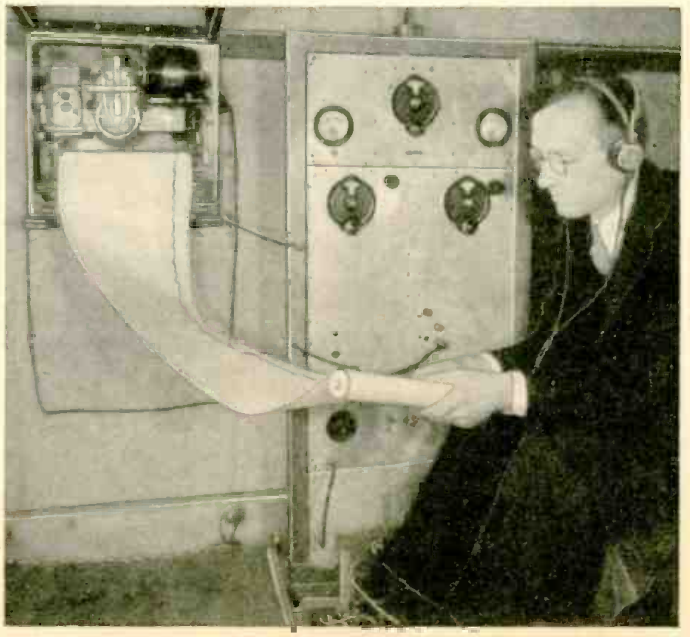
Dr. Karl Jansky at one end of the antenna used for receiving galactic radio waves.

were discovered in the course of radio studies carried on as a regular part of telephone research. The intensity of these waves is very low, so that delicate apparatus is required for their detection.

An investigation of their nature and source has been carried on for some time, and a preliminary report was published in December of last year.* Unlike most forms of radio disturbances, these newly found waves do not appear to be due to any terrestrial phenomena, but rather to come from some point far off in space—probably far beyond our solar system. By a series of investigations carried on over a considerable period, the direction from which these waves arrive has been determined. Measurements of the horizontal component of the waves were taken on several days of each month for an entire year, and by an analysis of these readings at the end of the year, their direction of arrival was disclosed.

Directions such as northeast or southwest have no application, of course, except to things on the earth. Objects in space surrounding us are located by their right ascension, measured in hours to the east of the vernal equinox—the position in the sky in which the sun appears at the beginning of spring—and by their declination in degrees above or below the Equator. The coordinates determined for the newly discovered radio waves are a right ascension of 18 hours and a declination of about 20°. The right ascension has been determined quite accurately but there is still some uncertainty about the declination.

The position indicated by these coordinates is very near to the point where the plane in which the earth revolves around the sun, crosses the center of the milky way, and also to that point toward which the solar system is moving with respect to the other stars. Further verification of this direction is required, but the discovery, like that of cosmic rays, raises many cosmological questions of extreme interest.



The automatic recorder which made a continuous ink record on a moving paper strip, like that shown just opposite, of the galactic short-wave signals received by Dr. Jansky's special revolving antenna and ultra-sensitive S.W. receiver.

Took 40,000 Light-Years to Reach Earth

Electrical energy in the form of radio waves, which scientists believe come from a point so remote in space that it requires between 30,000 and 40,000 light-years for the waves to reach the earth, was heard by radio listeners throughout the United States in a recent broadcast. It was the first such experiment ever carried out. The sound, generated by the waves arriving at a supersensitive receiving set operated by Dr. Karl G. Jansky, research engineer of the Bell Telephone Laboratories' experimental station at Holmdel, N. J., sounded like steam escaping

*Proceedings of the Institute of Radio Engineers.

American broadcast listeners were recently entertained by short-wave signals originating far out in interstellar space. The signals, which have also been recorded graphically on a paper chart, were picked up on an ultra-sensitive short-wave receiver on a wavelength of approximately 14.6 meters, or a frequency 20,550 kilocycles at Holmdel, N. J. A special antenna rotated by motors was used to pick up the signals from space which seemed to emanate from the region of the constellation of Sagittarius (the Archer).

from a radiator. Wires carried the sound from the New Jersey receiving station to the WJZ coast-to-coast network.

Dr. Jansky, speaking of his work carried on secretly for more than a year, said an immense amount of electrical power would be necessary to transmit waves over such distances. Some of the stars, however, have been found to radiate as much as 500 sextillion horsepower, he added.

Signals Emanate from Region of Sagittarius

Dr. Jansky was introduced by O. H. Caldwell, former Federal Radio Commissioner, who explained how the research engineer, using an antenna rotated by motors, determined the point in the sky from which the waves apparently arrive through space. The rotation of the earth on its axis causes the waves to strike the earth at different angles, depending upon the time of day and the season of the year. By carefully checking the gathered data it was discovered that the waves were arriving from the region of the constellation of Sagittarius (The Archer).

Mr. Caldwell, in introducing, Dr. Jansky, said:

"These radio impulses from the stars were discovered by Karl G. Jansky of the Bell Telephone Laboratories while he was studying the faint static hiss that can be heard on a sensitive radio set when its amplification is turned up so as to get the faintest possible signal. At Holmdel, N. J., where the Bell Laboratories have a 400-acre tract in the woods, Mr. Jansky has a tremendously sensitive receiving set, with a long antenna system mounted on wheels so it can be turned in any direction.

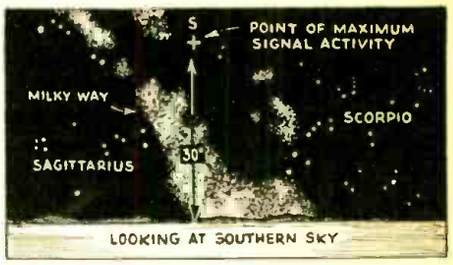
"Using this elaborate, sensitive equipment to listen to the faint static hiss that is always present in such a sensitive receiver even on the best days or nights, Mr. Jansky noticed that the hiss was always a little stronger coming from one direction that from other directions, and also that this directional maximum was continually rotating around the horizon, approximately once every day.

Accurate Records Pile Up Evidence

"At first he thought naturally that this maximum of his had something to do with the sun's position and with the earth's daily rotation. But when he began to keep accurate records of the shifting of position of this stronger hiss, which is recorded by automatic measuring instruments, Mr. Jansky noticed that each day its position was just a *little bit ahead* of the position at the same hour the day before. That is, in a week there would be a difference of half an hour in the position of maximum hiss. In a month a difference of two hours. So apparently this strongest hiss was not following the sun's position at all, but was following something which gained on the sun about 4 minutes a day, or two hours a month, or a whole rotation of the heavens in a year. Mr. Jansky said nothing in public but continued to keep his records carefully over a whole year, and at the end of that time, the maximum hiss was back again, once more coming from exactly the same direction as it did on the same date 12 months before.

"Now if you are accustomed to watching the stars in the evening sky, you have noticed that each night any given star or group of stars will rise 4 minutes earlier than it did the night before, and that in a month such groups of stars are all appearing two hours earlier. If you will stop to think you

(Continued on page 255)



Simplified map of the Southern sky for July 21 (10 P. M.) showing point from which interstellar short-wave signals may be expected.

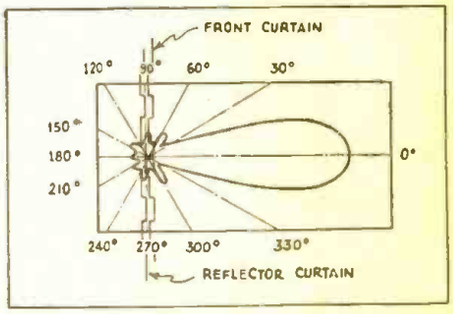
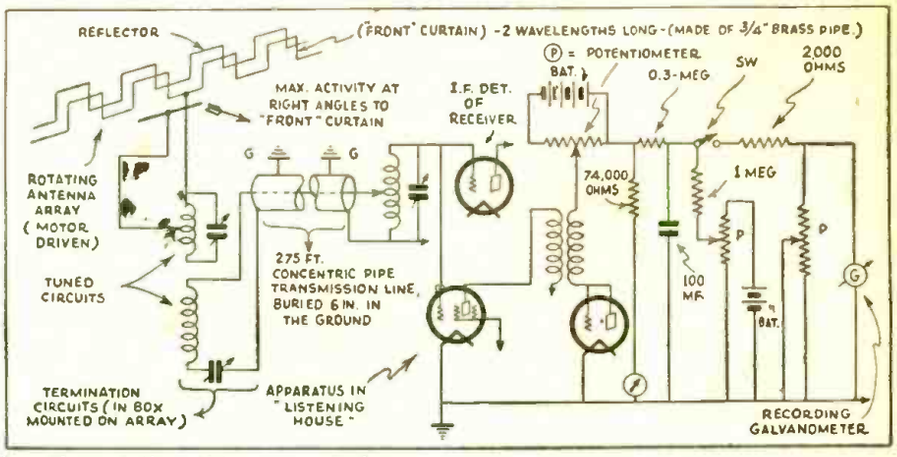
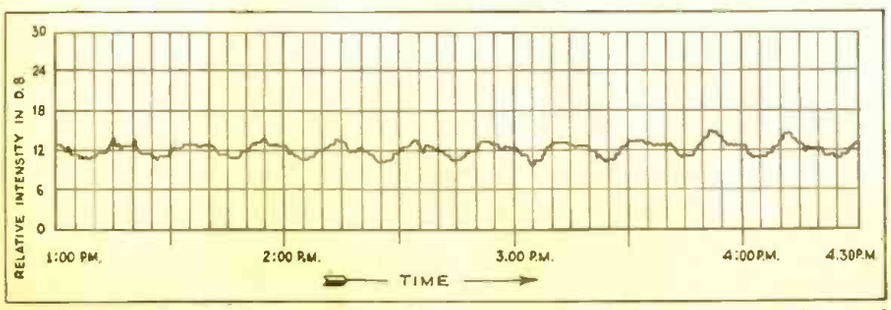


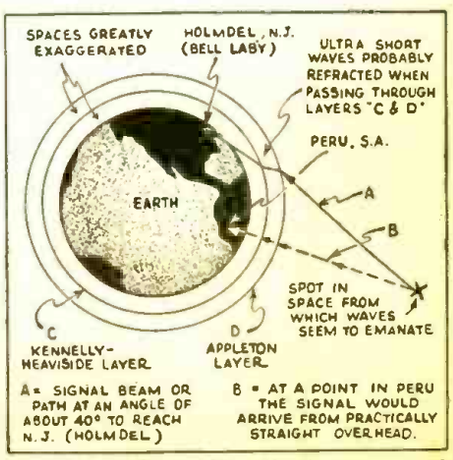
Chart above shows direction of maximum reception with respect to plane of antenna array used by Dr. Jansky.



How the rotating antenna array is connected through tuned termination circuits, the short-wave signal currents then being led through a shielded cable buried in the ground to the recording amplifiers and the ink recorder itself.



The mute evidence of the reception of short-wave signals from space is presented above, this chart showing just a small section of one of the long records made during Dr. Jansky's tests.



Angles at which ultra short-waves reach the earth from point in space.

Short-Wave Advances in

By VLADIMIR ALEXANDROVITCH PAVLOFF

Very little has been known up to the present regarding radio and especially the short-wave developments in the U.S.S.R. The readers of SHORT WAVE CRAFT may count themselves fortunate in having the opportunity of reading about the latest advances made by the Soviet engineers, as described by their Technical Director, Vladimir Alexandrovitch Pavloff. As recently pointed out by Dr. Louis Cohen, eminent American radio scientist, on his return from the U.S.S.R., the Soviet radio authorities are contemplating building broadcasting stations with as great a power as 1,000,000 watts!

● THE Soviet Union, which occupies an area of 21 million square kilometers, (8,106,000 sq. miles) is the home of 166 million people engaged in the development of an entirely new social organization. The *Soviet Union* is especially in need of a highly developed system of radio-communication. In this direction *short waves* lend their helping hand to a marked extent. Prior to the revolution, Russia was an extremely backward country when it came to the development or application of radio. Following the October revolution the program of electrical communication assumed a new and extremely rapid tempo. We are already in possession of the largest total network of broadcasting stations in the world. The length of inter-city wire lines of communication has been markedly developed during the last four years. The vast number of lines of communication that we are still in need of unfolds a colossal perspective for the future development of *short waves* in the U. S. S. R. Some idea of the possibilities for short-wave and general radio developments in this country may be gleaned from the fact that in 1931 the output of the radio industry in the U. S. S. R. was ten times larger than it was in 1913.

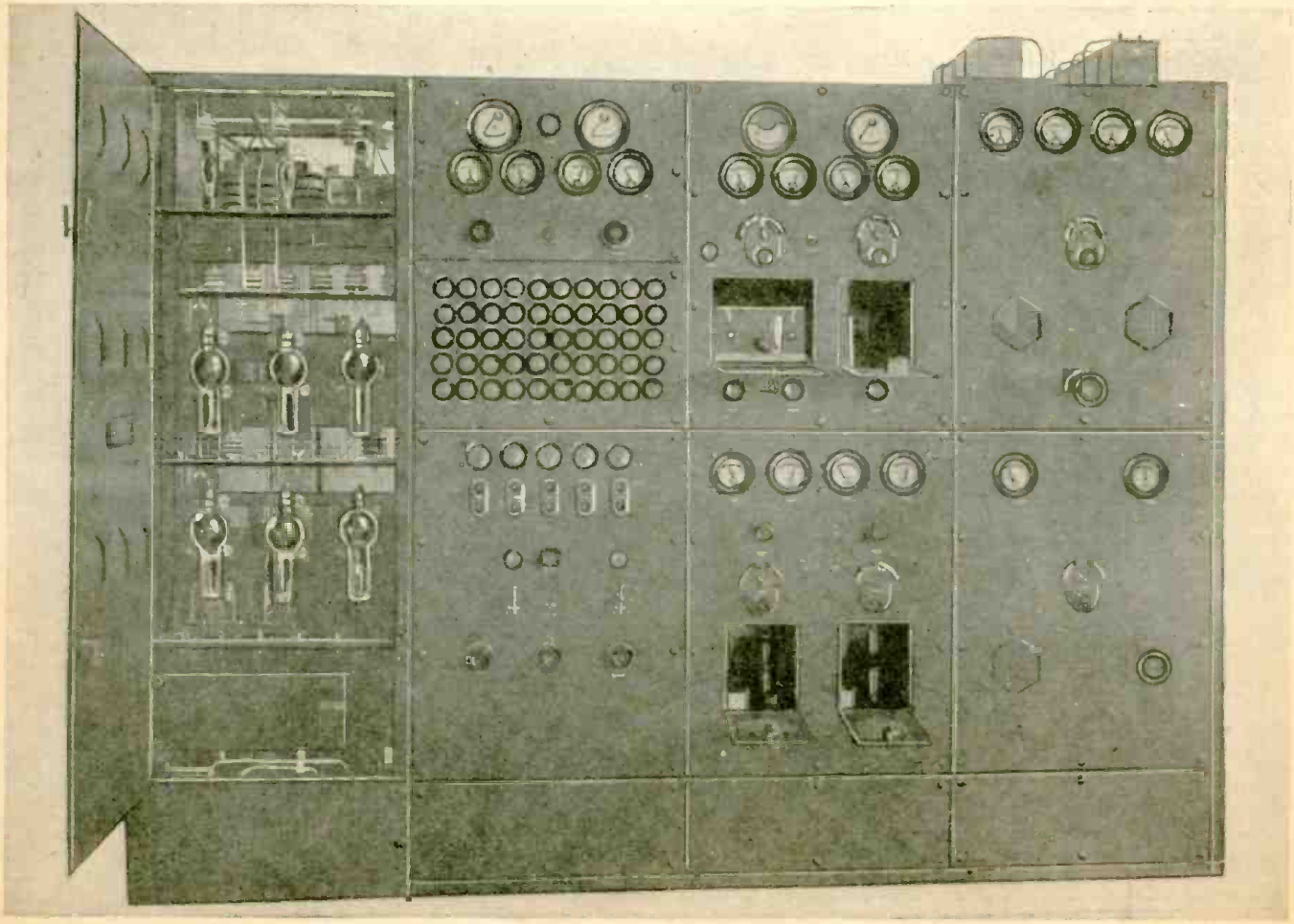
An especially broad development has been attained by our electrical industry of the "low-voltage" class, which, in 1932 had an output 23 times larger than in 1913. The radio industry, in our form of classification, belongs in the group of "low-voltage" industries. The vast expansion of the electrical industry has, naturally, created unusually favorable conditions for the development of radio technique, especially of the *short waves*.

The radio laboratories of the VESO (United Trust of Industries of Low-Voltage), employ more than a thousand engineers and assistants and, besides, have at their disposal the services of the Scientific Institutes of the Union.

250 KW Tubes!

During the last four years our laboratories have been eminently successful in the construction of powerful radio transmitters, having increased their scope by means of a broadcasting station with 600 kw. in the antenna. The construction of powerful stations naturally brought a demand for powerful generating (transmitting) tubes; we have begun producing tubes of 100 kw. capacity, and have also prepared the working model for a tube of 250 kw. capacity.

In reception technique our laboratories have advanced far in respect to eliminating atmospheric disturbances, by applying filters which afford an elimination of such disturbances unattained by any other filter extant. We have in our Soviet factories a diversified assortment of radio transmitters



1 kw. short-wave radio-telegraph and telephone transmitter, complete with rectifier and control panel, as designed and built by the Soviet radio engineers.

the U. S. S. R.

Specially Written for SHORT WAVE CRAFT

Here is a powerful Soviet short-wave transmitter, designed to be operated for code or phone transmission and capable of radiating 15 kw. in the antenna.

for short waves, designed for transcontinental communication. I think that a brief report concerning some of the construction features of our radio apparatus for short waves might provide a fair insight into the whole picture of short wave radio-technique in the Soviet Union. Under the peculiar conditions found in my country, there is evident an urgent demand for radio transmitters of the short-wave type, with a strength of the order of 1 kw. in the antenna.

Therefore we construct and produce in our factories a series of transmitters of this particular strength.

Frequency Control

This class of transmitters is constructed to operate on a frequency between 3,340 and 18,700 kilocycles.

A system of high frequency control of this transmitter is rendered possible in the following manner: the stabilization of the frequency depends upon a quartz crystal oscillator, with a range of 1,670-3,340 kilocycles. This crystal is placed in an oven in which the temperature is maintained with great exactitude by the aid of a special mercury thermostat. In three subsequent amplifier stages, the fundamental crystal frequency is either amplified or "doubled," according to the final signal frequency desired in the antenna.

Transmitter Frequency Changed by Switch

The transmitter, within the compass of the frequency range, is adjusted to four fixed waves, which makes it very handy in that it can be changed at will to operate on any one of the four predetermined wavelengths. The transfer from one fixed frequency to another occupies but two minutes; it is effected by making a change in the connections between the various apparatus in the transmitter. To aid in making the switch-over or frequency-change, the scales of the transmitter tuning condensers are furnished with fixed wave indicators; finally in each of the last two amplifier stages there are arranged four inductances which are grouped around a commutator-switch by means of which the required inductance coil is connected into the circuit. Each of the four inductances is conductively connected with its system of antenna connections. This transmitter works with constant frequency and also is applicable to phone as well as to code transmission.

Voice modulation in the transmitter is effected by causing a change in the screen-grid potential of the final tubes in the transmitter. The microphone current is amplified by means of a two-stage audio frequency amplifier, which is operated with four tubes, the stages being of the push-pull type. For C.W. or code transmission these tubes are switched into a suitable system; code transmission is carried out by interrupting the voltage applied to the screen-grids of the tubes in the second and third amplifiers.

Dual Code Transmission on 1 Transmitter

For use when heavy code traffic occurs, a special transmitting apparatus developed in our laboratories is attached to the transmitter, by means of which the transmission of two code messages simultaneously is made possible, besides utilizing in each channel the full strength of the transmitter for the highest speed.

The transmitter is connected directly to a three-phase alternating current supply circuit, having a potential of 220 volts per phase.

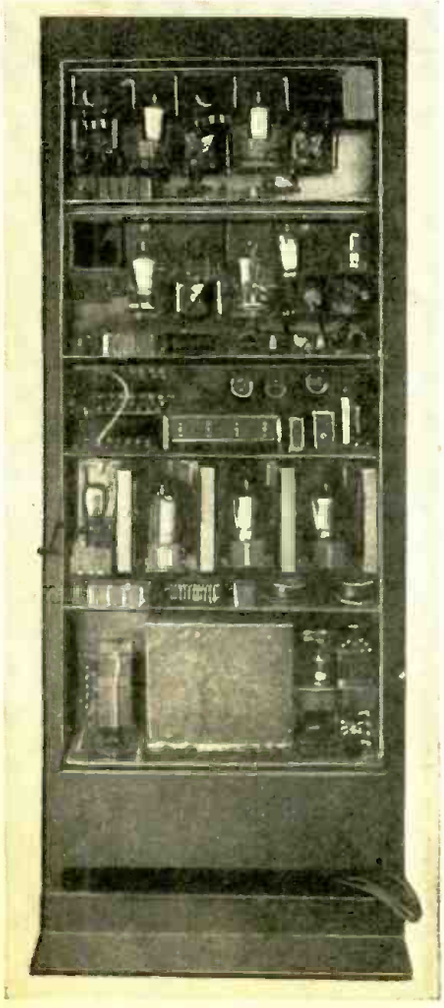
In the transmitter set-up, there are provided three different voltages to energize the screens and plates of the tubes, with separate rectifiers for the various elements and stages constituting the transmitter. For rectifying the current, gas-filled voltage regulator tubes of 1.5 amperes capacity are used for the first two stages and tubes of .4 ampere capacity for the third stage, these tubes being specially produced in our own factories and laboratories. The first two rectifiers are constructed to operate on a three phase arrangement. The first rectifier provides the 1,500 volts D.C. for the plate of the first amplifier, a suitable voltage being also supplied through a potentiometer for the plate of the tube used in the quartz-crystal oscillator, and also to supply suitable voltage for the screen electrode of the first amplifier.

The second amplifier obtains its necessary plate and screen voltage through a suitable potentiometer.

The third rectifier is provided with six gas-filled tubes, which are arranged in the system devised by Graetz, utilizing a three-phase transformer; it supplies current to the plates of the last two amplifiers at a tension of 4,000 volts, and also through a suitable potentiometer suitable voltage is applied to the plates of the second and third amplifiers, the modulating tubes, and the screens of all tubes but the first.

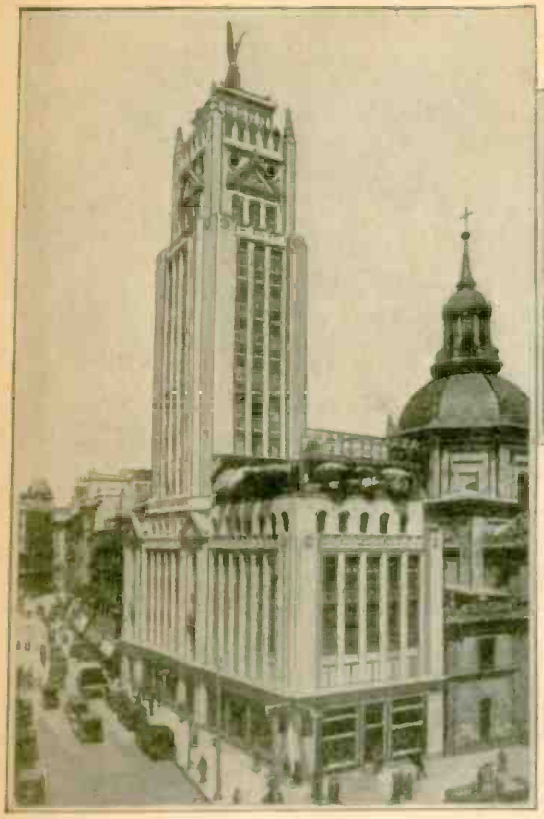
A unique system is provided for heating the cathodes; the series of A.C. transformers employed to supply the heating current are evenly distributed or balanced between the three phases of the supply system, the voltage applied to the heater of each tube being regulated by a suitable rheostat.

(Continued on page 240)

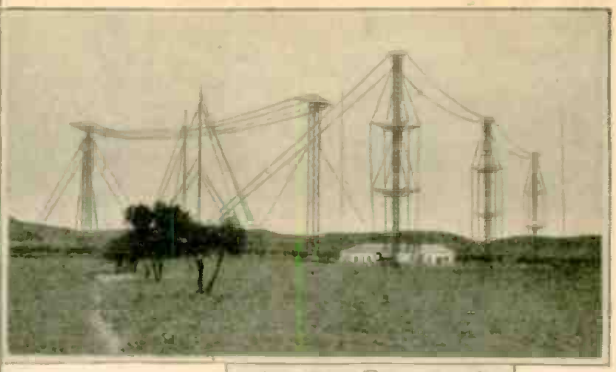


General appearance of the U. S. S. R. professional type short-wave receiver, which is provided with signal recording circuits.

The Story of "EAQ"...



The short-wave programs from EAQ heard by S-W "fans" all over the Americas emanate from the building shown above. The daily broadcast takes place between 5:30 and 7:00 p. m. E.S.T. The wavelength used is 30.4 meters and the power, 20 kw.



American short-wave "fans" are daily reporting excellent reception of station EAQ, located at Madrid, Spain. Photo at left shows the antenna system of the station, together with the station transmitter building. A view of the powerful and well laid out transmitting equipment is shown below.

The technical name of EAQ's sponsors is Radiodifusion Ibero-Americana. The short-wave-programs broadcast by EAQ are mainly intended for the three Americas, but are being equally well received in all parts of the world.

● RADIODIFUSION Ibero-Americana is an all Spanish organization, created by the initiative of a private company, Transradio Espanola, which began making short-wave wireless telephony tests on May 20th, 1931, for the whole world, amplifying them by the inclusion of music on August 8th, 1931.

These tests met with great success, and such was the number of letters received from radio-enthusiasts that the management decided to create a special department to establish a regular service. This department was called RADIODIFUSION IBERO-AMERICANA and with its formation a great improvement was effected in the quality of the matter broadcast. Finally, on May 21, 1932, His Excellency, the President of the Spanish Republic, officially inaugurated the Pioneer Intercontinental Broadcasting Service of Radiodifusion Ibero-Americana.

The programs of EAQ, the short-wave station of Radiodifusion Ibero-Americana, are mainly intended for the three Americas, but are equally well received in all parts of the world. The daily broadcast takes place between 5:30 and 7:00 p. m. E. S. T., and on Saturdays a special transmission is made for European listeners, between 1:00 and 3:00 p. m. E. S. T. The wavelength used is 30.4 meters and the power 20 kw.

The programs are composed of practically all Spanish music, entertaining lectures, and an extensive news bulletin

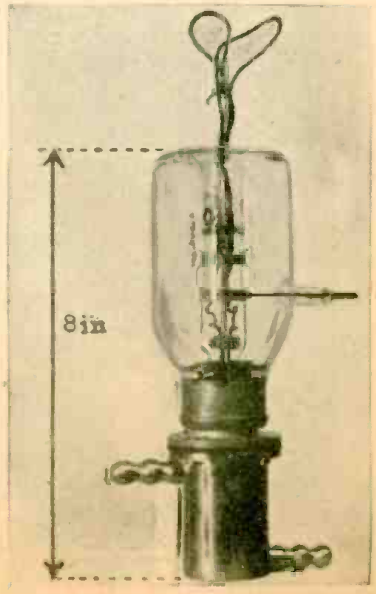
(Continued on page 233)

Film Star Uses S-W Transmitter

Left—Here we have the well-known film star, Frederic March, who is shown using one of the new R.C.A. Victor 5-meter transmitting sets. This is one of the prime, if not the very first, applications of 5 meter transmission to the direction of motion pictures. The set is shown in use at Hollywood.

Photo at right, sent to us by Dr. L. Rohde, shows a German high-power, short-wave, transmitting tube, which as will be observed, has a water-cooling jacket provided at the bottom of the tube, the inlet water entering at one of the pipes and leaving by the second opening.

Water-Cooled S-W Tube

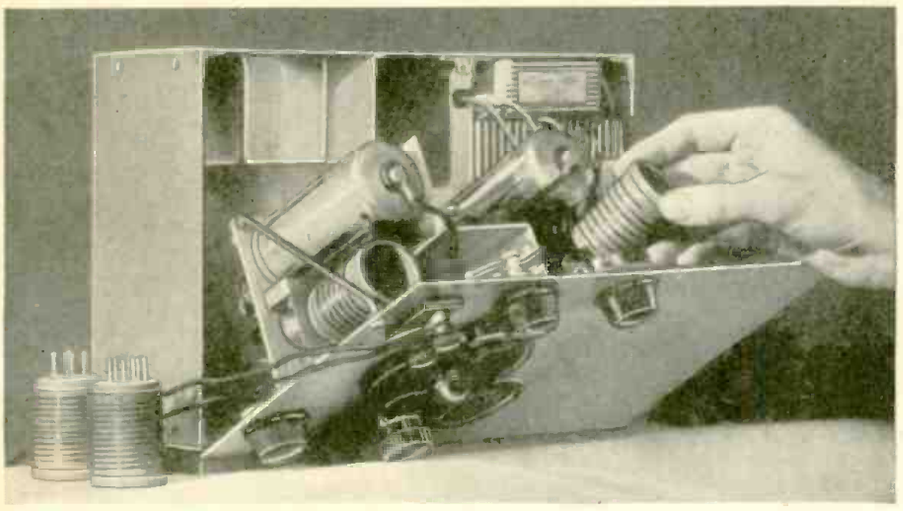


This S-W Set Brought News from Home

● THE accompanying photos at the right and below show an interesting short-wave receiver built in the laboratories of the famous Westinghouse Electric and Mfg. Co., this receiver having made quite a name for itself among the American delegates who attended the last International Radio Conference, held in Madrid, Spain, for it was on this set that the latest "news from home" was picked up on *short waves*.

Each night during the radio conference W8XK, KDKA's powerful short-wave station transmitted a special program of market quotations, ball scores, and news items, which were picked up in Madrid on the receiver shown, by Walter C. Evans, manager of radio broadcasting for the Westinghouse Company, and "believe you me" these short-wave tidbits from home were eagerly devoured as fast as received by Mr. Evans' fellow delegates.

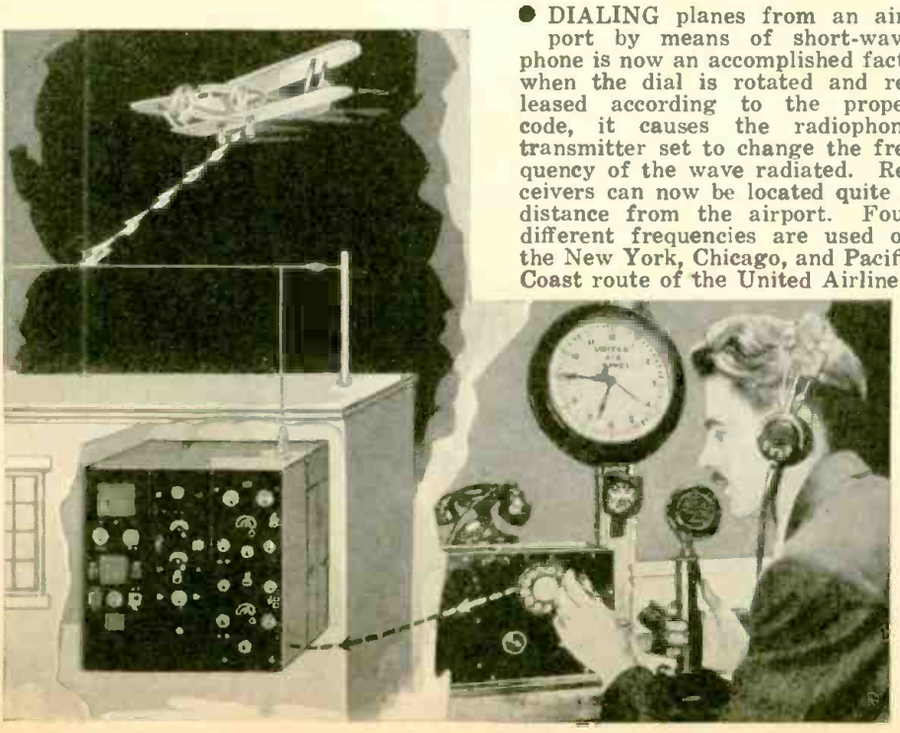
This compact little receiver, weighed but 15 pounds with the batteries.



Above—the short-wave receiver in operation at Madrid—listening to the "home news." Left—close-up appearance of the receiver, showing batteries inside the case.

"Dials" Planes by S-W Phone

● DIALING planes from an airport by means of short-wave phone is now an accomplished fact; when the dial is rotated and released according to the proper code, it causes the radiophone transmitter set to change the frequency of the wave radiated. Receivers can now be located quite a distance from the airport. Four different frequencies are used on the New York, Chicago, and Pacific Coast route of the United Airlines.



Transmitter Goes Up!

We recently described a European S-W transmitter sent up, attached to a balloon, for signaling the upper air conditions to weather observers. This photo shows similar apparatus used by the U. S. Weather Bureau.

A Band-Spread

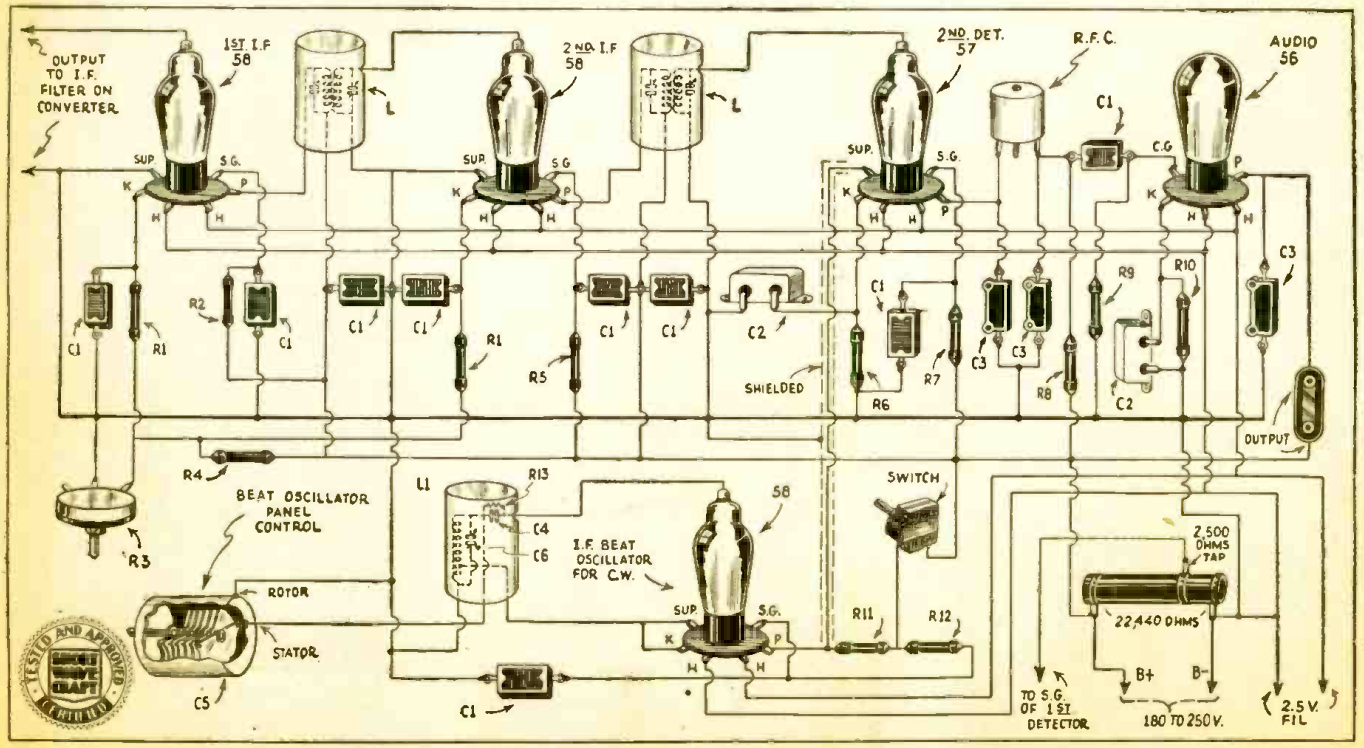
How to build an I. F. amplifier, second detector and A. F. stage for the "Band-spread Converter" described in the July issue

By GEORGE W. SHUART,
W2AMN-W2CBC

The author is here observed tuning in a "DX" station on the "band-spread" superhet receiver here described. Special plug-in coils are used.

● IT is the purpose of this article to present a suitable I.F. (intermediate frequency) and audio amplifier to be used with the short-wave converter described in last month's issue of this magazine. This unit consists of two stages of high gain low-frequency R. F. amplification, second detector and an audio output tube, together with a low frequency *beat oscillator* for C.W. reception. No short-wave super-heterodyne seems to be complete without a *beat oscillator*, which aids in locating short-wave broadcast stations and permits the reception of C.W. or code signals.

The I.F. amplifier is built on a 7x10x1 inch base, to match that of the converter; the two units are bolted together and attached to a 7x21 inch panel, which gives the neat appearance of one complete unit. The controls on the panel, from left to right, are: First knob, *trimmer condenser* for the first detector; next is the *main tuning dial* which controls the two-gang tuning condensers. Then comes the *control* for the *screen grid voltage* of the regenerative first detector; the next small knob is the *volume control* which varies



Anyone can, with a little care and a study of the above picture diagram, construct this band-spread superheterodyne receiver. Schematic diagram is shown on the opposite page and full details of the oscillator and antenna tuning circuits were given in the first part of the article in the July issue.

SUPERHET Receiver

the cathode bias of the two I.F. stages. The large dial next in line is for *controlling the low frequency beat oscillator*, and the last small knob is the *"on-off" switch* for the *beat oscillator*. This makes six controls in all, which may seem as though one is returning to the days when the set that had the most dials and knobs was considered the "hottest thing in town." However, each one of these controls is really necessary, if one wants a truly "flexible" receiver.

When this set was designed the new type I.F. transformers with the *air-dielectric* tuning condensers were not available, and the old type were used. However, the author highly recommends the use of the new style transformers, because they will hold their adjustment indefinitely, where the others require an occasional adjustment if the full gain and selectivity of the amplifier is to be obtained.

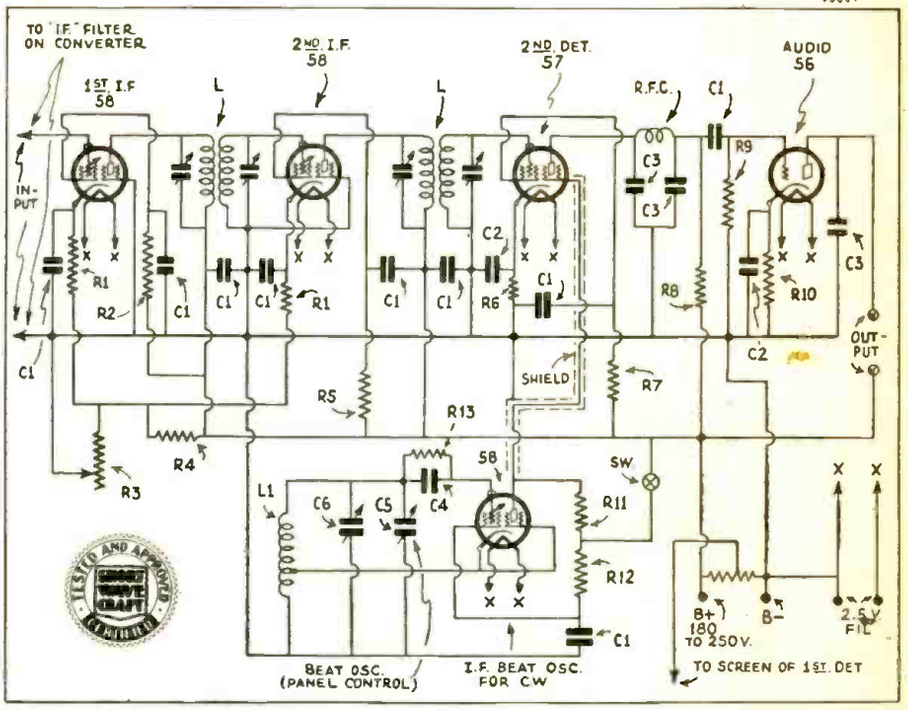
A type 57 tube was used for the *second detector* because it allowed the oscillator output to be coupled directly to the suppressor grid. This is a very satisfactory method of coupling and the strongest C.W. signal can be heterodyned with ease. This arrangement also helps to prevent the oscillator from feeding R.F. into the I.F. stages.

The editors have no hesitancy in highly recommending this "band-spread" superheterodyne receiver to the short-wave fraternity. Anyone with a little skill can build some sort of superhet for short-wave reception, but what's the use if the highly congested bands are spread over such a small space on the dial that it becomes almost, if not practically impossible to select the particular stations you want to hear. With this really remarkable set built by Mr. Shuart, not only do the "amateur" and "local" S.W. commercial stations come rolling in with tremendous volume, but also the "foreigns" as well, as actual tests have demonstrated.

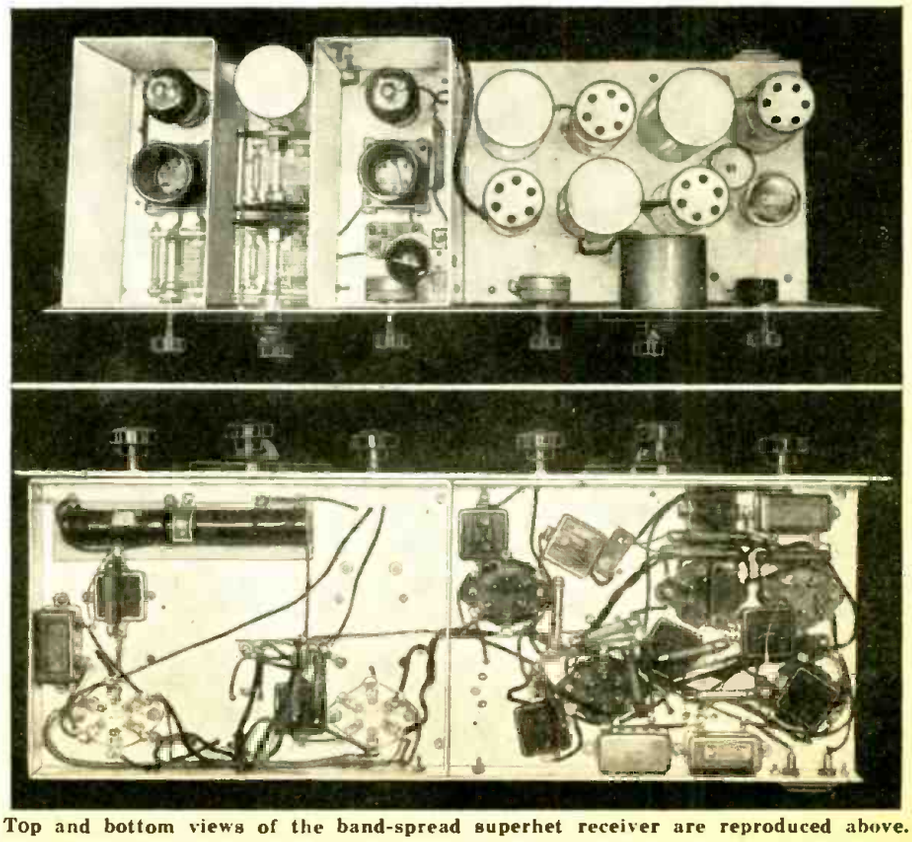
The audio amplifier, as can be seen from the diagram, consists of a single type 56 in a resistance-coupled circuit. A *pentode* could be used here if one should wish greater output, but with the output of the 56 any station could be brought up to *loud-speaker* volume, equal to any broadcast band receiver; so unless one wishes to entertain the whole neighborhood, it is advisable to try a 56 first and then *"judge for yourself."*

The *beat frequency oscillator* uses an electron-coupled circuit, which allows the plate load of the tube to be subjected to changes without noticeable effect on the stability of the oscillatory circuit. If a triode were used for the beat oscillator, with the high degree of coupling necessary to "beat" a strong station, instability would very likely be the result. The coil and condenser used with this oscillator are manufactured for this service. It has the same appearance as the I.F. transformers, and contains the grid condenser and grid-leak inside the shield. In order to have a panel control for the beat oscillator a separate tuning condenser must be connected in parallel with the one already in use inside the shield. The method used in this set was to mount a 35 mmf. Hammarlund midget condenser inside of a small coil shield, so that when the condenser is drawn to the panel for mounting the shield can presses tightly against the panel and forms a complete shield. It will be

(Continued on page 244)



Schematic wiring diagram for the I.F. amplifier, which when used with the "Band-Spread Converter" tuning circuits described in the July issue, provides a complete first-class superhet S-W receiver.

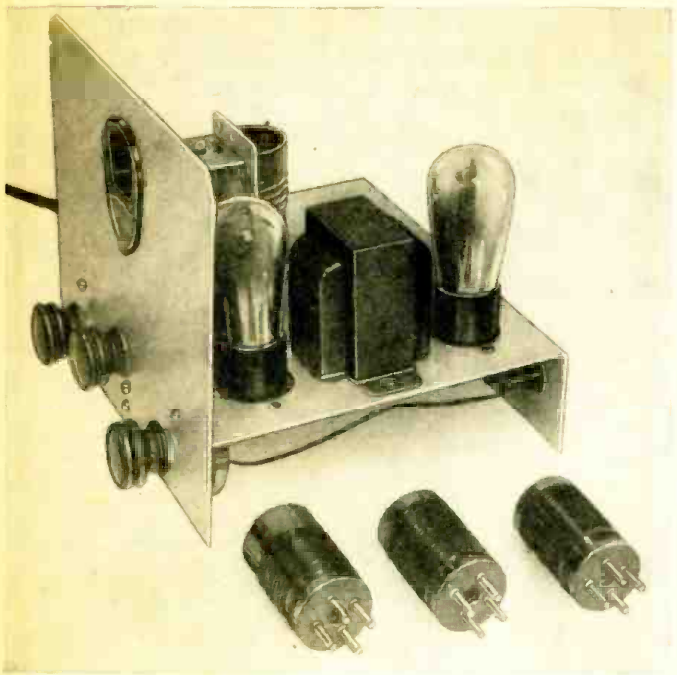


Top and bottom views of the band-spread superhet receiver are reproduced above.

The "Argonaut"

By CLIFFORD E. DENTON*

Here is just the receiver many of our friends have been looking for—a well-designed, "DX" getting, 2-tuber—and it works on batteries. Two 2-volt type 30 tubes are utilized, one for the regenerative detector and the other for the audio power stage. It is designed for head-phone reception, but even "foreign" stations have been heard on a loud speaker with the "Argonaut."



The "Argonaut" short-wave receiver works on two dry cells for "A" battery and a single 45-volt "B" battery. Well designed plug-in coils provide maximum efficiency. The set uses two type 30 tubes and "foreigns" as well as "locals" galore have been heard with it, many of them on the loud speaker.

THE *Argonaut* is a real "beginners'" set. Due to the simplicity of the circuit used, it is practically impossible to go wrong in the assembly or wiring. Only two tubes are used and these are of the simple three-element type, made up of a single grid, a plate and a filament. Ease of tuning and absolute reliability characterizes the completed job.

This set combines the best features of hundreds of short-wave circuits worked out by the author during the past five years. The circuit utilizes a regenerative detector, employing a 30 tube, and an audio power stage, also using a 30 tube. One of the best features of this powerful little receiver is the fact that it requires only two 1½ volt dry cells and a single "B" battery. While designed for headphone reception, it is possible to bring in many foreign stations with ample loud speaker volume with the *Argonaut*.

Regeneration Control is Smooth

Regeneration is controlled by a smooth working potentiometer, assuring perfect adjustment. The average time required to build the *Argonaut* is about 30 minutes. All parts are available in a complete kit form which includes drilled metal panel and chassis. Hence there is no occasion to shop around for "hard-to-get" parts, nor is a drill necessary to make mounting holes. The sockets are riveted to the chassis. The instructions accompanying the *Argonaut* are unusually complete, so that a successful job is pre-assured. A laboratory assembled and wired receiver may also be obtained, with a list of foreign stations actually logged on it.

Constructing the "Argonaut" 2-Tuber

The chassis comes drilled with mounting holes and with sockets riveted in place. The variable tuning condenser (10) is equipped with stay bolts, which can be slipped into the holes provided for them in the chassis. The first step is to fasten the variable condenser in place.

Before fastening the panel to the chassis, it is important that the small drive unit of the tuning dial be inserted in place, as it is impossible to put this on after the panel is bolted to the chassis. After the drive unit is fastened, mount the escutcheon plate on the panel and fasten the panel to the chassis by means of two small 6-32 round head screws. Then mount the 100,000 ohm regeneration control (8) on the right-hand side of the front panel and mount the rheostat (9) on the left hand side of the panel. Make sure that all parts are mounted securely. Slip the edge of the dial into the wedge drive of the tuning control shaft, and slide the tuning condenser into place, after one 5" length of wire has been soldered to the stator soldering lug terminal and another 5" length of hook-up wire has been soldered to the rotor lug terminal.

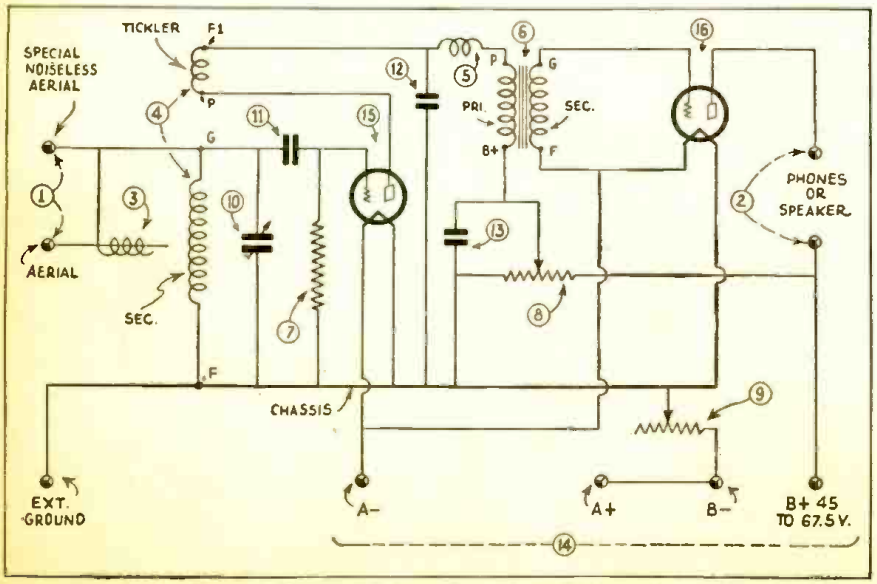
Fasten the audio transformer (6) on top of the chassis with the secondary terminals toward the back of the chassis (away from the panel). Mount the triple binding post (1) and the twin phone jack (2) on the rear chassis wall, as indicated. Next turn the chassis upside down and mount the R.F. choke (5), using the 2" transformer fastening bolt to hold the wood dowel in place. The R.F. coil should be 1" from the underside of the chassis. Part No. (3) is next constructed and fastened in place as follows:

A 1¼" piece of No. 14 bare wire is soldered to the short antenna binding post of (1). A short piece of No. 18 push-back wire is soldered to the long antenna post. About 14 turns of this wire are wound closely around the bare wire. The other end of the push-back wire is not connected to the bare wire, but is left open.

This now leaves two mica condensers, a tubular condenser and a small fixed resistor to be mounted. These parts are soldered into place during the process of wiring and naturally should be placed as close as possible to the other components with which they function.

How to Wire Set

Start the wiring by wiring in the filament circuit. Anchor the cable to the chassis by means of a knot on the



Schematic wiring diagram for the 2-tube "Argonaut," battery-operated short-wave receiver here described.

*Chief Engineer, Federated Purchaser, Inc.

Short-Wave Receiver

inside rear chassis wall and use one of the cable conductors to wire directly to the rheostat (9). The chassis may be used as a positive filament return lead.

Note:—Do not depend on the chassis as a return circuit for the tuning circuits. Run wires to all points in the high frequency circuits.

Wire grid circuits next, then plate circuits and by-pass condensers. This completes the wiring.

Putting the "Argonaut" Into Operation

To place the set in operation, connect the two dry cells to the "A" leads and the "B" battery to the "B" leads.

Insert the phones into phone tip jacks (2). Connect the antenna either to the long or short antenna post and connect ground to ground post. The importance of using a good antenna and ground cannot be overlooked.

Place the two tubes in the sockets and turn the filament rheostat up slightly. If a voltmeter is available, check the voltage to make sure that 2 volts is supplied to the filaments of the two tubes.

As the dry cells are new, it will be necessary to place the contact arm of the filament rheostat on the first turn of wire; as the batteries age, it will be necessary to move the contact arm around so that less resistance is in the circuit.

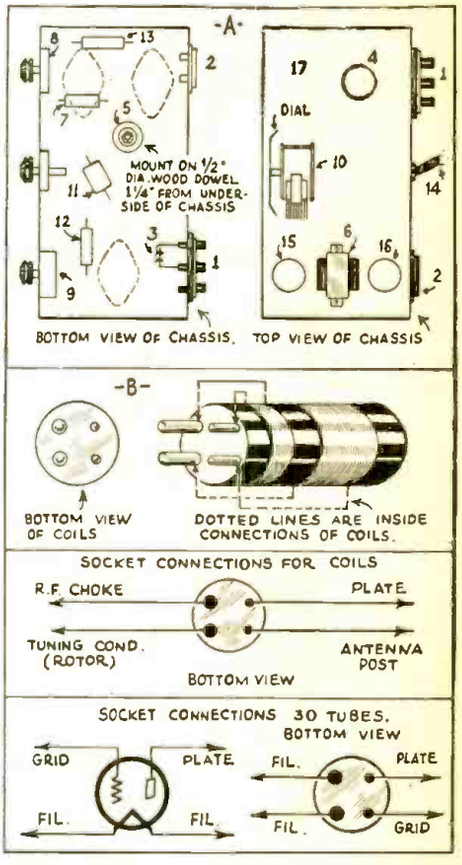
With one of the short wave coils inserted in the coil socket, adjust the antenna series condenser (3) by sliding the small coil of wire on the bare No. 14 wire. Each antenna will require a separate adjustment, but once made no further adjustment is required. Experimentation will indicate the proper value of this small condenser. Advance the regeneration control to the right until the tube goes into oscillation. If the receiver goes into oscillation too quickly it will be necessary to increase the coupling between the antenna by means of the adjustment of (3). Some types of short coils go into oscillation more readily than others. Tests show that the average short-wave tickler coil has too many turns. It might be advisable in some cases to take off one or two turns from the tickler winding.

Tuning Hints

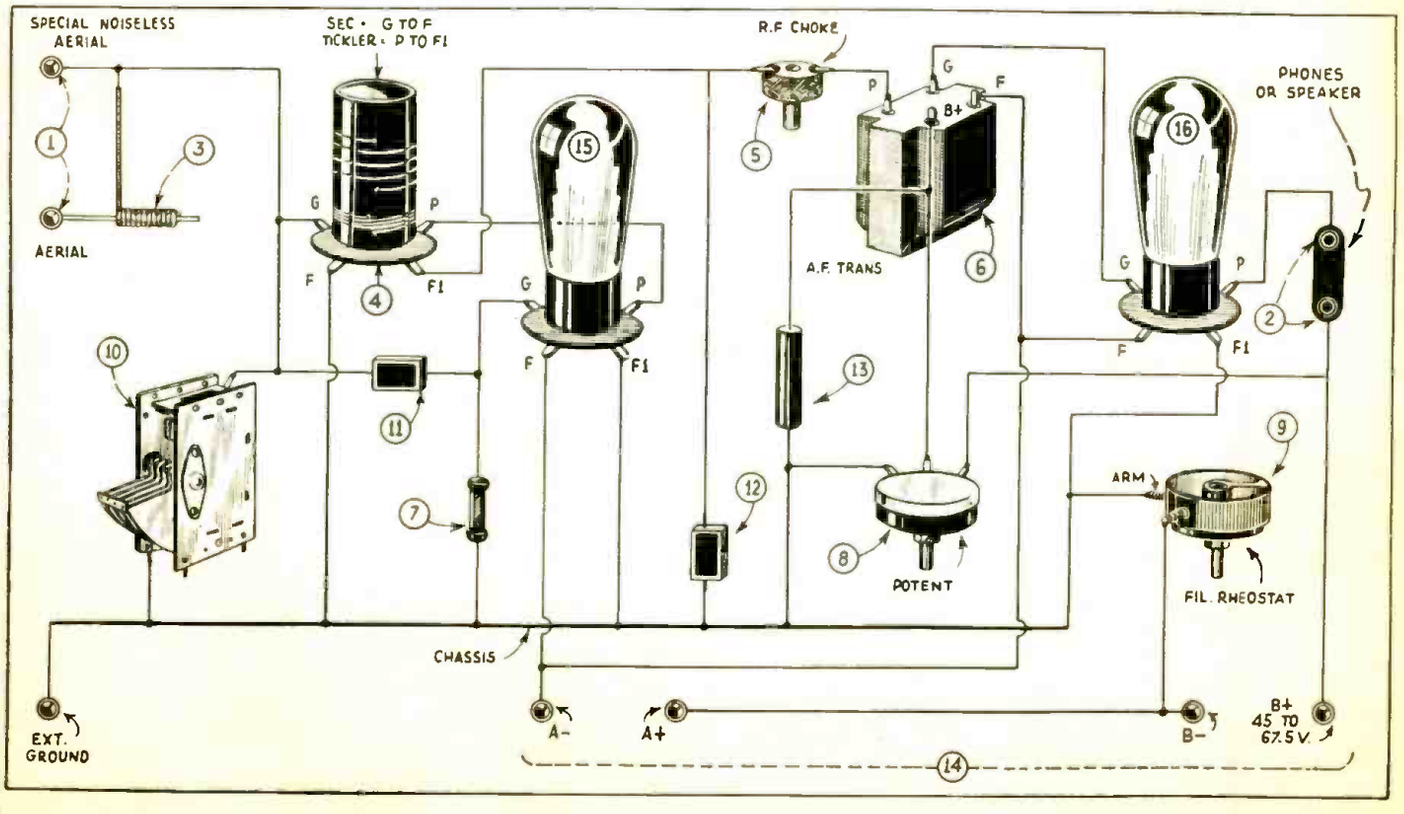
Slowly turn the tuning knob and advance the regeneration control to the right. Stop tuning the regeneration control when the set goes into oscillation. Keep turning the tuning condenser until a station is heard. If it is a phone station, the speech will be indistinct and accompanied by a whistle. Turn the regeneration control to the left until the signal clears up, and voice or music can be heard distinctly. Try to work the set always under the point of oscillation, so as not to cause annoyance in nearby short-wave receivers. Smooth regeneration control depends on having the proper filament voltage on the tubes and the proper adjustment of the small condenser (3).

After testing all the bands to see that the set is operating, adjust the antenna series condenser (3) so as to eliminate "dead-spots" and also to give smooth regeneration over the entire wave band which is covered. Coils are available which will permit this receiver to tune

(Continued on page 239)



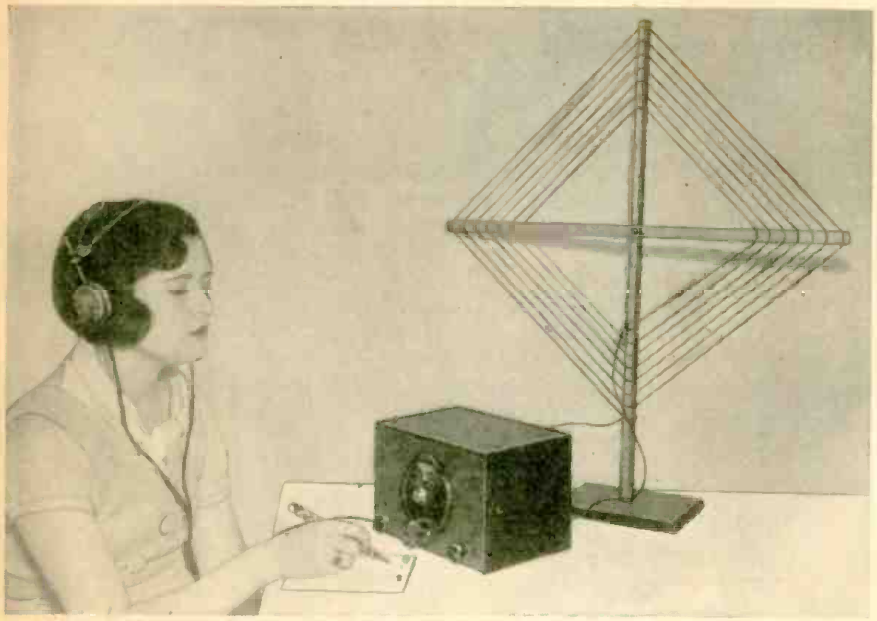
The drawing above shows top and bottom views of chassis as well as details of plug-in coils and socket connections.



Picturized wiring diagram which will make it an easy matter for the uninitiated to build the "Argonaut" short-wave receiver. This receiver was designed by Mr. Denton, who has presented many outstanding receivers in the past to readers of this magazine.

Picking Up EUROPE

By GEORGE W. SHUART
W2AMN-W2CBC



The special short-wave "Loop" antenna receiver in operation. The receiver uses but three tubes and is A.C. operated.

2,000 miles on a "loop" antenna is easy enough on the broadcast band, but when it comes to hearing European short-wave stations on 20 meters—"that's a horse of a different color." It was no cinch to design a Loop type S-W set to work on the lower wavelengths, but Mr. Shuart finally mastered the problem—and he heard Europe on his first test with the set!

HUNDREDS of short-wave fans have asked for methods of working a loop antenna on short-wave receivers. Loop antennas has found little favor in the short-wave field until recently, due to the inability to get them to tune to the higher frequencies and still have them large enough to have a fairly good R.F. (radio frequency) pick-up. However, in some foreign countries, short-wave experimenters are using this type of antenna with great success.

How Loop Is Coupled to Detector

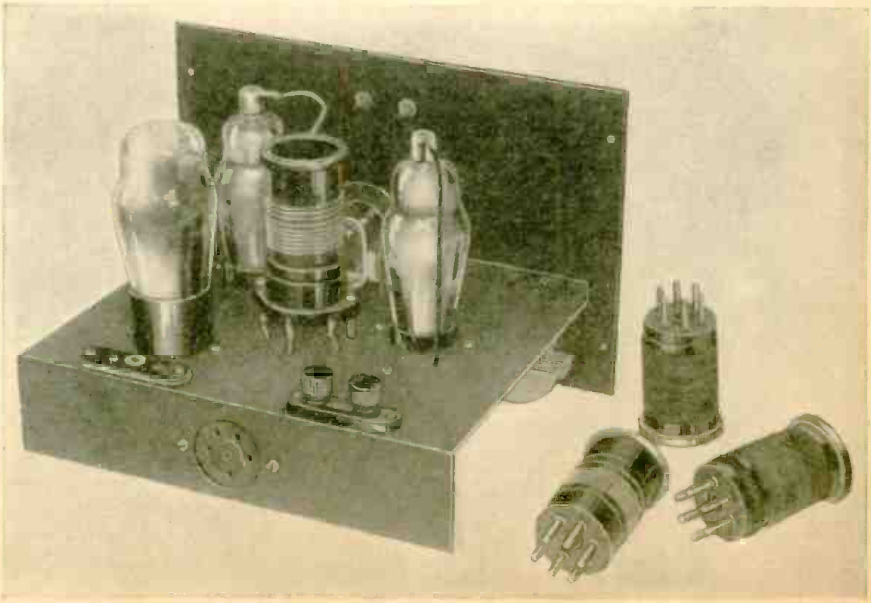
The set described here makes use of an untuned R.F. stage to couple the loop to the detector, the loop being connected in series with the grid circuit of the R.F. stage. This is the most simple method and gives surprising results; this system of course is not directional to any extent. Note this—an outside antenna produced signals only a shade stronger than the loop! The signal-to-noise level was considerably better with the loop than that of the regular out-door antenna. The dimensions of the loop were seven turns of wire, starting at a diameter of two feet and with the turns one inch apart. When using a loop of this kind it is advisable to have the receiver completely shielded, in order that there will be no interlocking feed-back between the R.F. stage and the detector at certain frequencies. This interlocking effect was experienced with an open-mounted receiver. No trouble was experienced at all in picking up all the major foreign short-wave broadcast stations on this set.

Another method tried by the writer and which gave promising results was the use of the well-known doublet antenna, "folded up" in the form of a loop antenna. This, of course, is not a "loop," but has the appearance of one. With this set-up a tuned R.F. stage was used, such as the one described by the author in the June issue of this magazine. A sketch of this type antenna is shown in one of the illustrations, together with the method of coupling it to the receiver. The dimensions of this antenna will depend entirely upon the frequency at which it is to be worked; also, it can be designed for a given frequency band and tuned, which should give it much greater pick-up and directional qualities.

Details of Receiver Used

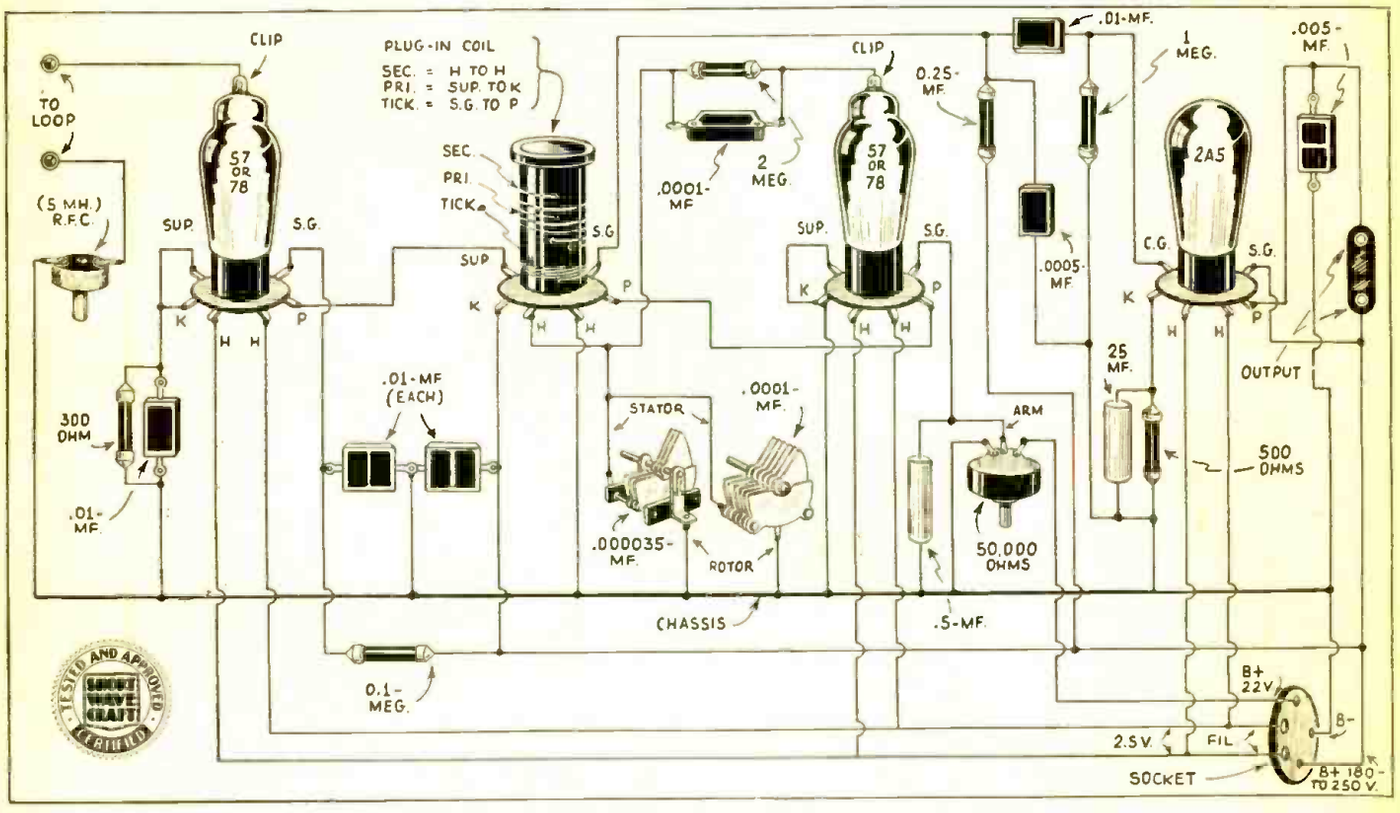
A description of the receiver shown in the photographs will be given for the benefit of those wishing to experiment along this line. The receiver is built in a copper cabinet, with a hinged cover to allow the change of plug-in coils. The R.F. coupling tube is a type 58 which is inductively coupled to the detector tube. A type 57 is used for the detector, with a potentiometer in the screen-grid lead to control regeneration. A type 2A5 is used as a resistance-coupled audio amplifier and gives very high gain. Trouble will be experienced with the audio tube feeding back to the detector and creating a loud howl, unless the plate of this tube is shunted by a .005 mf. by-pass condenser directly to the negative lead of the set. The by-pass condenser across the cathode bias resistor is a 25 mf., 25 volt electrolytic condenser. This is preferred over the usual 1mf. unit usually employed here because it gives a much *greater output* to the tube and improves the *tone quality*.

The coils used in this receiver are the same type as those described for the



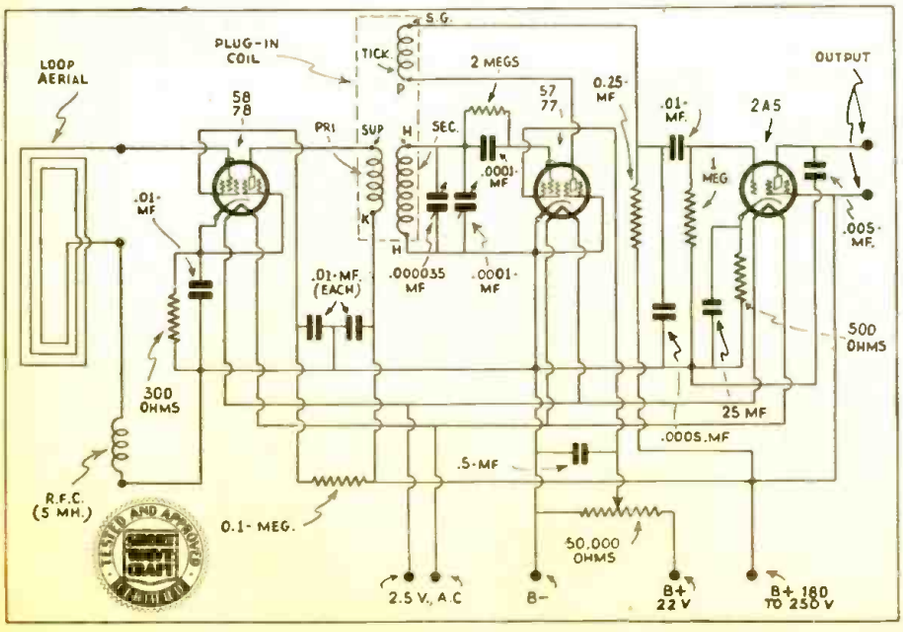
Here we have a view from the rear of the "Loop" operated receiver. It is built on a copper chassis and fits into a copper cabinet. Plug-in coils are used.

On A "LOOP"!



You will find this picturized wiring sketch very easy to follow. The receiver here described by Mr. Shuart can be used with the loop antenna described, or with a regular antenna if so desired.

3-tube "Electrified" Doerle receiver, described elsewhere in this issue. For tuning, a 35 mmf. Hammarlund condenser is used, in conjunction with a 100 mmf. Hammarlund, giving band-spread on all frequencies from 15 to 200 meters. The R.F. choke in the grid circuit of the antenna coupling tube was left in place, in order that an outside antenna could be coupled to the set at any time to compare the gain afforded by the regular outside antenna over that of the loop on a given signal. To couple an outside antenna to the set it is only necessary to short circuit the two loop antenna binding posts, and attach the regular antenna to this point.



The "Loop" antenna is left untuned in this particular receiver, which simplifies matters considerably. To tune a loop on 15 to 30 meters would require an extremely small loop, which would have but slight "pick-up" qualities.

Construction of Loop

The loop antenna shown with the set in the photograph was constructed from two dowel sticks, three-quarters of an inch in diameter. One of these sticks is twenty-four inches long, and forms a horizontal support, while the other is thirty inches long; the extra six-inch piece serves to elevate the loop from the mounting base. The wire can be fastened to the frame in a number of ways, thumb-tacks could be used, or bakelite strips could be mounted on the end of each section of the frame and the wire run through holes drilled in the strips one inch apart. In the loop shown with the set, the wires were fastened in slots in the wooden frame.

If one is interested in the use of a loop antenna for the reduction of background noise or man-made static, a suggestion would be to mount the loop at some remote point, that is out of the field of the noise producing machinery and power lines, and couple the loop to the set by means of a feeder line, using either transposed feeders or plain twisted lamp cord.

The frame used for the loop antenna of the old Radiola models 25 and 28 battery superheterodyne receivers would make an ideal frame for a loop to be used in this fashion. As shown in Figure "C," the loop wound on a frame of this type will take the form of two coils wound in the same direction and placed alongside of each other. The two outer connections are, in this case, left free or unused, as in the case of the regular doublet antenna. The

(Continued on page 231)

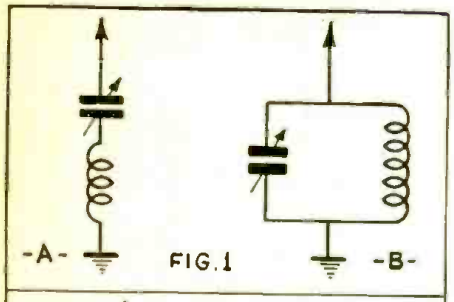


FIG. 1

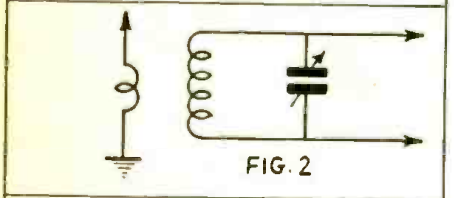


FIG. 2

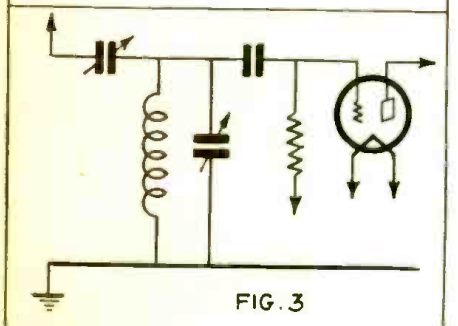


FIG. 3

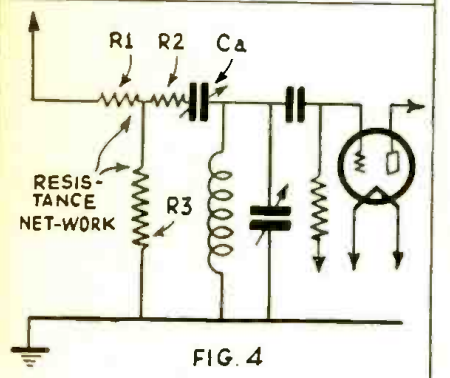


FIG. 4

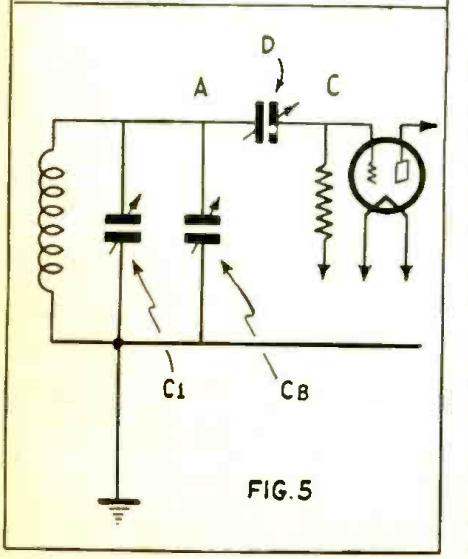


FIG. 5

Fig. 1 shows the older type hook-up of antenna circuit; 2, aperiodic antenna arrangement; 3, coupling the antenna to the "grid" circuit through a small condenser; 4, use of a "resistance-network" to couple antenna to tube; 5, use of a "band-spread" condenser CB.

Tuned vs. Untuned Aerials—

Hints On S-W Aerial

By DR. W. MÖLLER

PART I

● IN the early years of radio one often read in articles written by amateurs descriptions of their home-made receivers in which not only the *grid circuit* of the first tube was tuned, but the antenna circuit also. Then hook-ups were used of the sort shown in Fig. 1. In sketch A capacity and inductance are connected in series. It was supposed to be especially effective for the reception of wave lengths between 200 and 600 meters, while for work on the long wave band above 1000 meters, the parallel connection of tuning capacity and inductance was regarded as superior (sketch B).

To-day this view has been abandoned; it is only partially correct, for the quality of reception is also essentially influenced by the form and kind of antenna used. In antennas with high radiation resistance, tuning the antenna circuit is to no purpose, since the desired gain in volume and increase in selectivity does not occur to the desired high degree.

This is also reflected in the experiences of the amateurs themselves. When the number of transmitting stations increased and the individual transmitters were built for greater power, one gave up the specially tuned antenna and contented oneself with connecting a few turns of wire in the antenna circuit by means of which the antenna circuit was then inductively connected with the grid circuit of the first tube.

Aperiodic Antennas

Such untuned antenna circuits are termed in radio technology *semi-aperiodic* antennas. In the case of loose coupling with the input circuit of the receiver they provide good selectivity and at the same time perfectly sufficient volume.

If a receiver is to be constructed for short waves (meaning wavelengths between 10 and 100 meters) it is to be remembered in the case of the considerably higher frequency of these waves that the radiation resistance of the antenna increases to an extremely high degree. In the case of these waves it would therefore be senseless to have special tuning provided in the antenna circuit.

For short-wave reception then only the *semi-aperiodic antenna* comes into consideration. It can be coupled according to several methods with the following tube circuit. If there is used for the short wave set an antenna like that shown in Fig. 2, then for short-wave reception one can use any antenna of the type employed for regular broadcast reception. Therefore, as is to be once more stressed here, there is no need of a special antenna for short-wave reception. The short-wave set can be connected to the same antenna used at other times for the broadcast receiver.

One must only see to it that the location of the antenna is favorable. If we allow near the antenna wires, metal parts like gas pipes, electric wires, rain conductors and the like, these are always a source of loss for even ordinary broadcast waves, for the antenna current flows in a definite part directly over these neighboring parts to the ground and doesn't reach the set at all. With the considerably higher frequency alternating currents of the short-wave band, these losses are far greater than with the broadcast wavelengths.

Whoever wishes to occupy himself with the interesting experiments of short-wave reception is first advised to examine the location of the antenna wires and see to it that any proximity to other metal parts is carefully avoided. Distances over 2 ft., are not considered harmful.

The antenna is usually discussed first and then the ground connection is dismissed in a few words. This gives the reader the impression that careful arrangement of the *ground* wire matters but little. This is not so. Whoever works with short-waves will soon notice the great importance of the correct arrangement of the ground wire. It too is to be laid at a considerable distance from foreign masses of metal and for it, as for the antenna wire, a wire of not too small cross-section is to be used. One point in the ground conductor is especially to be considered, i. e., the place where the wire coming from the receiver is connected to the conductor leading directly into the ground. If one used as a ground the gas pipe or water pipe, the clamp by which the wire from the set is joined to this ground is only to be made up of parts carefully scraped clean and is to be attached securely and firmly, so that the resistance to the ground is as small as possible.

If, in the case of an imperfect ground wire system, it has too great a resistance, this error is at once evident in the reception results. In spite of careful metallic shielding of the set, it is then not possible to eliminate completely the *hand-(body) capacity.*

As already explained, any properly laid antenna suitable for receiving broadcast waves is also serviceable for short waves, and now this statement must be supplemented by another—that an outside antenna is not absolutely necessary. *With a good room antenna of some 12 meters (38.4 ft.) in length, absolutely perfect reception of short-waves can be attained in most locations.*

With the semi-aperiodic, inductively-coupled antenna, about two or three turns are to be used in the antenna coil. One can easily make antenna coils with but few turns; they are also obtainable commerically.

Figure 3 shows another kind of antenna circuit hook-up for short-wave receivers. Through a small condenser (a small variable condenser of some 20 mmf.) the antenna is directly connected with the grid side of the coil lying in the grid circuit of the first tube. In operation this type of antenna hook-up

Regeneration Control Systems and Receiver Circuits

shows some peculiarities, which must be recognized and exactly heeded. First, every variation or change of this coupling capacity also changes the *tuning* of the set. Second, over the antenna condenser, when it is set to greater capacity values, a greater amount of energy flows from the receiver into the antenna and it appears that in spite of a rigidly applied feed-back the set cannot be brought into oscillation. That is a very important point since in short-wave reception one has to operate with strong regeneration and just below the critical point at which oscillation sets in. From these considerations, the capacity of the small antenna condenser must not be of too great a value.

On the other hand in the case of small capacity, only a small fraction of the received signal energy flows out of the antenna into the first grid circuit. Therefore in reception experiments with this type of antenna coupling, one must see to it that one adjusts for the most favorable capacity value in the antenna condenser; that on the one hand the oscillating ability of the regenerative detector is not curtailed and also on the other hand, its capacity is to be chosen so large that a maximum of volume results.

A third type of antenna coupling is that employing a resistance network, as shown in the hook-up, Fig. 4. In the path from the antenna wire to the ground, lie the resistances R1 and R3. From them the conductor to the grid circuit coil branches off and in this branch lies resistance R2 and the coupling condenser Ca, which again is represented by a midget condenser of 20 mmf. maximum capacity. On account of the form of the resistance arrangement, this method is also called the "T-pad" method. The most practical value for the three resistances is 300 ohms each. Resistance R3 can also be chosen somewhat higher, as much as 500 ohms. Naturally they do not have a notable load; therefore those made to stand one-half watt are sufficient.

In the T-pad method the resistances lying in the antenna cause a considerable damping of the antenna signal currents. This gives the advantage that likewise the natural oscillations of the antenna circuit are strongly depressed; therefore the reception is perfectly independent of the form and length of the antenna used.

Where there are advantages, there are usually also disadvantages. The disadvantage of the T-pad method lies in the fact that this kind of antenna coupling also takes a great deal of energy from the receiver. Therefore setting the small condenser Ca to the most favorable capacity value is here also very important.

In making a short-wave receiver with coupling condenser it is advisable not to mount the latter on the front panel, since it is always very sensitive to *hand capacity*. Therefore it is best mounted inside the set some 4 inches from the front panel and operated by a small bakelite rod joining it to the dial.

PART II

Important Points in the Construction of a Short-Wave Receiver

If we first solve the R.F. or high frequency amplification problem, the antenna circuit is directly followed by the grid circuit of the detector. In it, parallel to the coil we have a variable condenser used for tuning (C1). It is best to use only specially insulated short-wave condensers. In general these have greater distances between the plates than ordinary broadcast condensers. The maximum capacity of the tuning condenser is to be about 100 mmf. (.0001 mf.)

Instead of making the adjustment to the wave to be received only by means of a variable condenser, one may also arrange things as in Fig. 5. Here there lies parallel to the main condenser C1 another smaller one of some 20 mmf. maximum capacity. With C1 one roughly adjusts the frequency range in which the station is to be expected and then makes a closer tuning of the wave-band with the small parallel condenser CB. In this way the tuning of the receiver is rendered much easier. In radio amateur circles the small parallel condenser is called the "band-spread" condenser. In connecting this tuning circuit with the elements of the detector tube, there are again some special points worth noting which are by no means so critical in the construction of

(Continued on page 234)

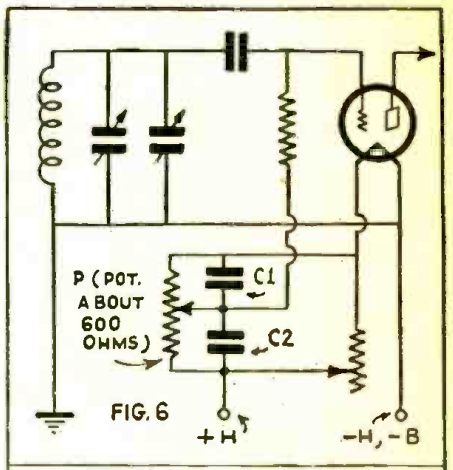


FIG. 6

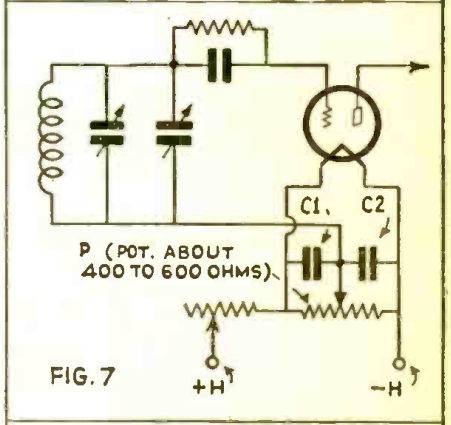


FIG. 7

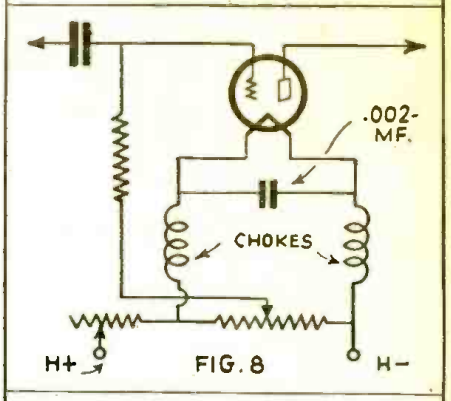


FIG. 8

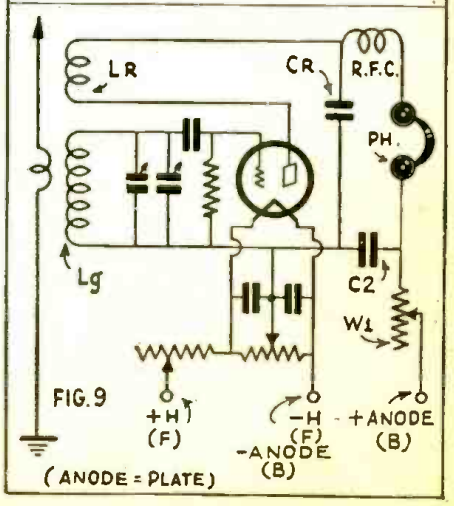
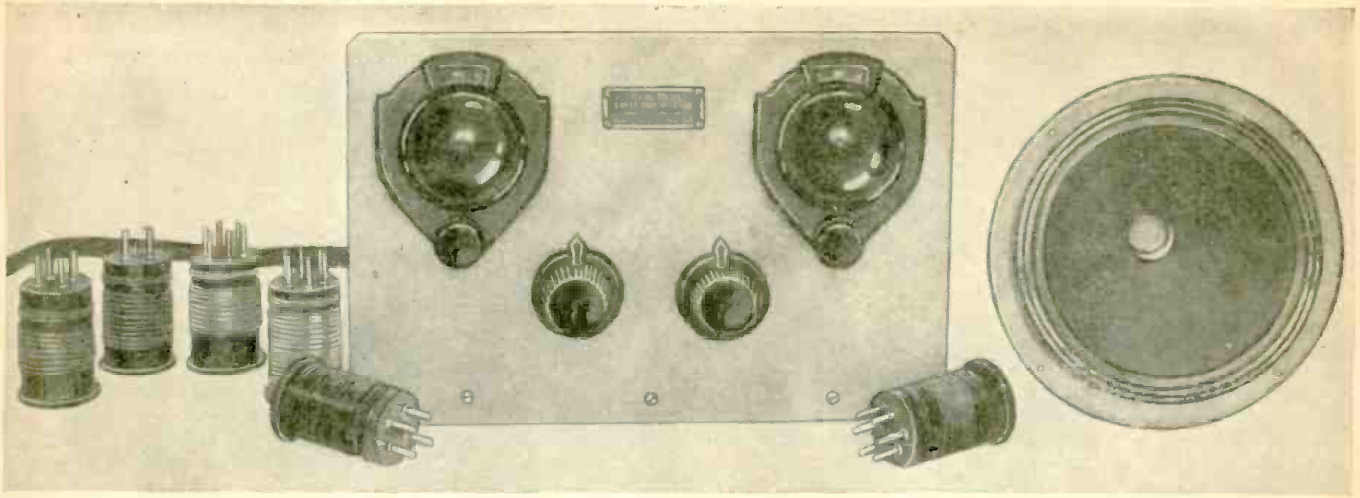


FIG. 9

Fig. 6—hook-up of grid-leak in detector circuit; 7—another hook-up for the grid-leak; 8—use of chokes in the detector heater circuit; 9—regulation of "feed-back" in S-W circuit.

● DR. MÖLLER, one of Europe's foremost authorities on short-waves, here presents some interesting food for thought for every short-wave student. Dr. Möller discusses the various forms of antenna-circuit tuning methods and the question of TUNED versus UNTUNED antennas, including a new antenna coupling system employing a RESISTANCE-NETWORK. In the second part of the article the author considers many important points in the layout of the short-wave receiver circuit, including the best method of RE-GENERATION CONTROL, the reason for using radio frequency chokes, and numerous other valuable points of interest to every short-wave fan, who is striving constantly to improve the efficiency and general control features of his receiver.



Thousands of short-wave fans will realize the fulfillment of their dreams, when they first try this extremely "smooth-working," A.C. operated, 3-tube short-wave receiver.

The DOERLE 3-Tube "Signal-Gripper" Electrified

By John H. K. Brown

$20.00 May Prize-Winner

The Doerle "Signal-Gripper," the battery model of which was illustrated and described in detail in the November issue, is one of the most popular of all the short-wave receivers that has ever been described in Short Wave Craft. It gives the editors great pleasure to present herewith the constructional details of the A. C. electrified "Signal-Gripper," in response to the many inquiries received from our readers.

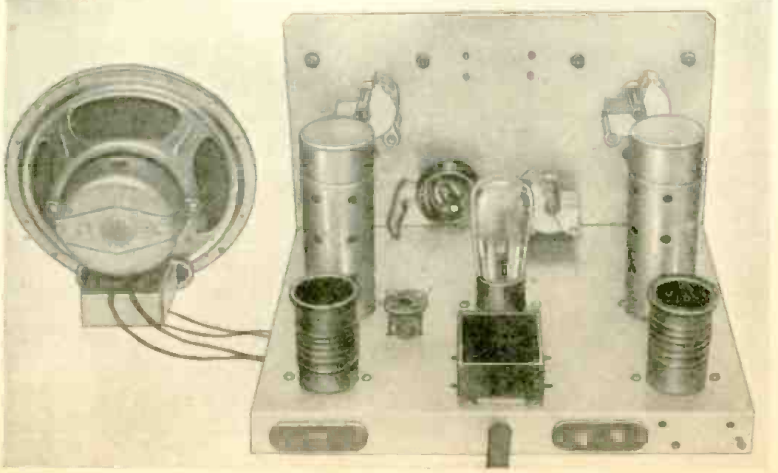
● IN view of the wonderful results obtained from the two-tube DOERLE receiver, using the new type tubes, described last month by Mr. G. Shuart, the author decided to electrify the three-tube model, and present it to the readers of this magazine.

The set described in this article is truly a wonderful short-wave receiver. Foreign short-wave stations can be brought in loud enough to operate a speaker even with only a triode (3-element tube) used in the output stage. If a *pentode* were used greater volume would be obtained, but then headphones would be out of the picture, and the author just can't seem to break away from phones, which are really the best for "DX" short-wave reception.

How to Change Battery Model

For those who already have the three-tube set, the operation of changing to the new type tubes is as follows. Remove all wiring, all sockets except the four-prong one on the left side of the chassis (front view) which is used for the R.F. coil. Remove the 20 ohm rheostat and replace it with a 20,000 ohm unit, which will be used for volume control. The additional parts that will be needed to convert this set are:

1—set of six-prong, three-winding coils, Radio Trading Co.
5—.01 mf. fixed condensers, Flechtheim
1—.002 mf. fixed condensers, Flechtheim
1—.5 mf. bypass condenser, Flechtheim
1—300 ohm fixed resistor, Lynch
1—100,000 ohm resistor, Lynch



Rear view of the electrified A.C. Doerle "Signal-Gripper."

1—100,000 ohm resistor, Lynch
1—250,000 ohm resistor, Lynch
1—1 Meg. resistor, Lynch
1—2,000 ohm resistor, Lynch
1—2,000 ohm variable resistor
3—Six prong sockets, Eby (Na-ald; Nat'l; Hammarlund)
1—Five prong socket, Eby (Na-ald; Nat'l; Hammarlund)
2—Screen grid tube shields, National (Hammarlund)

The old system of coupling between the R.F. stage and the detector, which is tuned impedance, is done away with and inductive coupling is used. The coils for this arrangement were obtained from the Radio Trading Co., and have three windings, one for the grid, one for the tickler, and a winding inter-woven with the grid coil for the plate circuit of the R.F. tube. Four of these coils will be needed and it is cheaper to buy them than to wind them by hand, because this is quite a difficult task. Four of the old coils formerly used with this receiver are used in the R.F. stage. Instead of coupling the antenna directly to the grid of the R.F. tube, as is done in the old receiver, the antenna winding on the R.F. coil that was unused is now employed to couple the antenna to the set.

Mount all the parts, following the same layout as in the old receiver, except that the audio transformer is not used. *Resistance-coupling* is used instead because of the high plate impedance of the detector tube. Solder all connections with a hot and well-tinned iron, using only

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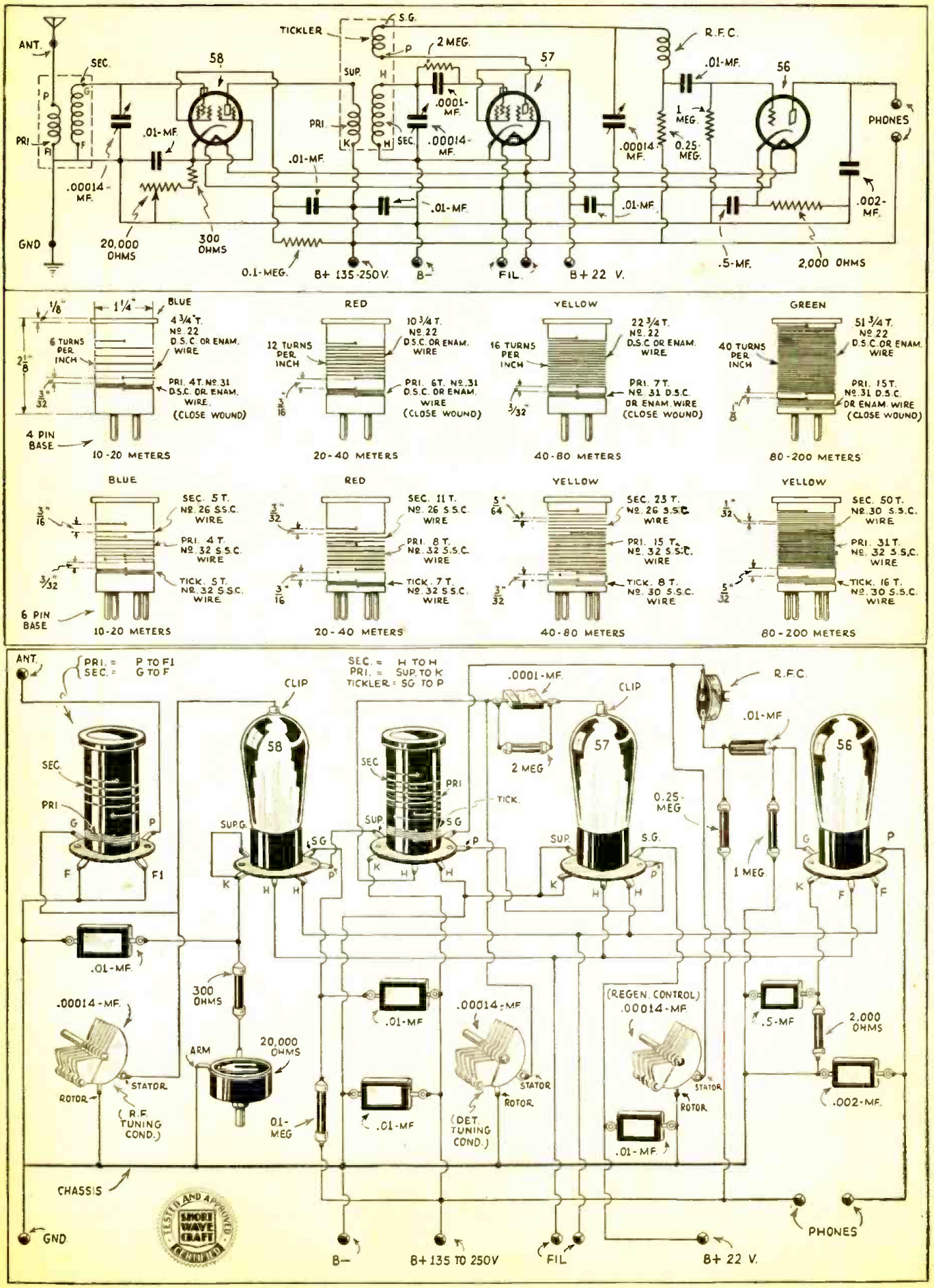


Schematic wiring diagram for the electrified Doerle "Signal-Gripper" is given in the top drawing, together with coil winding data. Picturized wiring diagram appears in lower half of the drawing.

$500.00 Prize Contest Awards

To Those Who Submitted Best Titles For Our May Cover

Above — the May cover of Short Wave Craft, for the best title to which the editors offered $500.00 in prizes. Left—Results!—and How!

● IN our May issue, we announced our Special Cover Contest. For those who missed this issue, the cover is reproduced herewith.

The scene obviously shows an irate mother, who, at 2 o'clock in the morning, breaks into the room where both the father and son are busily engaged putting together their latest two-tube "World Circler." What the mother really said to the frightened pair we have no means of knowing. We, however, asked our readers to supply a suitable title to the picture, and the following were some of the conditions of that Contest.

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

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

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

The contest officially closed in New York on May 31st—and boy, what a contest this was!

Of all the contests we have ever ran in SHORT WAVE CRAFT, this one certainly proved the contest of contests! A photograph reproduced in this magazine gives an idea of the 15,600 odd separate entries that were received. All of the entries had to be on cards 5½x3¼", the size of a postal card. This was done, of course, for uniformity, and to allow the hard-pressed judges to look through the thousands of entries that came pouring in from day to day. To be sure, there were a lot of repeaters; some of the repeaters sent in as many as 200 answers, but many contented themselves with only one or two. Most of the entries were on standard postal cards, which came in from all over the world. Others were written on pieces of paper or cardboard of the correct size. Naturally, in a contest of this kind, there was duplication galore. Every imaginable and unimaginable title that could be thought of appeared, and there was a great deal of ingenuity displayed in many of them.

And, as is usually the case in contests of this kind, thousands of contestants thought along the same lines. For instance, the title of QRM and all the rest of the "Qs" in all their variations stood first. *Static*, with hundreds of variations probably was second. *Local interference*, with hundreds of applications ran third; then came *interference*. Hundreds of contestants thought of the mother in terms of a *loudspeaker*, and there were thousands of variations in this thought too. Of course, the words *short waves*, in connection with all the others, were found in profusion. The same is the case of *high frequency*, and the word *broadcasting* in one way or another. Many had mother as an *announcer*, and the announcing was not very flattering to her! Then, there were hundreds of QSA. There was a good deal of *cross-talk* in different variations, and the term "DX," of course, came in for a lot of mention too.

From all of this, you will appreciate the fact that the judges did not have exactly an easy job to run through the 15,000 odd entries, in order to determine which were the good ones and the poor ones. The judges wanted some semblance of originality, and it is to be hoped that they succeeded in this.

All in all, it is believed that the contest was a highly successful one, for all concerned. According to the terms of the contest, the prizes have already been dispatched to the winners by the time this issue appears in print.

A list of the prize winners follows:

Here Are the "Prize Winners"

1st PRIZE—One "Royal Star" 2-Tube Short-Wave Receiver, donated by HARRISON RADIO CO., New York City. Value $25.00. To Fred W. Beehler, 378 E. Mansfield, Pontiac, Mich., for the title, *"A Dynamic Speaker Not Yet Baffled."*

2nd PRIZE—One "Powertone" 2-Tube Battery Operated Short Wave Receiver, donated by TRY-MO RADIO CO., INC., New York City. Value $20.00. To A. Phillips, Ste. 20 Haslemere Apt. 8, Winnipeg, Canada, for the title *"A Local Comes Roaring In."*

3rd PRIZE—One "Midwest" Model C-4 Short-Wave Converter, donated by MIDWEST RADIO CORP., Cincinnati, Ohio. Value $16.75. To Lewis G. Knepper, 457 W. Fremont St., Fostoria, Ohio, for the title, *"Better 'In-Su-Late' than 'Out-So-Late,' Maw."*

4th PRIZE—One 2-Tube "Doerle" Receiver, completely wired, donated by RADIO TRADING CO., New York City. Value $8.90. To D. Harrow, 103 Malvern St., Melrose, Mass., for the title, *"A Good Choke Might Help."*

5th, 6th, 7th, 8th, 9th, 10th PRIZES—A 1-Tube Short-Wave Receiver, donated by Charles Hoodwin Co., Chicago, Ill. To D. McDoren, 400 Stanyan St., San Francisco, Calif., for the title *"A Short Circuit to Bed"*; Louis K. Eriksen, 1323 Intervale Ave., Bronx, N. Y., for *"Their First Dynamic Speaker"*; E. W. Collins, 1103 Union St., Jonesboro, Ark., for *"Short Waves Cause Long Raves"*; Irvin Feinberg, 901 - 13th St., College Point, N. Y., for *"Wire-less and Sleep More"*; Al Dubin, 5 Ridge St., New Haven, Conn., for *"Making Short Work of Short Waves"*; G. P. Huntley, Jr., 400 E. 52nd St., New York City, N. Y., for *"Q.R.M., Quit-Raving-Mom."*

11th, 12th, 13th PRIZES—One transmitting type T-10 S Tube, donated by TRIAD MFG. CO., INC., Pawtucket, R. I., to W. L. Dunbar, 5519 Homeside Ave., Los Angeles, Calif., for *"The Last Word in Radio"*; E. R.

(Continued on page 237)

4,000 Mile Reception On 3 TUBES +4 Ft. Aerial—

And On a Loud-Speaker At That!

By D. M. DUNSMORE

Mr. Dunsmore, who lives in San Pedro Macoris, Dominican Republic, reports marvelous reception under trying static conditions, with this simple 3-tube receiver.

One of the gentler sex operating the 3-tube receiver here described, and which has distinguished itself with "high honors" by providing 4,000 mile reception under tropical static conditions.

● HEREWITH are photos and schematic diagram of a receiver built largely from ideas given in SHORT WAVE CRAFT. I have been experimenting with short waves and building sets since 1926. Short waves are our salvation in the Tropics, as the terrific static storms are diminished at 50 meters, and scarcely heard at 35 meters and less. Excepting January, February and March, static makes long-wave reception almost impossible in these latitudes.

I had always considered from the results obtained from regenerative sets built by myself, some with tuned, and others with aperiodic R.F. circuits, that no benefit was derived to merit the added complication of tuned R.F. In fact one of the finest battery sets I have ever handled is the old RCA Model AR-1145, with an untuned antenna circuit.

When the new pentodes came out, I became much interested, and Mr. Martin's idea of a good three tube receiver, in your September issue, struck my fancy. I then ordered material from the States for building this set, with the modification of a self-contained power supply, and an untuned R.F. stage.

Ran into two snags with Mr. Martin's circuit. One, the lack of a bias for the detector grid, was easily remedied by installing a grid condenser and leak. Volume was very feeble. The plate current was found to be very low, so I substituted the plate resistor for an impedance consisting of a G. R. audio transformer with primary and secondary in series. It seems quite important that "G" be connected to detector plate, "B" to the 250 volt supply, and the "P" and "F" together. Volume then increased somewhat. But the crowning stroke was Mr. Myers' idea of connecting the tickler between the cathode and B— as shown in the April SHORT WAVE CRAFT.

As a stable oscillator, I have never seen the equal, and the sensitivity is marvellous. On the 30 meter coil, I use only ¾ turn on the tickler! In my work-shop, under a galvanized iron roof, with a four-foot wire attached to a test prod for an antenna and no ground, I have pulled in Daventry, about 4,000 miles away, loud enough to be heard all over the house. On my regular antenna, I get VK2ME regular as clock-work. We have a number of high grade all-wave multitube superhets in the colony, but many neighbors say, "Why the complication of a superhet when such results are possible with but three pentodes?"

The set is *all-electric*, using one each 58, 57, 47 and 80 tubes. The three coils are fixed, a multi-contact switch effecting the wave-band changes. One coil tunes from below W3XAL on 16 meters to above Rabat on 32. The second tunes to above 70 meters. The third coil, with the assistance of a .00015 mf. fixed condenser which can be cut in and out, tunes from 200 to 550 meters. A .00016 mf. tuning condenser is used.

(Continued on page 233)

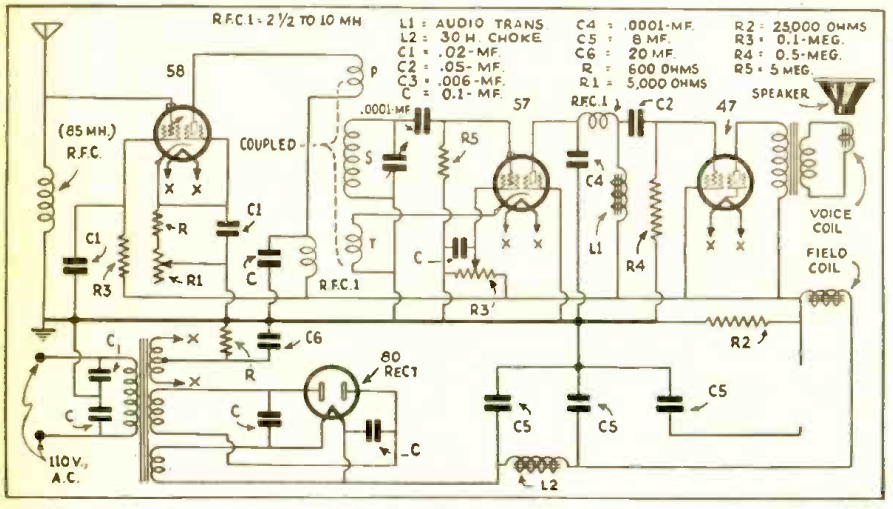
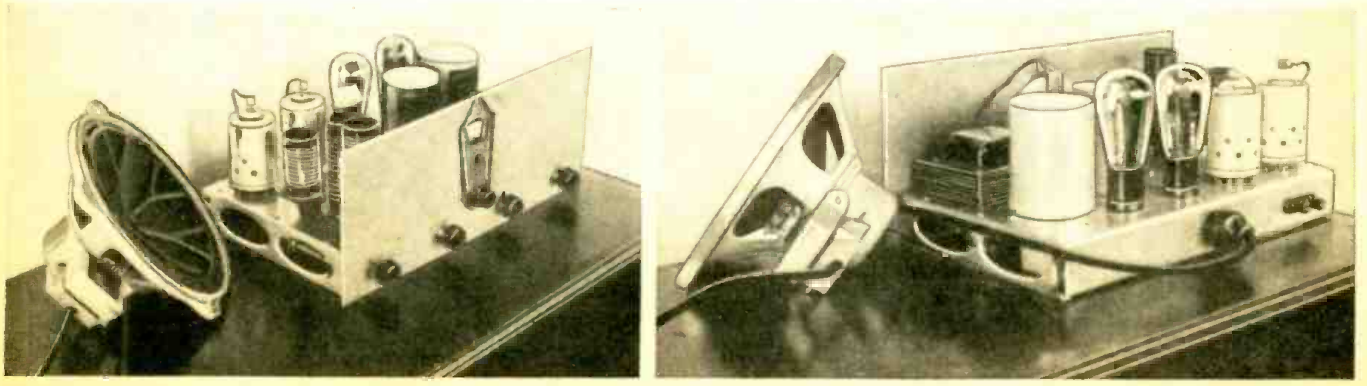
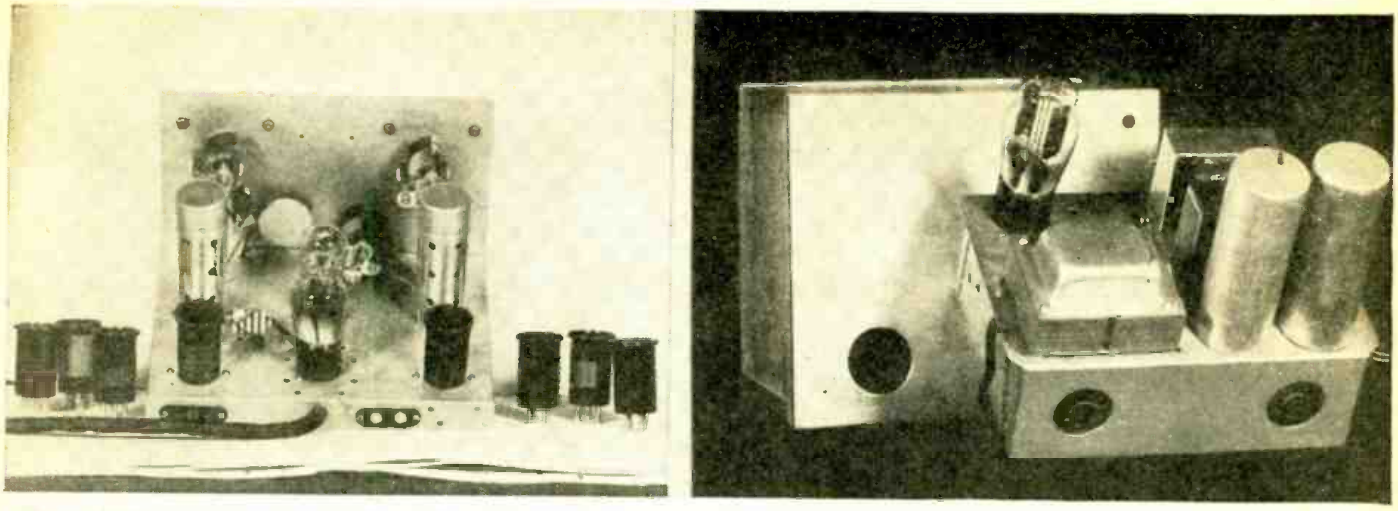


Diagram of Mr. Dunsmore's Receiver.



Photos above show a close-up perspective view and also a rear view of the 3-tube receiver here described by Mr. Dunsmore, and which has very smooth operating characteristics.



These photos show rear view of the 4-tube A.C. short-wave receiver with its plug-in coils, together with the specially filtered "independent" power supply unit at the right.

The "Supertone" 4-Tube A. C. Set

By H. W. SECOR

● A GOOD short-wave receiver today to satisfy most of us, who have become accustomed to the very fine reception afforded by our highly developed broadcast receivers of the present-day vintage, must fulfill these requirements: It must be quiet in operation and be free from hums or other background noise; the receiver must possess particularly high amplification, with as few tubes as possible, so as to properly amplify the distant DX signals, without having too much accumulated *tube noise*; and further, the set must have a smooth control of regeneration and the tuning must be sharp, without being so critical as to make it uncomfortable for the average man to operate the set.

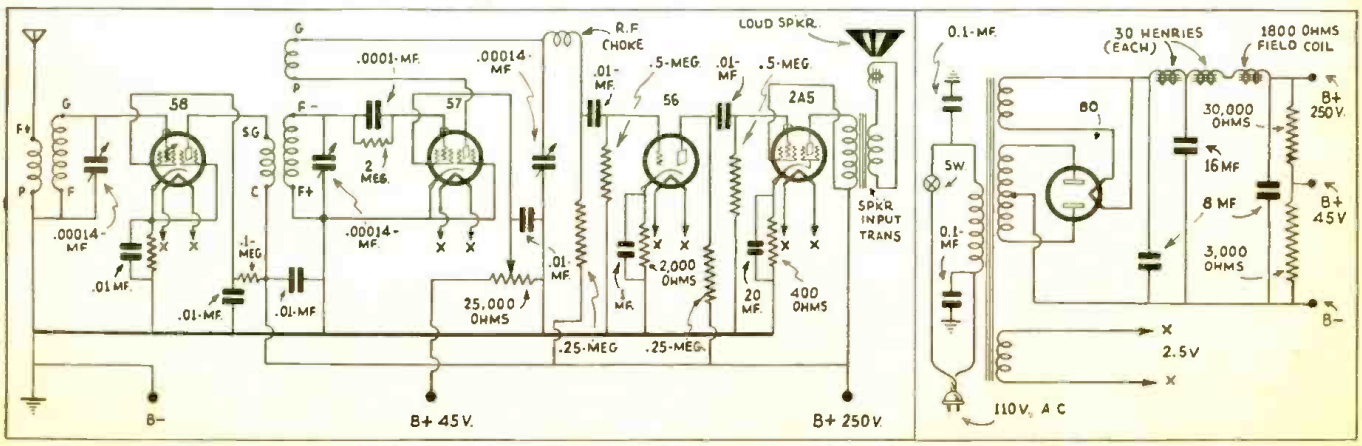
Mr. Edward Stannard of the Supertone Products Corporation was confronted with these many problems in the design of the new short-wave A.C. type 4-tube short-wave receiver here illustrated. Tests have shown that he succeeded admirably in the solution of the problems aforementioned. As might be expected one of the reasons for his success found its expression in the form of a *separate* plate supply unit. One of the interesting experiences that Mr. Stannard and his associates had in developing this new receiver, was that the *placement of the parts* on the panel and sub-panel had a great deal to do with the quiet and most efficient operation of the set. Here is a tip to short-wave experimenters who "build their own"—do not place the apparatus in what appears to be the "prettiest" position and then proceed to drill holes in the subpanel and screw them fast, but if you have a set that does not seem to *come up to scratch* take a leaf out of Mr. Stannard's book of experience—move the parts around while they are temporarily connected and in operation.

This 4-tube A.C. type receiver has been given the third degree and all of the usual "bugs" such as "tunable hums" eliminated. Separate tuning dials for the R.F. and detector stages provide for the accurate logging of stations. A powerful wallop in the loud speaker is assured by the use of the type 2A5 tube in the output stage. One of the secrets of this set's quiet operation is the use of a particularly well-filtered and separate power supply unit.

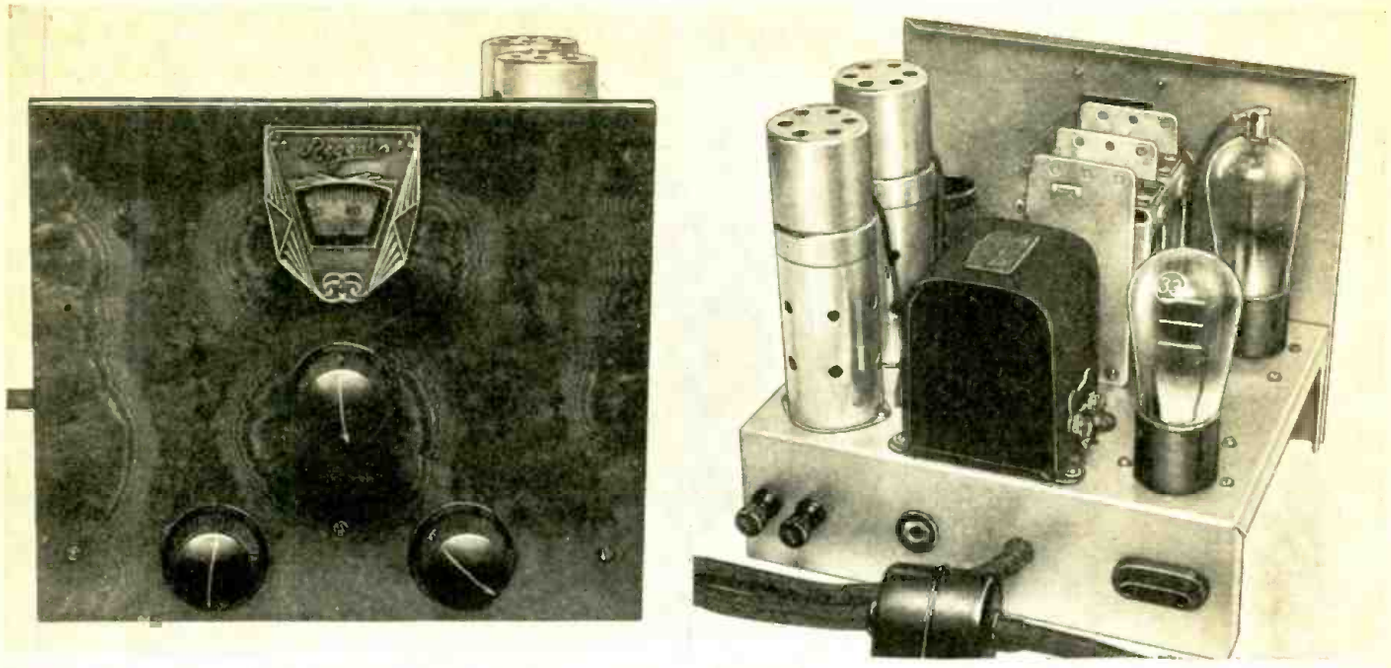
Again, if you are using an A.C. plate-supply unit try moving it to different positions and at different distances from the receiver proper. Even though the plate supply unit is placed in a shielded box which is connected to ground, one of the leading short-wave set manufacturers of the country recommends that the power supply should be located never less than *three feet* from the receiving set proper, in order to avoid pick-up of magnetic or other electrical induction from the plate supply unit.

The 4-Tube Circuit Used

A glance at the diagram herewith shows that a tuned stage of radio frequency amplification, employing a 58 tube, is used to build up the signal strength before it is detected. Next we come to the tuned three coil coupler which links the R.F. stage with the regenerative detector, employing a 57 tube. Dual regeneration control is provided through the medium of the .00014 mf. *(Continued on page 254)*



Interesting diagram showing the hook-up of the Supertone 4-Tube A.C. operated short-wave receiver, utilizing the new 2A5 output tube; also connections of power supply unit.



Front and rear views of the "Regent-Four" short-wave receiver. It embodies an unusually neat and efficient arrangement of the parts.

The "REGENT-FOUR" Receiver

By C. W. PALMER

Novel Short-Wave Receiver Using a New Tube Especially Designed for Short Waves—and a New Scheme of Equalizing Regeneration and Simplifying the Operation of the Set.

●

● THE short-wave "fan" who has been troubled by lack of oscillation on certain parts of the wavebands covered by one or more of the coils will welcome this new receiver. It employs the new S-30 tube, which has similar characteristics to the regular 30 tube, except for a much lower internal capacity which is accomplished by bringing the plate terminal out of the top of the glass bulb. This reduction in the internal capacity facilitates oscillation on the very low wavelengths and also makes the regeneration control much smoother.

The Regeneration Scheme

The second outstanding feature in the design of the *Regent Four* is the method of stabilizing regeneration.

In operating a regenerative short-wave receiver, continuous adjustment of the regeneration control is necessary to maintain the set just below the point of oscillation, where it is most sensitive. If this is not done, the detector either goes violently into oscillation or the regeneration drops down until the set is very insensitive, depending on whether the tuning is toward the higher or lower frequencies.

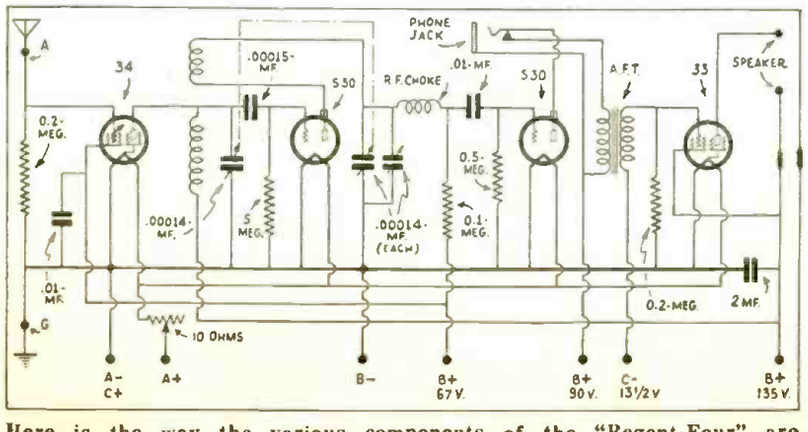
The operation of such a set can be simplified a great deal and, at the same time, the sensitivity can be increased by a method that will automatically keep the detector near to the point of oscillation.

Suppose we investigate some of the characteristics of the regenerative circuit to determine how this stabilization can be accomplished. If the size of the feedback coil is increased beyond a certain critical size, the detector tube will *block* and will not oscillate on certain parts of the scale; usually the high frequency end. This effect is manifested by *dead-spots* when tuning.

On the other hand, when the plate coil is reduced beyond a certain size, the set regenerates smoothly on the high frequency end, but will not oscillate at the low frequency end of the band. If a variable condenser is shunted across the plate coil for the purpose of controlling regeneration, an increase in the size of the condenser will, within certain limits, eliminate the lack of oscillation on the low frequency end of the band. However this causes the regeneration to be unstable on the high frequency end due to the greater capacity across the coil.

The practical solution to the problem has been found in the use of two regeneration condensers—one controlled by hand (in the usual way) and the other ganged with the tuning condenser. Now, at the low frequency end covered by any one coil, the sum of both condensers is available so that oscillation can be obtained to the end of the tuning scale—and on the high frequency end, the capacity of the condenser ganged with the tuning condenser is at its minimum so that the regeneration is not too great.

With this system, in conjunction with the correct coils, the set can be tuned over the entire frequency band covered by the coil, with only minor adjustments of the manually operated feedback condenser.



Here is the way the various components of the "Regent-Four" are hooked up.

Making the Set

So much for the principle of operation. The circuit and the appearance of the set in which these principles have been incorporated are illustrated here.

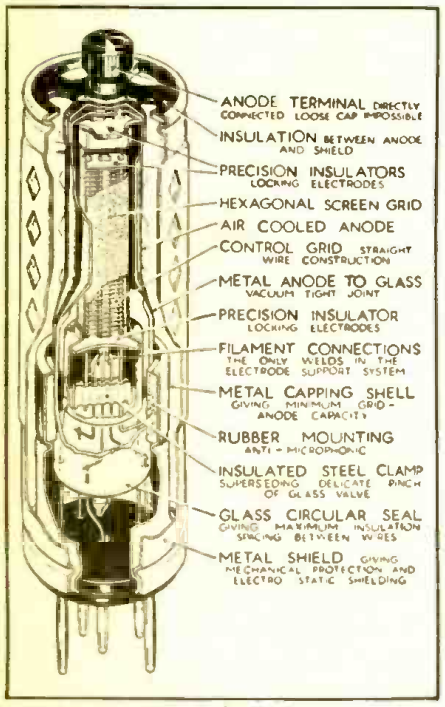
(Cont. on page 234)

WORLD-WIDE SHORT-

"Metal" Vacuum Tubes

● MUCH excitement has been voiced in recent issues of British radio magazines about the new "Catkin" tubes which have been introduced "overthere."

One of the tubes is here shown in a sectional view. It will be noticed that the glass parts of the tube are carefully protected in rubber mountings, and that the elements



The new English "metal" tube.

are prevented from being knocked out of alignment by the mica spacers which rest against the metal plate. The latter serves the double purpose of the tube plate and the top of the vacuum envelope.

Wireless Magazine, London, England, says:

"Why should the glass bulb be necessary when its sole object in a valve (tube) is to enclose the necessary vacuum and is no longer required to transmit light as in a lamp? In these new valves the external envelope is the anode (plate) itself, ingeniously sealed to the glass foot-tube by a glass to metal vacuum-tight joint."

"By making the anode itself the container, the necessity for support of a heavy mass of metal on thin wires is avoided, resulting in a solid, rigid structure and, in addition, a very small valve size owing to the abolition of the bulky bulb."

These tubes are being produced in a number of the standard English types and are interchangeable with the glass types which preceded them.

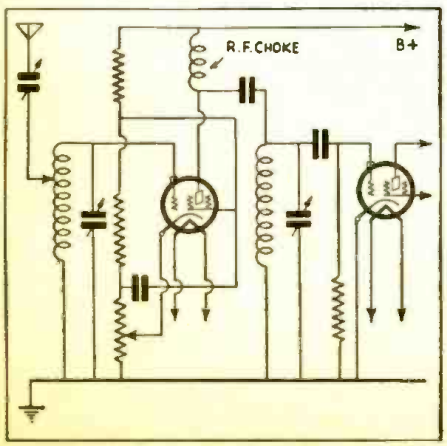
Amateur Wireless, London, England, in reporting some experiments made with the new tubes, says:

"Let's admit quite frankly that, when we first got hold of a bunch of *Catkins*, we could not immediately see the advantages. True, to the set manufacturer the greater consistency and reliability would mean more reliable sets, but would the individual amateur stand to gain anything?"

"And we can now say this for the *Catkins:* they do definitely offer the amateur real advantages. For one thing the screening (English expression for shielding) of the electrode is much more complete in a *Catkin* than in an ordinary glass bulb valve. The copper screening completely covers the valve. And as the electrode system is smaller than usual, this again increases the effectiveness of the shielding around the electrodes."

"Another thing, the screening is copper. Copper is the best screening metal it is possible to use. The electrode system is arranged so that the inter-electrode capacity is lower than usual. All this means that you can use more efficient coils—without sending the valve 'up in the air' through instability."

Among a number of circuits that were experimented with by the authors, that shown was included. It was given as the most promising for the new Catkin variable-mu tube. While there is nothing exceptional about this circuit, it is interesting because of the methods of obtaining the various potentials for the grid, screen grid, etc., which are a little out of the ordinary to the American experimenter.



A preferred circuit for the new "metal" tube or Catkin.

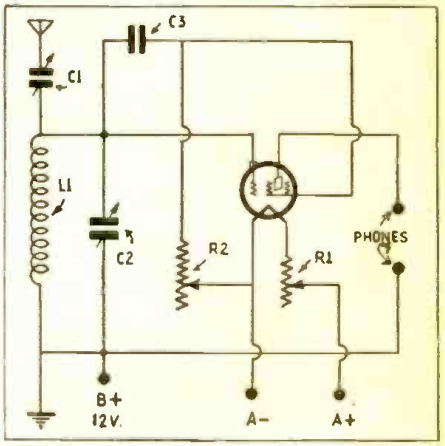
● The editors have endeavored to review the more important foreign magazines covering short-wave developments, for the benefit of the thousands of readers of this magazine who do not have the opportunity of seeing these magazines first-hand. The circuits shown are for the most part self-explanatory to 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 "Negadyne"—It Works On 12 Vts., Plate

(From RAFA—Stuttgart—Germany)

● THE short-wave Negadyne is a receiver ideally suited for portable use, where space and weight are very limited. It requires only about 12 volts for the plate supply—a welcome saving, yet the performance of the Negadyne is by no means inferior to that of a normal tube.

As the circuit shows, the arrangement is quite unusual in the fact that the "B plus" terminal is *grounded* and the filament circuit is isolated from the ground.

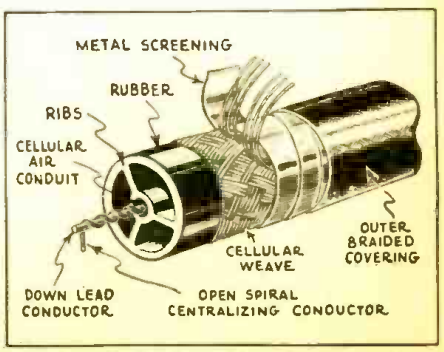


The Negadyne—it uses but 12 volts for the plate supply!

Under certain conditions, it is claimed that *super-regenerative* effects may be obtained with this circuit, thereby increasing the sensitivity many times.

In operating the set, it is found that the regeneration is controlled by adjusting the filament potential with resistor R1. At a certain point a constant whistle will be heard and at this point, the *super-regenerative* effect has been reached.

While the values of all parts were not supplied in the original article, the values of most of the parts are obvious. The coil L1 is the usual short-wave plug-in inductance, without the usual plate (tickler) coil. Condenser C1 is the aerial coupling condenser, many of which have been described in past issues of SHORT-WAVE CRAFT. It may have a value of about 30 to 50 mmf. Condenser C2 is the tuning condenser and would ordinarily have a capacity of about .00015 mf., depending on the tuning coils. Condenser C3 has a value of .00025 mf. The resistor R1 depends on the type of tube used and the filament supply. For a type 32 tube a rheostat of about 30 ohms should be used. R2 is a variable high resistance with a maximum value of about 4 megohms.



The latest English idea in a specially "shielded" lead-in wire.

WAVE REVIEW

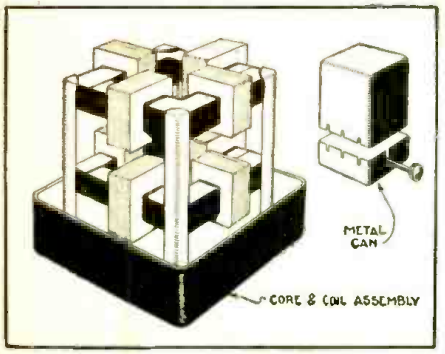
Edited by C. W. PALMER

Shielded Lead-In Wire

(From Amateur Wireless, London, England)

● THE English radio inventors have also been busy figuring out improved schemes for aerial lead-in systems to minimize man-made static and interference from electrical machines in the vicinity of the lead-in. The method of using this new shielded lead-in cable is to run the shielded cable all the way up to the flat-top, which is of course placed as far as possible above all trees, roofs, metal structures.

Iron Core for Tuning Coils



An experimental dual-range coil with Nucleon core.

(From Wireless Magazine, London, England)

● FOR several months, European set constructors and engineers have been taking a keen interest in the possibilities of making high frequency tuning coils with special *iron-dust* cores. The experiments of the German engineer Hans Vogt with his *Ferro-Cart* coils have been highly successful, judging by the number of sets appearing in magazines using these new coils.

Another engineer, Paul D. Tyers, describes his experiments along the same line. His object is to obtain the greatest amount of iron in the core with a resultant reduction in the losses. Those cores are called "Nucleon" cores.

In developing Nucleon, an attempt has been made to achieve this condition by what are believed to be totally different methods. The iron is reduced to an exceedingly small size, and by a special chemical process it is solidified with an extremely small amount of binding material, but of such a nature that sufficient insulation is obtained between the particles to give rise to no serious losses.

Nucleon will be molded into small coil forms which give a substantially closed magnetic circuit, and enable a very compact coil to be produced. The forms themselves will be made of special low-loss insulating material filed with nucleon. The coils will then be wound on the form in exactly the same way as an ordinary air coil and, accordingly they will add no complication to the production of sets. Quite a compact shielded coil can therefore be produced which should have an efficiency comparable with that of a large, highly-efficient air core coil.

It should be remembered that, owing to the compact field of an iron-core coil, a small screen (shield) can be used very close to the coil, and this is a great advantage where the saving of space is essential.

Ultra-Short Wave Reception

(From Wireless World, London, England)

● IN a comprehensive review of reception on short wavelengths, C. C. Whitehead points out a number of interesting facts concerning ultra short-wave receivers and reception conditions.

For wavelengths shorter than 4 meters, circuits of the *Hartley* type and pushpull circuits have been advocated, but the writer's experience has led him to believe that they are of doubtful value, equally good or better results being obtained with single-valve (tube) circuits.

On these wavelengths direct H.F. amplification (R.F. amplification) is, of course, quite out of the question, the choice in receiving equipment lying between the reacting (regenerating) detector and the superheterodyne principle, whilst, for a simple and highly efficient equipment where quality reception is not of paramount importance, the super-regenerative receiver more than holds its own.

For wavelengths between 1½ and 3 meters, the type of circuit shown at A seems to be the best. It has several advantages, but has the disadvantage of inconvenience of reaction (regeneration) control. Any attempt to control reaction by means of variable capacities leads to detuning difficulties. One arrangement in which this kind oof reaction control is used is shown by the dotted capacity C2 in "A." It is successful but has the peculiarity that either of the two condensers may be used for tuning or reaction indiscriminately, since both act in the capacity of both tuning and coupling condensers. In a circuit of this type tried by the author (wavelength about 2.5 meters) a low-capacity tube was used. C was .0001 mf. max. and C2 about 5 mmf. max. The best method, however seems to be that shown in the figure (without C2).

In practically all the circuits for use on

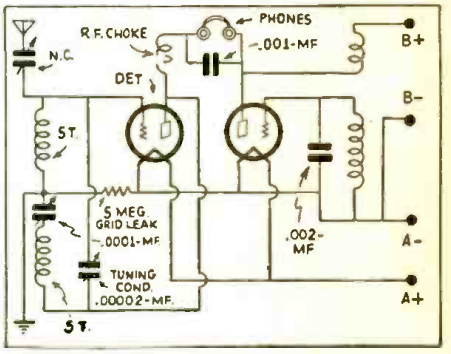
(Continued on page 247)

A 5 Meter Super-Regenerator

(From Popular Wireless, London, England)

● RECENT experiments on 5 meters in England have brought forth a number of successful receivers covering this band. Included among these is the super-regenerative set shown in the illustration. It consists of two tubes, a detector and an oscillator for generating the variation frequency. The constructional details are as follows:

The two detector coils are each wound with 5 turns of No. 10 gauge copper wire (B&S) and are made by winding the wire on one-half inch bakelite rod, letting it slide off and pulling it out so that there is a space about one diameter between turns.



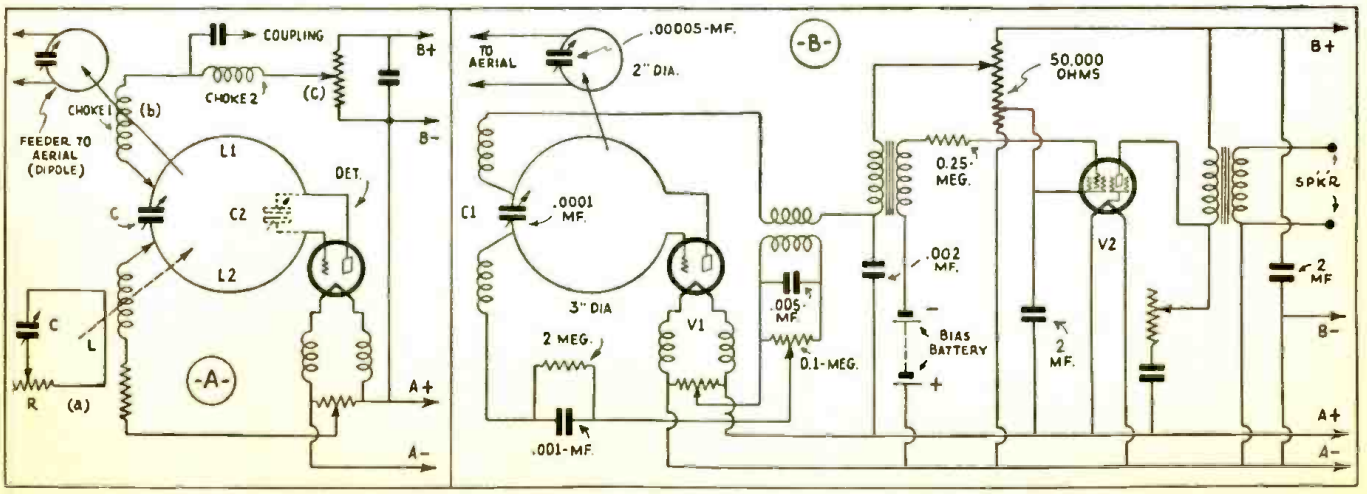
One of the latest 5-meter super-regenerative receiver circuits developed by English experimenters, is that shown above.

The adjustable condenser in series with the aerial should be a neutralizing condenser and should generally be worked at a very small capacity. (10 to 20 mmf.)

The "super" tube is simply a straightforward oscillator. All it needs is coils! These were wound originally on a solid 1½ inch ebonite (bakelite) former with two deep slots turned in it. No. 32 or 34 (B&S) gauge wire was used and 1,000 turns were wound for the grid coil and 750 turns for reaction (plate coil). Here again the outside ends go to the grid and plate and the "middles" to L.T. negative (A minus) and H.T. positive (B plus) respectively. The grid coil is shunted by a .002 mf. fixed condenser.

The operation is as follows: First of all, don't use more than 60 volts of H.T. (B battery). It isn't necessary. Remove the "super" tube altogether and make sure that

(Continued on page 247)



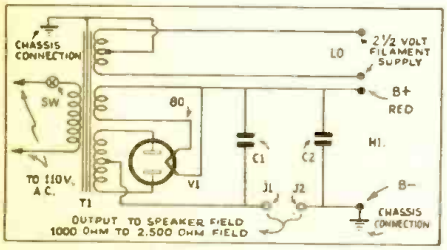
The circuit at the left, above, has been successfully used for wavelengths between 1½ and 3 meters. The circuit at the right is for an ultra short-wave receiver employing a self-quenching detector, coupled to a pentode; suitable for a wavelength of about 2.5 meters.

WHAT'S NEW In Short-Wave Apparatus

The short-wave apparatus here shown has been carefully selected for description by the editors and has been tested also in our laboratory.

Power Supply Unit for A. C. Sets

Above—a new and extremely compact power supply unit employing an 80 type tube and intended for use with short-wave A.C. receivers; diagram appears below. (No. 107.)



● THE little power supply unit shown in the illustration should prove extremely useful to radio set builders. For example, in rewiring a battery job for A.C. operation, the power supply is simply added as a complete unit.

Those fans who construct many different A.C. models can use this single power supply units for all of them, switching the unit from one set to another. This means a considerable saving in equipment.

Where space is at a premium, the A.C. set may be made extremely small by omitting the power supply apparatus and using this new unit at some other point. Many other desirable uses for this unit will of course suggest themselves.

The power supply unit illustrated consists essentially of a power supply transformer (T1), a dual electrolytic condenser (C1, C2), a wafer socket for an 80 tube (V1), a twin output jack for speaker field connections (J1, J2), an "on-off" switch (Sw1), and a binding post strip with posts for making the high and low voltage connections. These are mounted on a compact metal chassis 6"x4½"x1⅝" high. A six foot cord and plug are furnished for making connection to the 110-volt A.C. supply line.

This new power unit furnishes 5 volts at 2 amperes for the 80 tube and 2½ volts at 8¾ amperes for the filaments of the receiver tubes. The transformer (T1) supplies 300 volts on each side of the center-tap and approximately 250 volts at 40 ma. rectified current. This power supply, while especially designed for use with the "Voyager" short-wave receiver, is suitable for use with any set employing three 24's, 35's, 51's, 27's, 66's, or 57's or combinations of these tubes, together with a power output tube such as the 45, 47, 59 or the 2A5. The 80 type rectifier is recommended for use in the unit, although a 5Z3 could be employed.

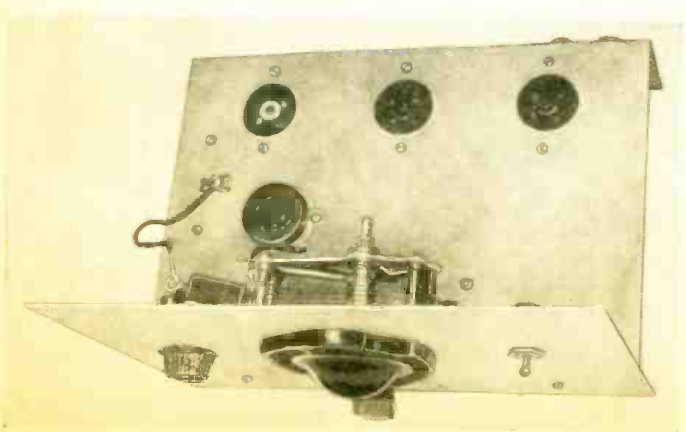
New Receiver Has Range of 14.9 to 555.2 Meters

● THERE has been a widespread demand on the part of the radio public for a reasonably priced, yet efficient table model, combination broadcast and short-wave receiver. The accompanying photograph shows one of the newest model receivers of this type, the beautifully figured walnut cabinet housing a powerful 8-tube latest design superheterodyne chassis. This chassis is also fitted into a console cabinet at a somewhat higher price. The superheterodyne circuit uses the new 2A5 and 2A6 tubes, which provide tremendous power and sensitivity on all frequencies between 540 and 20,000 kilocycles. Unlike some combination broadcast and short-wave receivers all of the 8 tubes in this new receiver work at full capacity on every tuning range. The table model cabinet here illustrated houses besides the 8-tube superheterodyne all-wave chassis, a full sized 8½" dynamic speaker. This receiving set delivers three watts of undistorted power output to the speaker, which yields a surprisingly fine tone and volume. The various wave-bands are tuned in at the flip of your wrist on a switch knob. The tuning dial is accurately calibrated and makes it easy to locate stations of *known* kilocycle frequency.

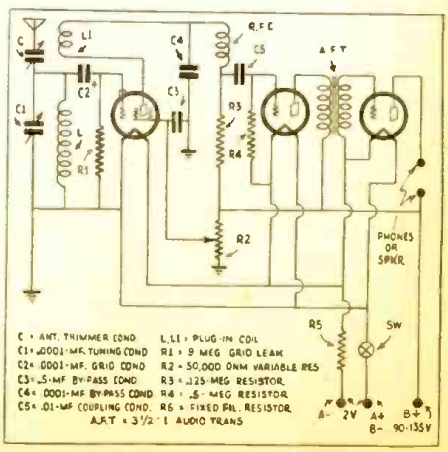
Newest table model broadcast and short-wave receiver using 8 tubes and covering all waves from 14.9 meters to 555.2 meters. (No. 109.)

New 3-Tube Set Uses 2-Volt Tubes

● THE new 3-tube short-wave receiver here illustrated is furnished by the manufacturers in knocked-down *kit* form; it comes complete with 4 plug-in coils to cover the short-wave bands from 15 to 225 meters. The kit includes aluminum subpanel, as well as the front panel, which are already drilled and ready to receive the component parts. The circuit employed is a standard regenerative one, with a potentiometer control of the regeneration by varying the voltage applied to the screen-grid of the detector. Two stages of audio amplification are included, the first audio stage being resistance-coupled to the detector, while the second stage employs a suitable ratio A.F. transformer. A high ratio vernier dial is used on the main tuning condenser. An antenna series condenser is employed, which enables the operator to eliminate dead-spots, should they occur. The values of the R.F. choke, the various coupling resistors, transformers, etc., have been very carefully chosen and lend their quota towards making this 3-tube receiver a very efficient set.



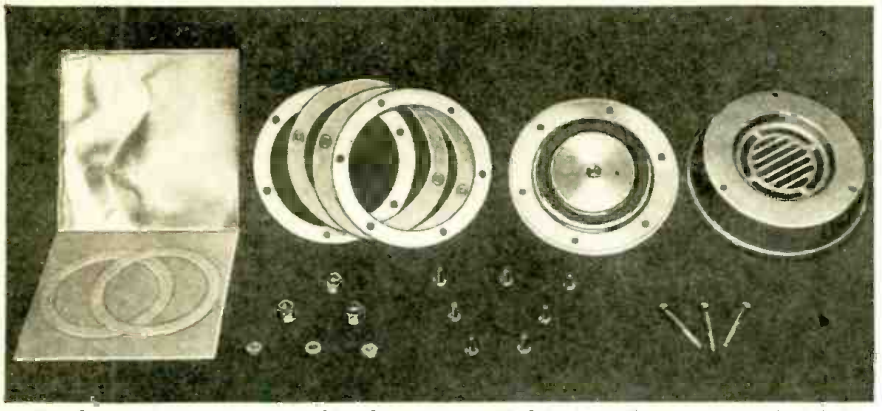
A new 3-tube short-wave receiver built from kit; it uses three 2-volt tubes.



Wiring diagram of the 3-tube battery-operated S-W receiver. (No. 108.)

(Names and addresses of manufacturers furnished upon receipt of stamped envelope; mention No. of article.)

An Accurately Made "Condenser Mike" in Kit Form

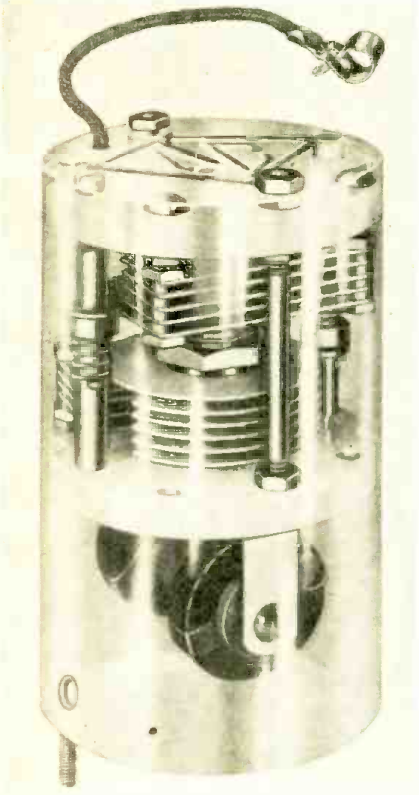


The few but accurately machined parts supplied in new "condenser mike" kit. (No. 110.)

● THE condenser type microphone has been widely used in commercial broadcasting, but the price of a good mike of this type has, up until recently, been far beyond the means of the average short-wave station owner. Thanks to the ingenuity of the engineers connected with the Bruno Laboratories of New York there has at last been produced a reasonable priced condenser mike kit which can be assembled very quickly and easily, by following the illustrated instruction sheet which accompanies the kit of parts.

The diaphragm is made of a very thin, specially-annealed aluminum alloy which, when it is properly clamped and tightly drawn by the circular compression rings furnished with the kit, enables it to respond to all frequencies up to 5,500 cycles. The diaphragm itself is a little over one-thousandth of an inch in thickness. The stationary electrode which is mounted behind the tightly stretched aluminum alloy diaphragm is accurately machined at the factory so as to leave a very minute yet exactly spaced air-gap between it and the diaphragm. Due to the clever design of this condenser mike, various thicknesses of spacing rings or washers can be placed under the diaphragm, for the purpose of experimentation. Ordinarily, the constructor will of course use the specified spacing washer furnished with the kit, which provides the length of air-gap found best after many laboratory tests by the manufacturers.

De Luxe "I.F." Transformer



Latest model National air-dielectric, tuned I.F. transformer, with self-locking rotors. (No. 111.)

● THE illustration above shows one of the finest intermediate frequency transformers yet developed. It was designed by the well-known National engineers and it provides micrometer tuning with air-dielectric condensers; all peaking adjustments can be made from the top of the shield. The tuning condensers, of the air-dielectric type, have double bearings and self-locking rotors. The various parts comprising the I.F. transformer are insulated with isolantite. Adjustable coupling is provided for between the two coils comprising the transformer, the coils being universal wound with Litz wire. These very newest type I.F. transformers which are used in both amateur and commercial high-grade types of short-wave receivers have a range of 450 to 550 kc. The condensers have non-resonant aluminum rotor and stator plates. These I.F. transformers are assembled in neat and efficient shield cans and are nominally priced; they will vastly improve the performance and stability of any superheterodyne, particularly those of the older type using mica peaking condensers on the I.F. transformers. The I.F. transformer shown is particularly suited to *single-signal* receivers.

Latest Automatic Voltage Regulator

● A NEW series of automatic regulators with standard flat-prong connections. Fitting the standard electrical outlet, it can be used in all commercial and public address installations. Radio sets equipped with flat-prong ballast sockets can use the improved regulators directly, without extra adapters.

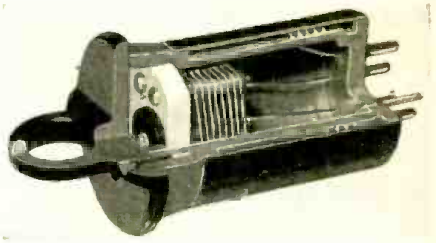
The new and recently improved regulating characteristics are obtained with this ballast. Improving the regulating characteristic means better regulation with less wattage; the wattage consumption of the new regulator tube is 40% less than that used by any former types of these regulators. (No. 112.)

New Type Transmitting Choke

● ONE of the illustrations herewith shows the very latest type isolantite insulated transmitting choke, designed for use with medium and high power short-wave transmitters. This choke comprises a continuous universal winding which is divided in five tapered sections. The metal base for mounting the choke is insulated for 10,000 volts plate. This transmitting choke has an inductance of 4 mf.; a distributed capacity of 1 mf.; a D.C. resistance of 10 ohms; a continuous current rating of .6 amp., and an intermittent current rating of .8 amp.

Improved Plug-in Coils

● THE very latest idea in plug-in coils is that illustrated herewith. It is the new National coil, fitted with an adjustable air-dielectric padding condenser inside the coil. The coil is protected by an insulating sleeve over the winding and is also fitted with a strong handle. Plug-in coils of this type are highly essential for maximum image suppression and sensitivity in single-control tuning of short-wave superheterodyne receivers.



Illustrating how the National plug-in coil is fitted with an adjustable air-dielectric "padding" condenser.

Latest model transmitting choke mounted on isolantite base. (No. 113.)

(Names and addresses of manufacturers furnished upon receipt of stamped envelope; mention No. of article.)

LETTERS FROM S-W FANS

LIKES 2 R.F. PENTODE JOB

Editor, SHORT WAVE CRAFT:

I am now interested in your Short Wave Superheterodyne, as published in the June issue of SHORT WAVE CRAFT.

I built the set you described some time ago, having two pentode R.F. stages, and I must say it is one of the best sets I have ever owned or heard.

K. A. YOUNG,
Humboldt, Nebr.

(Thanks, K.A.Y., for telling us of the successful results you have obtained with the "2 R.F. Pentode" job which we described in the April, 1932 issue. The one or two stage R.F. receivers have quite a number of superior merits for every short wave "fan" sooner or later to appreciate. We are looking at present time for some bright genius who can or will give us a good article on another T.R.F. short wave receiver, using either two or possibly "three" R.F. pentodes. According to some of the letters we have received from readers who have successfully built the 2 R.F. Pentode job on which they heard European and Australian stations on the loud speaker we imagine that the fellow that builds a "3 R.F. pentode" job will really have something to crow about. Of course, all articles which are accepted and published in SHORT WAVE CRAFT *are paid for at regular rates and if one of you short wave fans have now or in the near future, a good T.R.F. job with two or three R.F. stages, don't forget to at least send a rough diagram to the editors so that they can look it over and advise whether a full-sized article with photos and all the "garnishings" would be very desirable.—Editor.)*

INTERNATIONAL AMATEUR RADIO SOCIETY

Editor, SHORT WAVE CRAFT:

Recently, you received a letter from Mr. Woodley of New Zealand. I was told by Mr. Oliver Amlie that this letter would be published in the February issue of SHORT WAVE CRAFT and I was very much disappointed when I didn't see it there.

Mr. Woodley is a member of our club, the *International Amateur Radio Society,* and I am sure that many of our members would like to see his letter appear in SHORT WAVE CRAFT.

The circuit he used, as you probably know, is that of Oliver Amlie's, whose circuit appeared in the May issue of SHORT WAVE CRAFT.

As to SHORT WAVE CRAFT, itself, it is the only magazine that I can read and get something out of. The other magazines are all "Greek" to me. I am a beginner and unless things are made clear, they go way over my head. SHORT WAVE CRAFT has helped me a lot in building my own set, which incidentally is also Mr. Amlie's set.

In closing, I wish you would do me a favor and publish as a supplement to Mr. Woodley's letter, which I hope you will soon print, the following information about the *International Amateur Radio Society.* The club now contains about 500 members, most of whom are readers of SHORT WAVE CRAFT. Our members are spread all over the world and in a short time, the club magazine will be put out and the club album will be sent around to the members. The album will contain pictures of all the members and their sets or stations. New members should send a letter to either Leo Rosenman, 4158 Wilcox Street, Chicago, Illinois, or to Oliver Amlie, 56th City Line Avenue, Overbrook, Philadelphia, Pa.

Our headquarters are at Three Rivers, Michigan.

LEO ROSENMAN,
4158 Wilcox St.,
Chicago, Illinois.

(We are glad to mention that Mr. Woodley's letter and photograph appeared in the March number and in the same breath, we are asking all owners of "ham" stations, as well as short wave "receiving" stations, to send in photos of their stations and themselves. We cannot guarantee to publish all of them, of course, but we will select the best ones, particularly the good "clear" photos and those which are the most "interesting." We are glad to hear of further success with Oliver Amlie's much-discussed 4-tube receiving circuit, which appeared in the May issue. Thanks for the information concerning the International Amateur Radio Society and we wish you luck.—Editor.)

Q. S. T. AND AMATEUR RADIO

Editor, SHORT WAVE CRAFT:

I have often wanted to write a letter to the editor concerning a certain letter published in SHORT WAVE CRAFT of August, but I cannot delay in doing so any longer. No doubt, the letter appealed to his liking and self satisfaction or it could not be accepted as a letter of worth to waste good printer's ink. No matter how often I thought of the letter near the bottom of page 224, written by N. E. Brewer, I felt more indignant and resentful. I believe, as many other amateurs would, that Mr. Brewer's letter is an unfair and an unjustified opinion of the American Radio Relay League, and their indispensable publication, QST. We all know that amateur radio would not be what it is today, and progressed so rapidly and accurately if it was not for the unending interest and hard work of the A. R. R. L. In fact, the A. R. R. L. has been a successful and excellent example for other amateur organizations in this and other countries, and their noteworthy articles in QST have been published in many radio books of the very best with due thanks. Also many important men in the radio profession have acknowledged the A. R. R. L. and QST with due importance. The A. R. R. L. has taken all amateur problems to heart, and I again repeat; amateur radio would not be as far advanced if it was not for the A. R. R. L. and QST. I do not care to write a letter of length, but I at least have this off my mind and feel more at ease having not let this letter go unanswered. Just as a little reminder, Mr. Hugo Gernsback, I have been a faithful reader of SHORT WAVE CRAFT. *Radio Craft,* which I always bought from the news stands, and when my subscription to *Science and Mechanics* expires I will not renew it. It is deplorable what letters you accept as fit for publication. And for a few closing words I feel encouraged to express and heartily extend to the A. R. R. L. gang and QST a world of unlimited success.

Sincerely,
SAMUEL SCHWAB,
629 M Street.
Sacramento, California.

(Continued on page 251)

He Heard Last Radio from the "AKRON"

● On the night of April 3, 1933, I had returned home late, after attending a meeting of the Cape May County Radio Club, of which I am one of the directors, in fact the chairman. A storm was brewing, and a good one, too, with high winds which were variable, and heavy thunder and lightning which was nearby.

As is my custom I tuned my set, which is a Navy standard type short- and long-wave apparatus, comprising one radio frequency, detector and two audio stages. This was about 11:50 p. m. on April 3. The QRN was terrific on most all the wave bands. I heard signals but they were so broken up no one could make sense from them but it appeared to me that some aircraft was trying to establish communications.

At that time I was not aware that the Akron was aloft. When I began listening in I heard the call NEL, the call letters of the Lakehurst, N. J., naval air station. At that time the storm had abated somewhat and I gathered a few words. Not being able to tell what it was all about, I tuned in on 600 meters and copied a few position reports of ships over in Delaware Bay and one or two messages from a couple of ships.

The storm broke loose again. I left my set and disconnected a broadcast outfit in the living room, then came back to my other set and tuned on the short waves. To my surprise the signals were there again and I could read them "fair," as all was in plain language. This was about 12:20 a. m. on April 4. The QRN was still bad and broke up the signals pretty well. At first I was unable to understand just what they were. Then I caught the distress message. The station sending was already in operation when I tuned him in, so of course I missed the first part and his preamble. There were no call letters at this time and no signature, and the message ended abruptly at 12:26 a. m. April 4th. At this time I was sure the message was a distress message and I realized it must be from an aircraft because of its contents and felt it was of vast importance. I had much difficulty in getting what I did, but one who has had my experience tries to do their best. The next morning I reconstructed the message to read sense and here is what I made out of it:

"Two bays (or guys), controls broken—ship bad condition—heavy storm—strong winds—going up now—(words missing here)—broken out—700 feet—nose up—breaking center—run into—something—crashing (or cracking)."

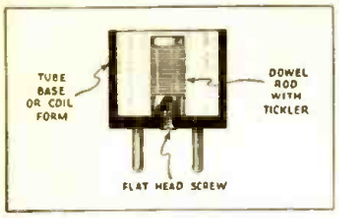
Here the message stopped and I presume that was when she crashed in the sea. I tried for a long time after that to pick up some dope on what it was all about and after breakfast next morning I heard the coast guard and other naval vessels and coast stations about 8:40 a. m. on the 4th. I intercepted a message from WSC on 600 meters to DDFW, a Dutch tanker, asking for a story and full particulars. I

(Continued on page 238)

● Introducing Arthur H. Hulfish of Wildwood, N. J., who had the honor of hearing what was probably the last radio message flashed from the ill-fated airship —"Akron." Mr. Hulfish quotes this dramatic message in the accompanying letter. ●

$5.00 For Best Short Wave Kink

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



$5.00 Prize

SPACE-SAVING TICKLER

The tickler coil frequently takes up more space than one has available, especially when winding plug-in coils for the higher bands on tube bases. To overcome this difficulty the idea shown in the accompanying drawing may be employed and will be found a very useful wrinkle indeed. The tickler coil is wound on a small piece of wooden dowel rod and is held inside the coil form by a screw passing through a hole drilled for the purpose, or the tickler can be glued inside the form.—Charles H. Hall.

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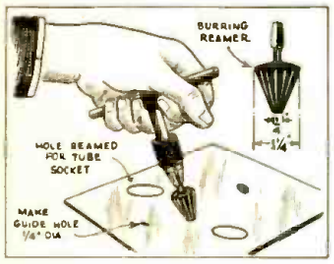
HOLE REAMER



When drilling a chassis for tube sockets and inverted condensers, a plumbers' burring reamer will enlarge the holes easily. First use a ¼ inch drill to make the guide hole, then use the reamer to enlarge to diameter desired. Edges of holes can then be smoothed with a half-round file. Use the ¼ to 1-¼ inch size reamer, which can be run right through to make a tube socket hole. I bought a ten-cent store brace to use with the reamer.

Needing an amplifier chassis of an odd shape, one was made from an automobile hood obtained at an auto junk-yard for the asking. After being drilled and bent to shape it was enameled black.—Elmer R. Boyer.

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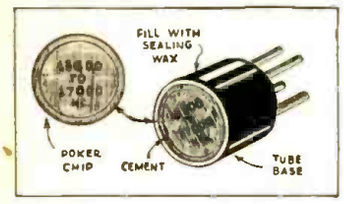
"K.C." LABEL FOR COILS

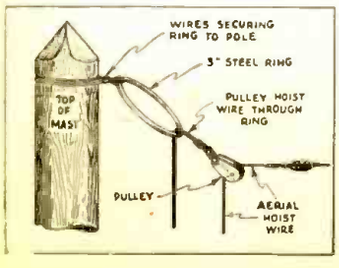


Here is my idea of a smart looking though simple "coil marker." Take an ordinary white poker chip, which is just a shade too large to be slipped into an old tube base, and file it to the proper size, at the same time roughening it. Apply ordinary household cement to the edge of the chip and inside edge of base and place the chip in position. The coil may then be marked as illustrated.—S. Ivan Rambo.

▼ ▼ ▼

AERIAL RIGGING

Having put up quite a few aerials, I find the handiest rigging for raising and lowering the aerial wire on high masts is to use a double system of hoisting. Before putting up the mast secure a three inch diameter steel ring to the top, in place of the usual pulley. Through this ring, run a hoist wire or light cable, with the usual aerial pulley on the end of it. Make this wire long enough to reach to the top of the mast and back again. When the mast is in place, but the usual aerial hoist wire through the pulley, hoist pulley up to the top of mast and secure the wire to the pole; then raise aerial wire in the usual way.



The idea of this double system is to get over the difficult and exasperating job which sometimes occurs if the hoist wire jumps the pulley wheel and jams between it and the frame. The pulley can be easily lowered this way to remedy the trouble.

I use wire, No. 12 galvanized, for hoists instead of rope, on account of weather conditions and also because 50 to 100 feet of rope is not very cheap.—Cliff Dawson.

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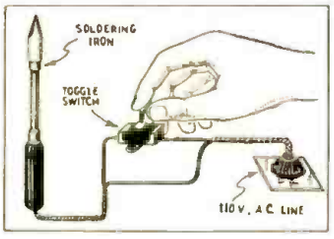
SOLDERING IRON SWITCH



Frequently one is in a quandary as to where to obtain a suitable switch to place in the circuit of a soldering iron. I have used an ordinary 110-volt toggle switch, of the type used on radio sets. This saves the trouble of disconnecting the soldering iron every time you are through using it. These switches may be obtained in double-pole style if so desired.—Charles H. Hall.

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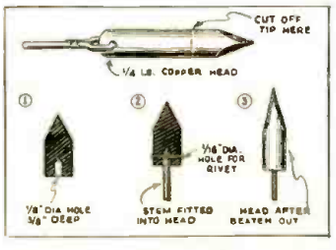
SMALL SOLDERING IRON

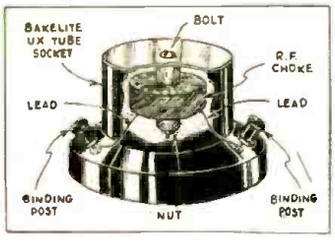
It is frequently difficult to lay your hands on a really small soldering iron suitable for soldering joints on fine magnet wire. I made a one-ounce soldering copper as follows:



I bought a ¼ lb. copper and cut it in two about ⅝ way back from the tip, drilled a ⅛ inch hole lengthwise in the base of the tip just cut off, to a depth of ⅜". In this I fitted the ⅛" stem of my old iron, and then drilled a 1/16" hole crosswise through the copper and stem. In this 1/16" hole I used a wire nail as a rivet to secure the assembly. To finish the job I heated the copper just a bit hotter than is used for soldering, and beat out the point to a long sharp one. This is easy as the copper is very soft and does not require much more than a few firm taps to do the job. The completed tool only weighs two ounces and is very light.

I beat out a point on the remainder of the ¼ lb. copper in the same way, and now have two nice size coppers, 3 ounce and 1 ounce.—Cliff Dawson.

R. F. CHOKE COVER



Remove all the binding posts and rods from a tube socket; then cut a piece of thin wood, fibre, etc., to fit on the inside of the socket. Place a small bolt through the center of the wood disc. The R.F. choke fits over this bolt and the nut is put on to keep it from slipping. Two of the binding posts are fastened on to the socket, where the choke leads are soldered. —Ralph Fichtl.

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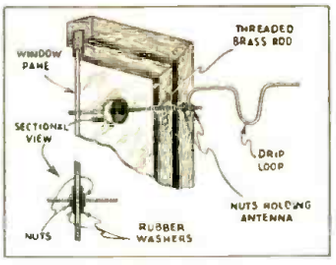
AERIAL LEAD-IN



A good lead-in fitting, which may be made from a piece of small threaded brass rod, ¼" or more in diameter and fitted with nuts, is shown in the drawing. Behind the nuts and washers on either side of the glass or other partition through which the rod passes, rubber washers should be placed in order to prevent cracking of glass, etc. Small holes may be drilled through window glass by breaking off the end of a three-cornered file and drilling with the squared end of the file, using turpentine liberally as a lubricant.—Charles H. Hall.

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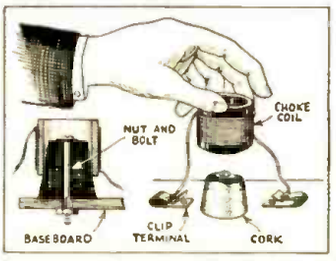
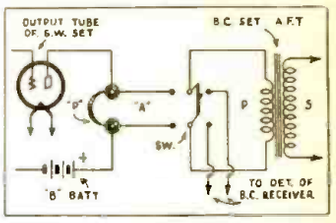
MOVABLE CHOKES



Here is a simple way to mount choke coils which I think many of our short-wave friends will like. The two terminals of the choke coil are connected to spring binding posts, such as the Fahnestock. The choke coil itself rests on a tapered cork, or a piece of wood of similar shape, the cork being glued or screwed to the base-board of the set. It is now a simple matter to try other choke coils having different numbers of turns.—Jimmy Tony.

USING "B.C." AUDIO FOR SHORT WAVES



Short-wave fans who have a good broadcast receiver and a two- or three-tube S.W. set can readily receive foreign broadcast stations on the loudspeaker by simply connecting their two receivers as shown. In connecting the two receivers, the lamp cord marked "A" can be of any length and the two receivers can be placed in different rooms if necessary.

In tuning, the phones "P" are left on the S.W. receiver to help the operator to find a station before putting it on the loud speaker.

The switch "S.W." can be placed in any convenient position on the "B.C." receiver. One side of the switch is connected to the output of the S.W. set and the blades with the input of the audio amplifier of the "B.C." set, the other side (jaws) of the switch being used for the normal operation of the "B.C." receiver. Care should be taken that the leads from the transformer are not reversed when reconnected to the detector through the switch. Howling, if it occurs, may be avoided by placing the speaker in another room.—John Remper.

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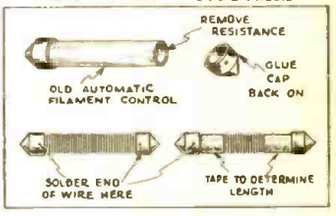
"PLUG-IN" CHOKES



For short-wave transmitters particularly, plug-in choke coils will be found very useful so that one may try different size chokes on the various bands.

Most of us who have tinkered with battery sets have some of the automatic filament controls, contained in a glass tube, lying around, so why not put them to work as follows: Remove the metal end caps and take out the resistance element; then glue the metal end caps back on. You now have an R.F. choke form with winding space that will accommodate enough wire to choke in the 160 meter band, and all the others.—Grover E. Hall.

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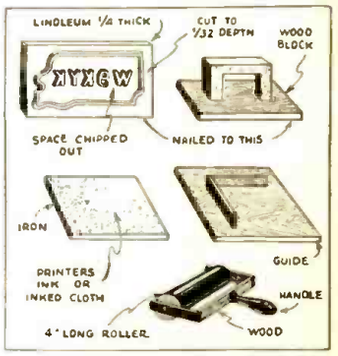
HOME-MADE QSL CARDS



Materials needed: linoleum, cut to size of card and sandpapered smooth—on this the border and letters of any design are cut; some printers' ink or ordinary ink, and a roller, which is a wringer roller cut short. The cards may be bought from the post office, already stamped, at a rent a card. A guide, to hold the cards and to enable better printing, is also needed.

The border and call letters are first drawn on paper, then pasted on linoleum. A sharp knife cuts out the drawing and the space between is chipped out. This type is nailed to a wood block, size of a card. The ink is spread on an iron plate, over which the roller runs, then transferring the ink to the type. Care should be taken when drawing or else the print will read wrong. The small type may be done by hand or gotten some way; it's a good idea to have two types, one for the border and the other for call letters.—Matt J. Surofka.

SHORT WAVE STATIONS OF THE WORLD

SECTION ONE

As promised in the last issue, we are presenting herewith a complete, revised and combined list of the short wave broadcasting, experimental and commercial radiophone stations of the world. This is arranged according to frequency, but the wavelength figures are also given for the benefit of readers who are more accustomed to working with "meters" than with "kilocycles." All the stations in this list, with one or two exceptions of the time stations, use telephone transmission of one kind or another and can therefore be identified by the average listener.

The July, 1933, issue (copies mailed for 25c) contained a very fine list of police, airport and television stations, which was marked "Section Two." This will reappear in the September issue with the latest corrections and additions. Section One (this month's list) will be published again in the October issue, also with last minute changes. **Note: Stations maked with a star (*) are the most active and easily heard stations and transmit at fairly regular times.**

Around-the-Clock Listening Guide

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

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

To the east of the listener, from about noon to 10:00 p. m., the 20-35 meter will be found very productive. To the west of the listener this same band is best from about midnight until shortly after daybreak. After dark, results above 35 meters are usually much better than during daylight. These general rules hold good whether you live in the United States or in China.

31000 kc. W8XI
9.68 meters
Westinghouse Electric
SAXONBURG, PA.

27800 kc. W6XD
10.79 meters
Mackay Radio
PALO ALTO, CALIF.

25960 kc. G5SW
11.55 meters
British Broad. Corp.
CHELMSFORD, ENGLAND
Experimental, relay broadcasting

25700 kc. W2XBC
11.67 meters
Radio Corp. of America
NEW BRUNSWICK, N. J.

24000 kc. W6XQ
12.48 meters
SAN MATEO, CALIF.

21540 kc. ★W8XK
13.93 meters
WESTINGHOUSE ELECTRIC
SAXONBURG, PA.
7:30 a. m.-noon; relays KDKA programs

21470 kc. ★GSH
13.97 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

21420 kc. W2XDJ
14.00 meters
A. T. & T. CO., DEAL, N. J.
Experimental radiophone

21400 kc. WLO
14.01 meters
A. T. & T. CO.
Lawrence, N. J.
Transoceanic phone

21130 kc. LSM
14.15 meters
MONTE GRANDE, ARGENTINA
Commercial radiophone; occasional broadcasting.

21020 kc. LSN
14.27 meters
(Hurlingham), Buenos Aires, Argentina
Commercial radiophone; occasional broadcasting.

21000 kc. OKI
14.28 meters
PODEBRADY, CZECHOSLOVAKIA

20730 kc. LSY
14.47 meters
MONTE GRANDE, ARGENTINA
Commercial radiophone; occasional broadcasting.

20680 kc. LSN
14.50 meters
MONTE GRANDE, ARGENTINA
after 10:30 p. m. Telephony with Europe

20680 kc. LSX
14.50 meters
BUENOS AIRES
Telephony with U. S., also occasional broadcasting

20680 kc. FSR
14.50 meters
PARIS-SAIGON PHONE

20620 kc. PMB
14.54 meters
Bandoeng, Java
After 4 a. m.; radiophone to Holland

20140 kc. DWG
14.89 meters
NAUEN, GERMANY
Tests 10 a.m.-3 p. m.

19950 kc. LSG
15.03 meters
MONTE GRANDE, ARGENTINA
From 7 a. m. to 1 p. m.
Telephony to Paris and Berlin

19950 kc. DIH
15.03 meters
NAUEN, GERMANY

19906 kc. LSG
15.07 meters
MONTE GRANDE, ARGENTINA
8-10 a. m., commercial radiophone

19850 kc. WMI
15.10 meters
A. T. & T. CO., DEAL, N. J.

19830 kc. FTD
15.12 meters
ST. ASSISE, FRANCE

19400 kc. FRO, FRE
15.45 meters
ST. ASSISE, FRANCE

19300 kc. FTM
15.55 meters
ST. ASSISE, FRANCE
10 a. m. to noon

19240 kc. DFA
15.58 meters
NAUEN, GERMANY

19220 kc. WNC
15.60 meters
A. T. & T. CO., DEAL, N. J.
Transoceanic radiophone

18820 kc. PLE
15.94 meters
BANDOENG, JAVA.
8:40-10:40 a. m.
Phone service to Holland

18620 kc. GBJ
16.10 meters
General Post Office
BODMIN, ENGLAND
Telephony with Montreal

18620 kc. GBU
16.11 meters
General Post Office
RUGBY, ENGLAND

18370 kc. PMC
16.33 meters
BANDOENG, JAVA.

18350 kc. WND
16.35 meters
DEAL BEACH, N. J.

18310 kc. GBS
16.38 meters
General Post Office
RUGBY, ENGLAND
Telephony with New York

18310 kc. FZS
16.38 meters
SAIGON, INDO-CHINA
1 to 3 p. m. Sundays

18240 kc. FRO, FRE
16.44 meters
ST. ASSISE, FRANCE

18170 kc. CGA
16.50 meters
DRUMMONDVILLE, QUEBEC CANADA
Telephony to England

18100 kc. GBK
16.57 meters
General Post Office
BODMIN, ENGLAND

18050 kc. KQJ
16.61 meters
BOLINAS, CALIF.
Transpacific radiophone

17850 kc. PLF
16.80 meters
BANDOENG, JAVA
("Radio Malabar")

17850 kc. W2XAO
16.80 meters
Radio Corp. of America
NEW BRUNSWICK, N. J.

17830 kc. PCV
16.82 meters
KOOTWIJK, HOLLAND
9:40 a. m. Sat.

17780 kc. ★W8XK
16.87 meters
WESTINGHOUSE ELECTRIC AND MFG. CO.
Saxonburg, Pa.
Relays KDKA programs

17780 kc. W3XAL
16.87 meters
NATIONAL BROAD. CO.
Bound Brook, N. J.
Experimental; relays WJZ programs

17780 kc. W9XF
16.87 meters
DOWNERS GROVE, ILL.
Irregular; relays N8C programs

17770 kc. ★GSG
16.88 meters, British Broad. Corp.
DAVENTRY, ENGLAND
British Empire programs

17770 kc. PHI
16.88 metes
HUIZEN, HOLLAND
Experimental

17640 kc. Ship.
17.00 meters
SHIP
Phones to Shore
WSBN, "Leviathan"
GFWV, "Majestic"
GLSQ, "Olympic"
GDLJ, "Homeric"
GMJQ, "Belgenland"
Work on this and higher channels

17380 kc. JIAA
17.25 meters
TOKIO, JAPAN

17300 kc. W8XL
17.34 meters
DAYTON, OHIO

17300 kc. W6XAJ
17.34 meters
OAKLAND, CALIF.

17300 kc. W9XL
17.34 meters
ANOKA, MINN.

Short Wave Stations of the World

17110 kc. WOO
17.52 meters
A. T. & T. CO., DEAL, N. J.
Transoceanic radiophone

17110 kc. W2XDO
17.52 meters
A. T. & T. Co.
OCEAN GATE, N. J.

17080 kc. GBC
17.55 meters
RUGBY, ENGLAND

16300 kc. PCL
18.40 meters
KOOTWIJK, HOLLAND
Works with Bandoeng from 7 a. m.

16300 kc. WLO
18.40 meters
A. T. & T. CO., LAWRENCE, N. J.

16200 kc. FZR
18.50 meters
SAIGON, INDO-CHINA
Radiophone to Paris

16150 kc. GBX
18.56 meters
RUGBY, ENGLAND

16060 kc. ★NAA
18.68 meters
U. S. NAVY, ARLINGTON, VA.
Time signals, 11:57 to noon

15950 kc. PLG
18.80 meters
BANDOENG, JAVA
Afternoons.

15860 kc. FTK
18.90 meters
ST. ASSISE, FRANCE
Commercial radiophone

15490 kc. JIAA
19.36 meters
TOKIO, JAPAN
5:00-7:00 a. m.

15330 kc. ★W2XAD
19.56 meters
GENERAL ELECTRIC CO.
Schenectady, N. Y.
Relays NBC and WGY programs

15300 kc. OXY
19.60 meters
LYNGBY, DENMARK
Experimental & relay broadcasting

15270 kc. ★W2XE
19.65 meters
COLUMBIA BROAD. SYS.
Wayne, N. J.
11:00 a. m.-1:00 p. m.

15240 kc. ★FYA
19.68 meters
"RADIO COLONIAL"
Pontoise (Paris), France
Service de la Radiodiffusion, 103 Rue de Grenelle, Paris
Daily 7:00-10:00 a. m.
Also during late afternoon

15210 kc. ★W8XK
19.72 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
Saxonburg, Pa.
7:30 a. m. to 5 p. m.
Relays KDKA programs

15200 kc. DJB
19.73 meters
ZEESEN, GERMANY

15140 kc. ★GSF
19.81 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

15120 kc. ★HVJ
19.83 meters
VATICAN CITY
Rome, Italy
Daily 5:00 to 5:15 a. m.

15120 kc. JIAA
19.83 meters
TOKIO, JAPAN
Irregular, early morning.

15075 ★TI4NRH
19.9 meters
HEREDIA, COSTA RICA, C. A.

15000 kc. CM6XJ
19.99 meters
CENTRAL TUINUCU, CUBA
Irregular

14620 kc. XDA
20.50 meters
TRENS-NEWS AGENCY
Mexico City
2:30-3 p. m.

14530 kc. LSA
20.65 meters
BUENOS AIRES, ARGENTINA

14480 kc. GBW
20.70 meters
RADIO SECTION
General Post Office, London E. C. I.
Rugby, England

14480 kc. WNC
20.70 meters
A. T. & T. CO., DEAL, N. J.
Transoceanic radiophone

14420 kc. VPD
20.80 meters
SUVA, FIJI ISLANDS

14150 kc. KKZ
21.17 meters
BOLINAS, CALIF.

13400 kc. WND
22.38 meters
A. T. & T. CO., DEAL BEACH, N. J.
Transoceanic telephony

12880 kc. CNR
23.38 meters
RABAT, MOROCCO, AFRICA

12850 kc. W2XO
23.35 meters
GENERAL ELECTRIC CO.
Schenectady, N. Y.
Experimental radiophone and relay broadcasting

12850 kc. W2XCU
23.35 meters
AMPERE, N. J.

12850 kc. W9XL
23.35 meters
ANOKA, MINN.,

12820 kc. ★CNR
23.38 meters
DIRECTOR GENERAL
Telegraph and Telephone Stations, Rabat, Morocco
Sun., 7:30-9 a. m. Daily, 5-7 a. m. Telephony

12780 kc. GBC
23.46 meters
RUGBY, ENGLAND

12290 kc. GBU
24.41 meters
RUGBY, ENGLAND

12250 kc. FTN
24.46 meters
STE. ASSISE (PARIS), FRANCE
Works Buenos Aires, Indo-China and Java. On 9 a. m. to 1 p. m. and other hours

12250 kc. GBS
24.46 meters
RUGBY, ENGLAND

12250 kc. PLM
24.46 meters
BANDOENG, JAVA
Radiophone to Holland

12150 kc. GBS
24.68 meters
RUGBY, ENGLAND
Transatlantic phone to Deal, N. J. (New York)

12150 kc. FQO, FQE
24.68 meters
STE. ASSISE, FRANCE

12045 kc. ★NAA
24.89 meters
ARLINGTON, VA.
Time signals, 11:57 to noon.

12045 kc. ★NSS
24.89 meters
ANNAPOLIS, MD.
Time signals, 9:57-10 p. m.

12000 kc. FZG
24.98 meters
SAIGON, INDO-CHINA
Time signals, 2-2:05 p. m.

11945 kc. KKQ
25.10 meters
BOLINAS, CALIF.

11905 kc. ★FYA
25.16 meters
"RADIO COLONIAL"
Pontoise, Paris
Daily 10:30 a. m.-2:00 p. m.

11880 kc. ★W9XF
25.24 meters
NATIONAL BROADCASTING CO.
Downers Grove (Chicago), Ill.
9-10 p. m. daily; relays NBC programs

11870 kc. VUC
25.26 meters
CALCUTTA, INDIA
9:45-10:45 p. m.; 8-9 a. m.

11870 kc. ★W8XK
25.26 meters
WESTINGHOUSE ELECTRIC
East Pittsburgh, Pa.
4-10 p. m., relays KDKA programs

11865 kc. ★GSE
25.28 meters
British Broad. Corp.
DAVENTRY, ENGLAND
British Empire programs

11840 kc. W9XAO
25.34 meters
CHICAGO FEDERATION OF LABOR
Chicago, Ill.
Relays WCFL programs

11830 kc. ★W2XE
25.36 meters
COLUMBIA BROADCASTING SYS., Wayne, N. J.
3:00-5:00 p. m.

11810 kc. ★I2RO
25.4 meters
"RADIO ROMA NAPOLI"
Rome, Italy
Daily, 11:30 a. m. to 12:15 p. m and 2:00-6:00 p. m. Sunday, 11:00 a. m.-12:15 p. m.
Woman announcer

11800 kc. ★VE9GW
25.42 meters
W. A. SHANE,
CHIEF ENGINEER
Bowmanville, Canada
Daily, 1-4 p. m.

11790 kc. WIXAL
25.45 meters
BOSTON, MASS.

11780 kc. ★VE9DR
25.47 meters
DRUMMONDVILLE, QUEBEC
Canada
Irregular

11760 kc. XDA
25.50 meters
TRENS-NEWS AGENCY
Mexico City
3-4 p. m.

11760 kc. ★DJD
25.50 meters
ZEESEN, GERMANY

11750 kc. ★GSD
25.53 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

11750 kc. ★VE9JR
25.53 meters
WINNIPEG, CANADA
Weekdays, 5:30-7:30 p. m.

11730 kc. PHI
25.57 meters
HUIZEN, HOLLAND

11705 kc. ★FYA
25.6 meters
"RADIO COLONIAL"
Pontoise (Paris)
Daily, 3:00-6:00 p. m.

11690 kc. ★YVQ
25.65 meters
MARACAY, VENEZUELA
(Also broadcasts occasionally)

11670 kc. KIO
25.68 meters
KAHUHU, HAWAII

11530 kc. CGA
26.00 meters
DRUMMONDVILLE, CANADA

11490 kc. GBK
26.10 meters
BODMIN, ENGLAND

11470 kc. IBDK
26.15 meters
S.S. "ELETTRA"
Marconi's yacht

11435 kc. DHC
26.22 meters
NAUEN, GERMANY

11340 kc. DAN
26.44 meters
NORDEICH, GERMANY
Time signals, 7 a. m., 7 p. m.
Deutsche Seewarte, Hamburg

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

10980 kc. ZLW
27.30 meters
WELLINGTON, N. Z.
Tests 3-8 a. m.

10630 kc. PLR
28.20 meters
BANDOENG, JAVA
Works with Holland and France weekdays from 7 a. m.; sometimes after 9:30

10540 kc. WLO
28.44 meters
A. T. & T. CO., LAWRENCE, N. J.
Transoceanic radiophone

10540 kc. VLK
28.44 meters
SYDNEY, AUSTRALIA
Commercial radiophone

10410 kc. PDK
28.80 meters
KOOTWIJK, HOLLAND

10410 kc. KEZ
28.80 meters
BOLINAS, CALIF.

10410 kc. LSY
28.80 meters
BUENOS AIRES, ARGENTINA

10390 kc. GBX
28.86 meters
RUGBY, ENGLAND

10350 kc. LSX
28.98 meters
BUENOS AIRES, ARGENTINA
Commercial radiophone

10250 kc. ★TI4NRH
29.30 meters
AMONDO CESPEDES MARIN
Heredia, Costa Rica
Mon. and Wed., 7:30 to 8:30 p. m.; Thurs. and Sat., 9:00 to 10 p. m.

10150 kc. DIS
29.54 meters
NAUEN, GERMANY
Press (code) daily; 6 p. m., Spanish; 7 p. m., English; 7:50 p. m., German; 2:30 p. m., English; 5 p. m., German.
Sundays: 6 p. m., Spanish; 7:50 p. m., German; 9:30 p. m., Spanish

10000 kc.
30 meters
BELGRADE, JUGO-SLAVIA

9950 kc. GBU
30.15 meters
RUGBY, ENGLAND

9890 kc. LSN
30.30 meters
BUENOS AIRES
Phone to Europe

9890 kc. LSA
30.30 meters
BUENOS AIRES

9860 kc. ★EAQ
30.4 meters
TRANSRADIO ESPANOLA
Alcala 43-Madrid, Spain
(P. O. Box 951)
5:30-7:00 p. m. daily

9790 kc. GBW
30.64 meters
RUGBY, ENGLAND

9750 kc. WNC
30.75 meters
DEAL, N. J.

9700 kc. WMI
30.90 meters
DEAL, N. J.

9675 kc. ★T14NRH
31 meters
HEREDIA, COSTA RICA, C. A.

9640 kc. HSP2
31.10 meters
BROADCASTING SERVICE
Post and Telegraph Department
Bangkok, Siam
9-11 a. m., daily

9600 kc. ★CTIAA
31.25 meters
LISBON, PORTUGAL
Tues. and Friday, 4:30-7:00 p. m.

9600 kc. LQA
31.25 meters
BUENOS AIRES

9600 kc. LGN
31.23 meters
BERGEN, NORWAY

9595 kc. ★HBL
31.27 meters
League of Nations
GENEVA, SWITZERLAND

9590 kc. ★VK2ME
31.28 meters
AMALGAMATED WIRELESS, Ltd., Sydney, Australia
Sun., 1-3 a. m., 5-9 a. m., 9:30-11:30 a. m.

Short Wave Stations of the World

9585 kc. ★GSC
31.29 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

9580 kc. ★W3XAU
31.32 meters
BYBERRY (Philadelphia), PA.
relays WCAU daily

9570 kc. ★WIXAZ
31.35 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
Springfield, Mass.
6 a. m.-10 p. m., daily

9570 kc. SRI
31.35 meters
POZNAN, POLAND
Tues., 2:00-5:00 p. m., Wed., 7:00-8:00 a. m., Thurs., 2:00-3:30 p. m.

9560 kc. ★DJA
31.38 meters
REICHSPOSTZENTRALAMT
11-15 Schoenberge Strasse (Berlin)
Konigswusterhausen, Germany

9530 kc. ★W2XAF
31.48 meters
GENERAL ELECTRIC CO.
Schenectady, N. Y.
Relays NBC and WGY programs

9520 kc. ★OXY
31.51 meters
SKAMLEBOEK, DENMARK
Daily from 1:00 p. m.

9510 kc. ★GSB
31.55 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

9510 kc. ★VK3ME
31.55 meters
AMALGAMATED WIRELESS, Ltd.
167-169 Queen St., Melbourne, Australia
Wed., 5:00-6:30 a. m., Sunday, 5:00-7:00 a. m.

9375 kc. EH9OC
32.00 meters
BERNE, SWITZERLAND
3-5:30 p. m.

9330 kc. CGA
32.15 meters
5:00-7:00 a. m.
DRUMMONDVILLE, CANADA

9310 kc. GBC
32.22 meters
RUGBY, ENGLAND
Sundays, 2:30-5 p. m.

9300 kc. CNR
32.26 meters
RABAT, MOROCCO
Sunday 2:00-4:00 p. m.

9250 kc. GBK
32.40 meters
BODMIN, ENGLAND

9230 kc. FLJ
32.50 meters
PARIS, FRANCE
(Eiffel Tower). Time signals 2:56 a. m. and 2:56 p. m.

9200 kc. GBS
32.61 meters
RUGBY, ENGLAND
Transatlantic phone

9010 kc. GBS
33.30 meters
RUGBY, ENGLAND

8928 kc. TGX
33.50 meters
GUATEMALA CITY, C. A.

8872 kc. NPO
33.81 meters
CAVITE (MANILA)
Philippine Islands
Time signals 9:55-10 p. m.

8872 kc. ★NAA
33.81 meters
ARLINGTON, VA.
Time signals 9:57-10 p. m., 2:57-3 p. m.

8810 kc. WSBN
34.05 meters
S.S. "LEVIATHAN"

8690 kc. W2XAC
34.50 meters
SCHENECTADY, NEW YORK

8650 kc. W2XCU
34.68 meters
AMPERE, N. J.

8650 kc. W3XE
34.68 meters
BALTIMORE, MD.
12:15-1:15 p. m., 10:15-11:15 p. m.

8650 kc. W2XV
34.68 meters
RADIO ENGINEERING LAB.
Long Island City, N. Y.

8650 kc. W8XAG
34.68 meters
DAYTON, OHIO

8650 kc. VE9BY
34.68 meters
LONDON, ONTARIO, CANADA

8650 kc. W4XG
34.68 meters
MIAMI, FLA.

8650 kc. W3XX
34.68 meters
WASHINGTON, D. C.

8630 kc. WOO
34.74 meters
DEAL, N. J.

8630 kc. W2XDO
34.74 meters
OCEAN GATE, N. J.

8570 kc. ★RV15
35.00 meters
FAR EAST RADIO STATION
Khabarovsk, Siberia
5-7:30 a. m.

8550 kc. WOO
35.09 meters
OCEAN GATE, N. J.

8450 kc. PRAG
35.50 meters
PORTO ALEGRE, BRAZIL
8:30-9:00 a. m.

8120 kc. PLW
36.92 meters
BANDOENG, JAVA

8100 kc. EATH
37.02 meters
VIENNA, AUSTRIA
Mon. and Thurs., 5:30 to 7 p. m.

7390 kc. DOA
37.80 meters
DOEBERITZ, GERMANY
1 to 3 p. m.
Reichpostzentralamt, Berlin

7890 kc. VPD
38.00 meters
SUVA, FIJI ISLANDS

7880 kc. JIAA
38.07 meters
TOKIO, JAPAN
Broadcasting 5:00-7:00 a. m.

7830 kc. PDV
38.30 meters
KOOTWIJK, HOLLAND
After 9 a. m.

7799 kc. ★HBP
38.47 meters
LEAGUE OF NATIONS, GENEVA, SWITZERLAND

7770 kc. FTF
38.60 meters
STE. ASSISE, FRANCE

7770 kc. PCK
38.60 meters
KOOTWIJK, HOLLAND
9 a. m. to 7 p. m.

7660 kc. FTL
39.15 meters
STE. ASSISE, FRANCE

7612 kc. HKF
39.40 meters
BOGOTA, COLOMBIA
8-10 p. m.

7612 kc. X26A
39.4 meters
NUEVO LAREDO, MEXICO

7530 kc. El Prado
39.80 meters
Riobamba, Ecuador
Thurs., 9-11 p. m.

7520 kc. CGE
39.74 meters
CALGARY, CANADA
Testing, Tues., Thurs.

7460 kc. YR
40.20 meters
LYONS, FRANCE
Daily except Sun., 10:30 to 1:30 a. m.

7444 kc. HBQ
40.3 meters
LEAGUE OF NATIONS, GENEVA, SWITZERLAND

7320 kc. ZTJ
40.90 meters
JOHANNESBURG, SO. AFRICA
9:30 a. m.-2:30 p. m.

7230 kc. DOA
41.46 meters
DOEBERITZ, GERMANY
Irregular

7220 kc. HB9D
41.50 meters
ZURICH, SWITZERLAND
1st and 3rd Sundays at 7 a. m., 2 p. m.

7195 kc. VSIAB
41.67 meters
SINGAPORE, S. S.
Mon., Wed. and Fri., 9:30-11 a. m.

7140 kc. HKX
42.00 meters
BOGOTA, COLOMBIA
Irregular

7020 kc. EAR125
42.70 meters
MADRID, SPAIN
Irregular

6990 kc. ★CTIAA
42.90 meters
LISBON, PORTUGAL
Fridays, 5-7 p. m.

6976 kc. EAR110
43 meters
MADRID, SPAIN
Tues., Sat., 5:30 p. m.

6875 kc. F8MC
43.60 meters
CASABLANCA, MOROCCO
Sun., Tues., Wed., Sat.

6860 kc. KEL
43.70 meters
BOLINAS, CALIF.
Transpacific Radiophone

6860kc. Radio Vitus
43.70 meters
PARIS, FRANCE
4-11 a. m. 3 p. m.

6840 kc. CFA
43.80 meters
DRUMMONDVILLE, CANADA

6753 kc. WND
44.40 meters
DEAL, N. J.

6660 kc. F8KR
45 meters
CONSTANTINE, ALGERIA
Mon., Fri., 5 p. m.

6660 kc. HKM
45 meters
BOGOTA, COLOMBIA
9-11 p. m.

6660 kc. TGW
45 meters
GUATEMALA CITY, C. A.

6515 kc. WOO
46.05 meters
DEAL, N. J.

6438 kc. REN
46.6 meters
MOSCOW, U. S. S. R.

6425 kc. W9XL
46.70 meters
ANOKA, MINN.

6425 kc. ★W3XL
46.70 meters
NATIONAL BROADCASTING CO.
Bound Brook, N. J.
Relays WJZ programs

6425 kc. VE9BY
46.7 meters
LONDON, ONTARIO, CANADA

6420 kc. RV62
46.72 meters
MINSK, U. S. S. R.
Irregular

6382 kc. HC1DR
47.00 meters
QUITO, ECUADOR
8-11 p. m.

6335 kc. VE9AP
47.35 meters
DRUMMONDVILLE, CANADA

6270 kc. HKC
47.81 meters
BOGOTA, COLOMBIA
8:30-11:30 p. m.

6243 kc. HKD
48.05 meters
BARRANQUILLA, COLOMBIA

6250 kc. ★CN8MC
48 meters
CASABLANCA, MOROCCO
Monday, 3:00-4:00 p. m.
Tuesday, 7:00, 8:00 a. m. and 3:00-4:00 p. m.

6220 kc. ★I2RO
48.2 meters
ROME, ITALY

6167 kc. XIF
48.65 meters
MEXICO CITY, MEXICO

6147 kc. ★VE9CL
48.8 meters
WINNIPEG, CANADA
7:00-9:30 p. m.

6140 kc. ★W8XK
48.86 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
Saxonburg, Pa.
Relays KDKA programs, 5 p. m.-midnight

6125 kc. VE9HX
48.98 meters
HALIFAX, NOVA SCOTIA

6122 kc. ZTJ
49 meters
JOHANNESBURG, SOUTH AFRICA
10:30 a. m.-3:30 p. m.

6120 kc. ★W2XE
49.02 meters
COLUMBIA BROADCASTING SYS.
Wayne, N. J., 6:00-11:00 p. m.

6120 kc. FL
49.02 meters
EIFFEL TOWER, PARIS
5:30-5:45 a. m.; 5:45-12:30, 4:15-4:45 p. m.

Short Wave Stations of the World

6120 kc. ★YV1BC
49.02 meters
CARACAS, VENEZUELA
8:00-10:00 p. m. nightly

6110 kc. VE9CG
49.10 meters
CALGARY, ALTA., CANADA

6110 kc. VUC
49.1 meters
CALCUTTA, INDIA

6100 kc. ★W3XAL
49.15 meters
NATIONAL BROADCASTING CO.
Bound Brook, N. J.
Relays WJZ programs

6100 kc. VE9CF
49.15 meters
HALIFAX, N. S., CANADA
6-10 p. m., Tues., Thurs., Fri.

6100 kc. ★W9XF
49.18 meters
DOWNERS GROVE, ILL.
Relays WENR, Chicago

6095 kc. ★VE9GW
49.17 meters
BOWMANVILLE, ONTARIO, CANADA
5:00 p. m. to midnight

6080 kc. ★W9XAA
49.31 meters
CHICAGO FEDERATION OF LABOR
Chicago, Ill.
Relays WCFL programs

6075 kc. ★OXY
49.4 meters
SKAMLEBOAEK, DENMARK

6072 kc. UOR2
49.41 meters
VIENNA, AUSTRIA

6069 kc. VE9CS
49.43 meters
VANCOUVER, B. C., CANADA

6069 kc. JB
49.43 meters
JOHANNESBURG, SOUTH AFRICA
10:30 a. m.-3:30 p. m.

6065 kc. SAJ
49.46 meters
MOTALA, SWEDEN
6:30-7 a. m., 11 a. m. to 4:30 p. m.

6060 kc. ★W8XAL
49.50 meters
CROSLEY RADIO CORP.
Cincinnati, O.
Relays WLW progran

6060 kc. ZL2ZX
49.5 meters
WELLINGTON, N. Z.
Mon., Wed., Thurs., Sat., 10:15 a. m.-1:15 p. m.

6060 kc. ★VQ7LO
49.50 meters
IMPERIAL AND INTERNATIONAL COMMUNICATIONS, Ltd.
Nairobi, Kenya, Africa
Monday, Wednesday, Friday, 11 a. m.-2:30 p. m.; Tuesday, Thursday, 11:30 a. m.-2:30 p. m. Saturday, 11:30 a. m.-3:30 p. m.; Sunday, 11 a. m.-1:30 p. m.; Tuesday, 3 a. m.-4 a. m.; Thursday, 8 a. m.-9 a. m.

6060 kc. CMCI
49.5 meters
HAVANA, CUBA
9:00-11:00 p. m.

6060 kc. ★W3XAU
49.50 meters
BYBERRY, PA.
Relays WCAU, Philadelphia

6050 kc. ★GSA
49.58 meters
BRITISH BROAD. CORP.
Daventry, England
British Empire programs

6050 kc. VE9CF
49.59 meters
HALIFAX, N. S., CANADA
11 a. m.-noon, 5-6 p. m. On Wed., 8-9; Sun., 6:30-8:15 p. m.

6040 kc. PK3AN
49.67 meters
SOURABAYA, JAVA
6-9 a. m.

6040 kc. ★W4XB
49.67 meters
LAWRENCE E. DUTTON
care Isle of Dreams Broadcast Corp., Miami Beach, Fla.
until 10:00 p. m.

6040 kc. WIXAL
49.67 meters
BOSTON, MASS.

6030 kc. VE9CA
49.75 meters
CALGARY, ALTA., CANADA

6023 kc. XEW
49.8 meters
MEXICO CITY, MEXICO

6020 kc. DJC
49.83 meters
ZEESEN, GERMANY

6005 kc. VE9DR
49.96 meters
CANADIAN MARCONI CO.
Drummondville, Quebec
6-10 p. m. daily.

6005 kc. VE9CU
CALGARY, CANADA
Irregular

6000 kc. ZGE
50 meters
KUALA LUMPUR, MALAY STATES

6000 kc. EAJ25
50 meters
BARCELONA RADIO CLUB, BARCELONA, SPAIN

6000 kc. FIQA
49.97 meters
ADMINISTRATION DES P. T. T. Tananarive, Madagascar
Tues., Wed., Thurs., Fri., 9:30-11:30 a. m. Sat. and Sun., 1-3 p. m.

6000 kc. ★RV59
50 meters
RADIO MOSCOW, U. S. S. R.
2:00-5:00 p. m. daily

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

5900 kc. HKO
50.80 meters
MEDELLIN, COLOMBIA
8-11 p. m., except Sunday

5857 kc. XDA
51.22 meters
MEXICO CITY, MEXICO

5835 kc. HKD
51.40 meters
BARRANQUILLA, COLOMBIA
7:45-10:30 p. m., Mon.; Wed., 8-10:30 p. m.; Sunday, 7:45-8:30 p. m. Elias J. Pellet.

5710 kc. VE9CL
52.50 meters
WINNIPEG, CANADA

5550 kc. W8XJ
54.02 meters
COLUMBUS, OHIO

5170 kc. OK1MPT
58.00 meters
PRAGUE, CZECHOSLOVAKIA
1-3:30 p. m., Tues. and Fri.

5170 kc. PMY
58.00 meters
BANDOENG, JAVA

5170 kc. PMB
58.00 meters
SOURABAYA, JAVA

5714 kc. HCJB
52.5 meters
QUITO, ECUADOR, S. A.

5145 kc. OK1MPT
58.31 meters
PRAGUE, CZECHOSLOVAKIA

4975 kc. W2XV
60.30 meters
RADIO ENGINEERING LABORATORIES, Inc.
Long Island City, N. Y.

4795 kc. W9XAM
62.56 meters
ELGIN, ILL.
(Time signals.)

4795 kc. W3XZ
62.56 meters
WASHINGTON, D. C.

4795 kc. W9XL
62.56 meters
CHICAGO, ILL.
Irregular

4795 kc. VE9BY
62.56 meters
LONDON, ONTARIO, CANADA

4770 kc. ZL2XX
62.80 meters
WELLINGTON, NEW ZEALAND

4760 kc. Radio LL
63.00 meters
PARIS, FRANCE

4750 kc. WOO
63.13 meters
OCEAN GATE, N. J.

4700 kc. WIXAB
63.79 meters
PORTLAND, ME.

4430 kc. DOA
67.65 meters
DOEBERITZ, GERMANY
6-7 p. m., 2-3 p. m., Mon., Wed., Fri.

4273 kc. ★RV15
70.20 meters
FAR EAST RADIO STATION
Khabarovsk, Siberia
Daily, 3-9 a. m.

4116 kc. WOO
72.87 meters
DEAL, N. J.

4105 kc. ★NAA
74.72 meters
ARLINGTON, VA.
Time signals, 9:57-10 p. m., 11:57 a. m. to noon

3750 kc. F8KR
80.00 meters
CONSTANTINE, TUNIS, AFRICA
Mon. and Fri.

3750 kc. I3RO
PRATO EMERALDO, Rome, Italy
Daily, 3-5 p. m.

3620 kc. DOA
82.90 meters
DOEBERITZ, GERMANY

3560 kc. OZ7RL
84.24 meters
COPENHAGEN, DENMARK
Tues. and Frl. after 6 p. m.

3256 kc. W9XL
92.50 meters
CHICAGO, ILL.

3156 kc. PK2AG
95.00 meters
SAMARANG, JAVA

3124 kc. WOO
96.03 meters
DEAL, N. J.

3076 kc. W9XL
97.53 meters
CHICAGO, ILL.

2342 kc. W7XAW
128.09 meters
FISHER'S BLEND, INC.,
Fourth Ave. and University St.
Seattle, Washington

1560 kc. WIXAU
199.35 meters
BOSTON, MASS.

A Word of Explanation About S. W. Schedules

This list is compiled from many sources, all of which are not in agreement. In fact, conflicting data are received sometimes from the stations themselves. We are constantly writing to stations all over the world and reading reports from hundreds of correspondents. We invite individual listeners to inform us of any stations not listed herewith, or operating on frequencies of hours different from those indicated. All times given are Eastern Standard.

Listeners living in zones operating on daylight saving time must make their own corrections.

Special note: please do not ask us to identify unknown stations from snatches of voice or music. This is utterly impossible. Make a notation of the dial setting and try for the station again until you get an understandable announcement. This list will appear again with last minute corrections, in the October issue.

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

Publicity Aids For Your Club

● SEVERAL months ago we emphasized the importance and value of obtaining publicity in the local newspapers as an aid toward enlarging the membership of local chapters of the SHORT WAVE LEAGUE. As an illustration of the effectiveness of local publicity of this kind, we might state that the Lawrence, Mass., chapter of the League had only seven members when it started. After the write-up which is reproduced herewith appeared in a local newspaper, the membership jumped to *twenty-seven!*

Short Wave Club Being Formed Here

Plans are now being formulated for the organizing of a local club of the SHORT WAVE LEAGUE. *This league is affiliated with the* SHORT WAVE CRAFT *Magazine. The purpose of the club is to promote further interest among the short wave fans of Greater Lawrence. Meetings will be held at regular intervals where all that is going on in the short-wave world will be discussed. New circuits and kinks will be explained by competent radio men, and will prove of great value to all fans.*

The requirements for joining the club are few and is not restricted as to age. Membership buttons will be issued to all those becoming members. Membership blanks can be secured by getting in touch with James Mulligan at Al's Radio Shop, 59 Broadway or by writing to Paul Miller, 61 High street, City.

Club secretaries in other cities should by all means work this same stunt. When writing to the newspaper editor be sure to include the names and addresses of all the members.

* * *

Nebraska Chapter

A new chapter of the SHORT WAVE LEAGUE has been formed in Kimball, Nebraska, and all short-wave fans living in the vicinity are invited to join. The officers are as follows: Sidney Rohinson, president, Russel Brothers, treasurer, and Charles Beard, secretary. Other members include Joe Cezik, Floyd Hollick, and Delbert Miles.

In sending in this news item, Mr. Miles requests that we publish more circuits for 2-volt battery tubes. Thanks for this suggestion, Mr. Miles, we will try to comply with it. Past issues have contained quite a number of hook-ups of 2-volt sets.

* * *

Live New York Club

The following letter from Mr. J. M. Andrews, ex-U. S. Naval operator, will be of particular interest to the many short-wave fans who live in New York City.

"In view of the fact that so many radio clubs have been benefited by your magazine, I would like to insert in your readers' column a notice of a new club formed by a 'bunch of hams' in New York. It is the Progressive Radio Club, with headquarters at 42 Morton Street, New York, N. Y. It was started by a 'ham' who, seeing the other fellows having a tough time breaking into the game, decided to form a club for the assistance of that type.

"We have lectures on code and theory, etc., and home work is one of our stand-bys. The dues at present are very liberal: 25c for a two-month period. Notices of the place and date of meetings will gladly be sent to prospective members."

* * *

More on That Code Argument

The controversy that we started some time ago about the removal of the code restriction for 5-meter licenses seems to be going just as strong as ever. One of the best letters on the subject that we have received in a long time comes from Mr. Arnold J. Ely, W8IPD-W8JEE, 2902 McKoon Ave., Niagara Falls, N. Y.

"One thing which prompts this letter is the increasingly controversial subject of Code vs. No Code. Every month I read in SHORT WAVE CRAFT letters from proponents of the 'no code' argument, but if my memory serves me correctly, none of the authors of these letters are licensed hams. The only letters signed by licensed hams have been opposed to any modification of code requirements. These two facts speak for themselves. The unlicensed fan wants to 'play' with the radiophone. It offers him an opportunity to enjoy the hobby of radio communication without going to any trouble to learn anything about the subject. This same 'no code' man would prefer to operate without any kind of examination whatsoever, or without any knowledge of what he was doing. From his standpoint there is nothing wrong with operating without knowledge of what he is doing, for the reason that he does not know anything about it. The reason why the licensed amateur is opposed to anyone operating without knowledge of the subject is that he knows something about it and realizes the chaos which would result in allowing any Tom, Dick, or Harry to operate a phone transmitter improperly adjusted and improperly handled. So there are the two sides of the question. The licensed ham sees both sides of it because he knows, and the 'no code' or 'no knowledge' proponent sees only his own side because he knows nothing about the other side. You can hardly blame the licensed ham, who has taken time to study and learn something about radio communication, and has invested his hard-earned money in radio equipment for the purpose of enjoying his chosen hobby, for opposing any modification of the radio laws which would result in the ornamentation of every alley telephone pole with a piece of wire terminating, in most cases, at an oscillator with loop modulation, which even in the hands of an engineer would turn the whole radio-frequency spectrum into a bedlam. There is enough noise on the air now.

"Another angle of the subject develops with the suggestion that these proponents of the 'no code' license be confined to the five-meter band. This, it seems to me, is tantamount to an acknowledgment by some of those 'no code' men who may know a little about radiophone that there would be interference with other radio communication if they operated without knowledge of the subject, as they evidently figure that if they were sufficiently removed from the most popular frequencies for amateur communication they would be less liable to cause interference. How-

(Continued on page 244)

Get Your Button!

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

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

Please note that you can order your button AT ONCE—SHORT WAVE LEAGUE supplies it at cost, the price, including the mailing, being 35 cents. A solid gold button is furnished for $2.00 prepaid. Address all communications to SHORT WAVE LEAGUE, 96-98 Park Place, New York.

The "EAGLE" S-W Receiver

By JERRY GROSS*

Continuous Band-Spreading and Stable Regeneration Control Permit Easy Tuning of "Foreign" Stations.

Jerry Gross himself, tuning in a "DX" station on the "Eagle" S-W receiver.

● ONE of the greatest sources of discouragement to the beginner in short wave radio is the excessively sharp and critical tuning of most short-wave receivers. It is only in a number of highly specialized sets, selling for well over a hundred dollars, that provision is made for easier tuning by means of "band-spreading" of one kind or another.

The writer didn't think this situation particularly equitable in view of the fact that the beginner with only a limited amount of money to spend is just the man who needs an easy-tuning set most urgently. Therefore he surveyed the short-wave set field, noted the features and shortcomings of the existing low-priced sets, and then designed the "Eagle," which is probably the only set under the hundred-dollar class that boasts of *continuous band-spreading on all wavelengths*. Of course the fundamental idea of band-spreading is not new—"hams" have been using it for years for C.W. telegraph reception—but heretofore it has not been available in a simple set intended for people interested in the fascinating sport of long-distance short-wave broadcast reception.

A receiver with a correctly operating system of *band-spreading* is a revelation of tuning convenience. Take an ordinary regenerative short-wave set with plug-in coils and a 140 mmf. tuning condenser, which seems to be the standard combination. Right now the 49-meter relay broadcasting channel is unusually crowded with interesting stations such as Moscow, Berlin, Montreal, Daventry, Caracas (Venezuela), Skamlebaek (Denmark) and a host of Canadian, American and Central American transmitters. With a straight set these are hopelessly jammed into about 6 or 8 dial divisions, and it is not uncommon to have stations in Europe actually breaking up the signals of locals!

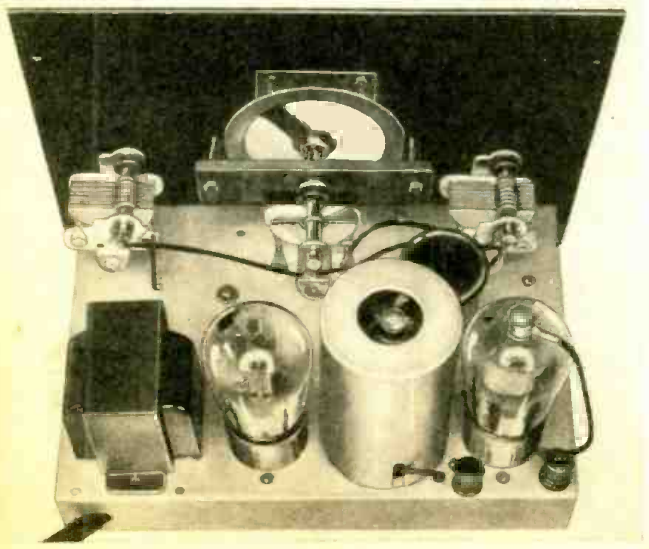
With this receiver the whole channel is literally "pulled apart" or magnified to the extent of about 35 degrees on the dial, and interference on adjacent channels is reduced enormously. It is not necessary to silence everyone in the house and hold your own breath while you tune in stations with this receiver; the *band-spreading* action relieves the set of that "hair-trigger" criticalness and makes it possible even for the rankest beginner in the short-waves to "spot" elusive stations.

The set is a three-tube outfit, designed for economical operation on ordinary No. 6 dry cells for filament supply, and three small 45-volt "B" batteries for plate supply, with an additional small "C" battery. It uses a type 32 tube as an untuned radio-frequency amplifier, another 32 as a regenerative detector, and a 33 output pentode. The writer does not claim loud speaker results under all conditions, but the majority of owners of the set say it works a magnetic loud speaker very satisfactorily.

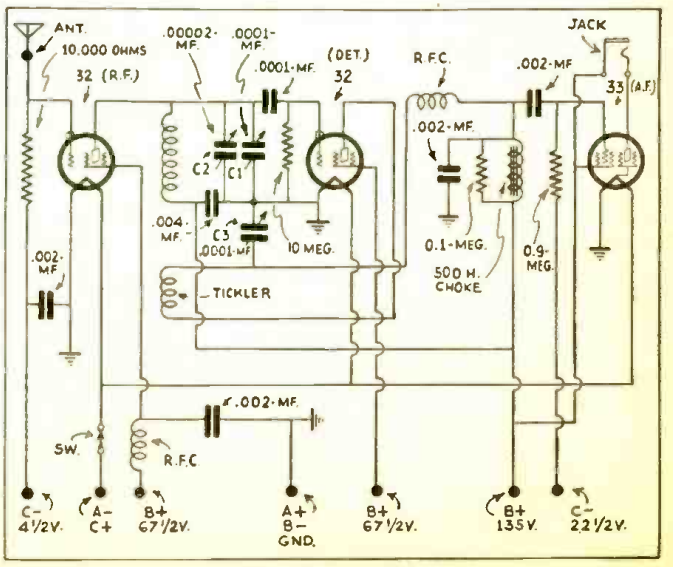
The utter absence of background

(Continued on page 236)

*Gross Radio Company.



Rear view of the new receiver, which provides continuous "band-spreading."



Wiring diagram for the short-wave receiver.

SHORT WAVE QUESTION BOX

DIAL NOISE

P. L. Z., Tucson, Ariz.

(Q) I am having considerable trouble with dial noise in a set that I made from a diagram in SHORT WAVE CRAFT some months ago. I have definitely tracked the noise to the dial, because if I use a plain knob the set is perfectly quiet. Is there any way of eliminating this noise by means of condensers or something else?

(A) Dial noise is very common. It is created by the friction contacts of the driving mechanism. The easiest way to avoid it is to use an insulated coupling between the tuning condenser itself and the dial stud, with an extra short section of brass rod between the coupling and the dial proper. This removes the dial, in an electrical sense, from the condenser circuit. An incidental advantage of this arrangement is that hand-capacity effects are reduced to a minimum.

CHOKE VERSUS RESISTOR

D. E. Pentz, Elizabeth, N. J.

(Q) Which is better for use in the plate circuit of a screen-grid detector, an ordinary fixed resistor or a high value audio-choke of about 300 henries?

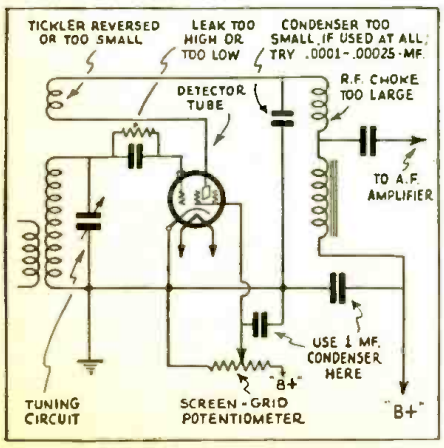
(A) The special 300 or 500 henry choke coils made especially for the purpose are usually more satisfactory than ordinary fixed resistors, mainly because their D.C. resistance is comparatively low and the tube therefore receives a respectable plate voltage. The extremely high impedance of the choke to the audio frequency component of the detector plate current prevents any appreciable loss of signal energy through the plate circuit, this current being forced to flow through the grid coupling condenser to the grid of the first audio tube.

In the absence of special 300 henry chokes, many experimenters use an ordinary audio transformer with the primary and the secondary connected in series. It is necessary to experiment with the poling of these leads in order that the inductive effects of the two windings may be *additive*. The actual plate current in a screen-grid detector is comparatively low and therefore the fine wire on the secondary winding serves the purpose without much trouble.

With some transformers it is better to use the secondary winding alone, leaving the primary terminals completely open.

REGENERATIVE SET TROUBLES

A great deal of our correspondence deals with the failure of perfectly ordinary, straightforward regenerative receivers to produce oscillation. Some of the troubles may be summarized as follows:



General faults with short-wave receivers are indicated above.

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

Special problems involving considerable research will be quoted upon request. We cannot offer opinions as to the relative merits of commercial instruments.

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

Reversed tickler. In spite of all the instructions that have been given in this regard, improperly connected ticklers are still an important reason for lack of regeneration. With some tubes, particularly triodes, the existing tickler on regular plug-in coils may be too small. An additional turn or two may make all the difference between success and failure.

Poor R.F. chokes, particularly large chokes intended originally for broadcast purposes, must also be considered. The old 85 mh. chokes that were standard a few years ago are much too big. Small chokes between 2½ and 15 millihenries are plenty big enough and are much less troublesome because their self-capacity is quite low. In all cases, an R.F. choke should be accompanied by a small mica bypass condenser between its "hot" end and ground.

See the accompanying diagram for these various points.

POWER TUBES AS DETECTORS

Herman Green, New York.

(Q) Is there any reason why some of the new audio power tubes like the 59 and the 2A5 cannot be used for R.F. amplification or detection? Since these tubes are of the heater cathode type, they should cause no trouble from the standpoint of hum.

(A) Audio tubes of the 59 and 2A5 classes are not particularly suitable for R.F. work, but they are already being used in experimental sets of advanced nature for detection purposes. Here is an excellent field for experimentation. We would suggest that readers with a little spare time on their hands investigate the possibilities of these tubes for detection. They certainly should be capable of handling an enormous amount of power, and therefore they would be very desirable for use as second detectors in superheterodynes. It is quite easy to overload ordinary detector tubes when extremely powerful telegraph signals are tuned in. We would like very much to hear from any of our readers who obtain satisfactory results.

ELECTROLYTIC CONDENSER TROUBLE

A. A. Smith, Long Island City, N. Y.

(Q) I have heard that the use of electrolytic condensers should be avoided in the R.F. portions of short-wave receivers. Is there any reason for this?

(A) Most of the trouble being experienced with electrolytic condensers in short-wave work is due entirely to the failure of constructors to observe the polarity markings. It is absolutely essential that these be followed, as otherwise the gas film that forms the dielectric of the condenser is quickly destroyed, and the condenser then fails to operate as a condenser.

SHORT RANGE TRANSMITTER

Edward Walker, Plainfield, N. J.

(Q) I wish to construct a very small radio telephone transmitter for communication with a friend of mine who lives only a few hundred yards away. Will I need a license? I understand that no license is necessary if the signals do not go beyond the state.

(A) A license is necessary for a radio transmitter of any kind, *regardless of its power!* You evidently have been reading some old radio magazines. We warn you to observe the law in this regard; it is for your own protection as well as for the protection of other amateurs. There is absolutely no restricting the possible range of a radio transmitter. Amateurs have worked all around the world on "flea power" sets using ordinary receiving tubes with only one or two small "B" batteries.

TAPPED COILS FOR SHORT WAVES

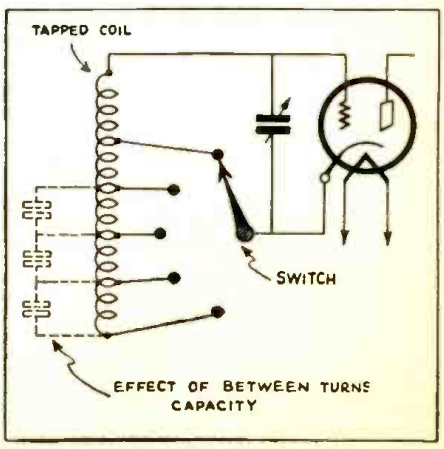
Joseph Glotz, Rochester, N. Y.

(Q) I notice that tapped coils are used in quite a number of high priced long-wave receivers made for commercial shipboard use. Why aren't more coils of this kind used for short-wave work, so as to eliminate plug-in coils?

(A) This question is a very natural one and is being asked by a great many people, particularly commercial radio operators.

The answer is found in the undesirable capacity effects of the unused portions of tapped coils. See the accompanying diagram. Even though only a section of the winding is in actual use, the unused turns are still conductively connected, and together with their inherent between-turns capacity, they constitute little tuned circuits that react quite appreciably on the active portion. The result is *broad tuning* and a general lowering of the efficiency of the tuned circuit formed by the actual tuning condenser and the active section of the tapped winding. The greater the proportion of unused turns to used turns, the more serious does this effect become. This is unfortunate, because the criticalness of the circuit is greater at the very short wavelengths than at the higher wavelengths.

Dead-end troubles are comparatively less troublesome in long-wave sets because the capacity effect in relation to the wavelength is less marked, and because long-wave circuits in general are much more stable than short-wave circuits. Many short-wave troubles, such as *interstage coupling* due to stray capacities, are practically non-existent above six or seven hundred meters.



The undesirable capacity effect due to having unused coil turns in circuit is shown graphically above.

Picking Up Europe on a "Loop"

(Continued from page 209)

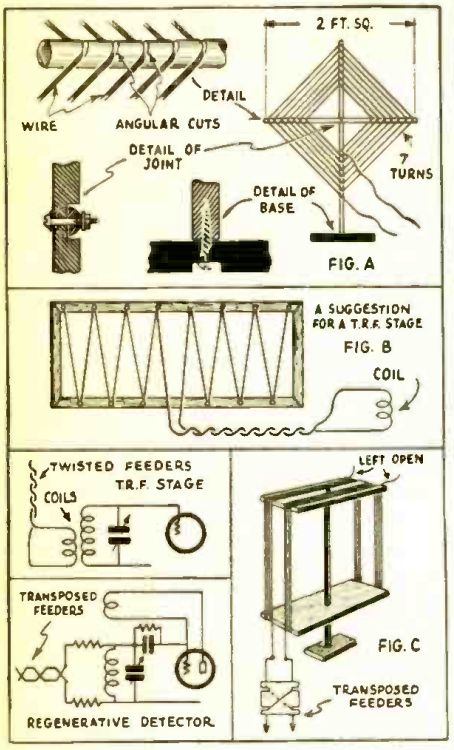


Fig. A. Details of loop. Fig. B shows another style of loop and method of coupling. Fig. C shows method of constructing and mounting loop at distance from set, also methods of coupling to T. R. F. and Regenerative receivers.

two connections for the feeder system are made at the two central points; five or six turns should be used in each section for average short-wave work. This antenna also can be designed to operate on a given frequency and the feeders tuned to give maximum response. For best results with this type of antenna it should be used in conjunction with a receiver having a tuned R.F. stage ahead of the detector, as in the case of the antenna shown in Figure "B." However, it can be used on a receiver such as the one described in the first part of this article, or a plain regenerative detector. In the case of the set described above, the antenna feeders should be connected directly across the R.F. choke coil in the untuned R.F. stage. When used with an ordinary regenerative detector, the feeders should be connected across the grid coil, with a resistor in series with each feeder. The value of this resistor can be anywhere from 300 to 600 ohms.

The antenna outlined above should find favor among those living in congested areas and troubled with interference from motors and high tension power lines. Being small in size, it can be placed in an out-of-the-way place, far from the source of noise. The feeders, of course, should not be run any nearer to sources of noise than necessary.

Connections of the different type *loop* antennas outlined to the various forms of receivers are given in the drawings.

It is hoped that this article will bring about some real developments in the use of small antennas for short-wave reception.

Parts For Loop Set

1—Set of Coils for 15 to 200 meters (see text; also article on 3-Tube "Electrified" Doerle Receiver, (page 213).
1—Hammarlund 35 mmf. Cond.
1—Hammarlund 100 mmf. Cond.
1—50,000 ohm Variable Resistor.
1—R.F. Choke, Value five mh., Radio Trading Co.
3—6-prong Wafer Sockets.
1—6-prong Bakelite Sockets.
1—300 ohm Resistor, Lynch.
1—100,000 ohm Resistor, Lynch.
1—250,000 ohm Resistor, Lynch.
1—2 Megohm Resistor, Lynch.
1—1 Megohm Resistor, Lynch.
4—.01 mf. Cond., Flechtheim.
1—.0001 mf. Cond., Flechtheim.
1—.005 mf. Cond., Flechtheim.
1—.0005 mf. Cond., Flechtheim.
1—25 mf. Electrolytic Cond.
1—500 ohm Resistor, Lynch.
1—Type "B" National Dial.
1—.5 mf. Cond., Flechtheim.
1—Phone Terminal Strip, Eby.
1—Antenna Terminal Strip, Eby.
1—58 Tube, Triad.
1—57 Tube, Triad.
1—2A5 Tube, Triad.

In NEXT Issue!

Making An Automatic "Speed Key"

* * *

2-Tube A.C. Receiver that works on your B.C. Audio

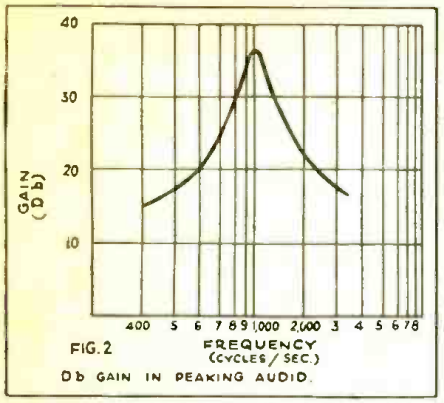
* * *

More Information About S-W Aerials

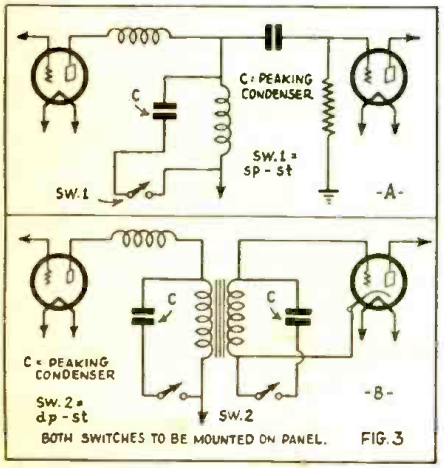
How to Use "Peaked" Audio

By B. N. FISHKIN

C.W. or Code signals are received with greater volume and improved selectivity by utilizing "tuned" or "peaked" audio as here explained.

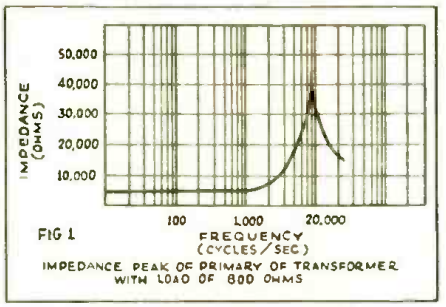


Note gain in "DB" obtained by peaking audio.



3—A: tuning impedance coupling choke; how both windings of an A.F. coupling transformer are tuned by condensers C and C.

● THE construction of the average short-wave receiver is accomplished without regard to the opportunities that lie in specialized reception. Radio-telegraph (C.W.) and phone signals are received indiscriminately, whereas (C.W.) signals might be separated and clarified by the use of a peaked audio amplifier. In the following exposition I have endeavored to present briefly the means by which specialized reception may be accomplished.



Impedance peak of primary of transformer is usually too high to be useful.

First let us examine a certain characteristic of a good modern transformer. Figure 1 shows that with a load of 800 ohms the primary has a resonance peak at 19,000 cycles, which is too high to be heard by the human ear. However, because of the limitations of the ear, the transformer is faithful on all frequencies for the reception of music and voice. There remains room for improvement on C.W. reception. If that resonance peak, which seems so worthless on 19,000 cycles, is moved down so that it resonates at the frequency of the incoming C.W. signals, an additional wallop is added to these signals.

If you examine Fig. 2, you will find a difference of about 22 db between a frequency of 500 cycles and one of 1000 cycles, which is about the frequency of a C.W. signal. (The amplitude factor of both frequencies is constant.) In amateur terminology this is a difference of R5 to R9, a very desirable difference, if the signal is weak.

Changing the frequency of the resonance peak may be easily accomplished. There are two types of audio commonly used in short-wave receivers. Those sets employing a screen grid detector have an impedance coupled audio; most other sets use a transformer coupling. Both audios are adapted in the same manner.

In Fig. 3-A is shown an impedance coupling in which the choke coil is tuned to resonance by a shunted condenser. Fig. 3-B shows a transformer coupling for which two shunted condensers are required to tune both primary and secondary to the necessary frequency.

First we must find the relationship between our inductance and capacity; this is given in the formula:

$$F = \frac{1000}{2\pi\sqrt{LC}}$$

F is frequency in cycles per second.
L is inductance in henries.
C is capacity in microfarads.

As the value of F = 1000, (desired) and the value in henries of the choke coil is rated by the manufacturer, it is a matter of simple mathematics to find the value of the shunted capacity. If the value of the choke coil is unknown,

(Continued on page 233)

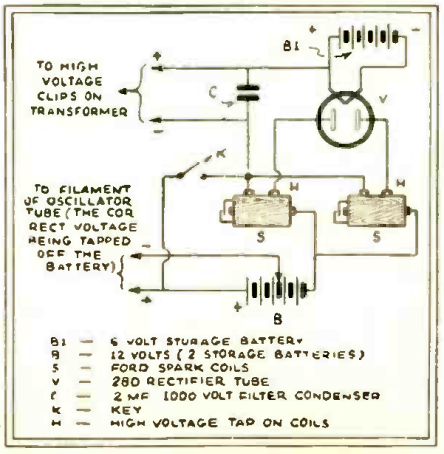
Transmitter Plate Supply from Ford Coils

● FOR the fellow who has no A.C. current at his elbow and has to rely on a bank of "B" batteries for the plate supply for his transmitter, a good way to obtain the current is to use the ordinary ignition coils taken from an old Model "T" Ford car.

By using two of these coils with 12 to 18 volts on the primary, from three to five hundred volts can be obtained.

I have been using two of these coils with 12 volts on the primary and have gotten fair "DX." The type of transmitter I use is a series-feed Hartley, but any other type may be used with the same results. In about four months of operation with these coils all but the 6th and 7th districts have been worked on the 80 meter band. I always get fine reports on signal strength and generally get the report that my signals are "pdc" and sometimes I get a report that my note is "xtal dc."

The vibrator on the coil must be made to vibrate at a higher frequency to get higher voltage. This is accomplished by cutting a piece of postal card large enough to be doubled and put between the vibrator and the magnet of the coil. The frequency then is adjusted by the little nut on the coil to a point where the vibrator has about a 500 cycle note which is pleasing.



How to use two Ford spark (ignition) coils to obtain high voltage for plate supply of transmitter. The tube "V" rectifies the secondary voltage.

A separate battery must be used for the rectifier tube if it is one of the filament type, such as the 280, which is used at my station. A BH rectifier may be used, however, if desired.

If the filament supply for the oscillator tube of the transmitter is gotten from the same battery as the supply for the coils the center-tap connection on the filament leads to the oscillator will have to be taken loose, because this connection will already be made at the battery when it is connected as in the diagram.

The keying is in one of the leads to the Ford Coils instead of at the transmitter proper as is generally the case.

The filter condenser is very essential and if it is left out an A.C. tone will result in the note of the transmitter. If it is found to hold a charge large enough to make the note of the transmitter have "tails" or a *backwave* on it, which can be told by listening on the monitor, a relay may be connected so that when the key is pressed, the lead to the plate of the oscillator tube

(Continued on page 233)

The Story of "EAQ"

(Continued from page 202)

("Radio Cronica"). At first, only the Spanish language was used, but it was very soon found that the enormous interest aroused in the United States of America, England, and all other English-speaking countries, warranted the appointment of English announcers. Subsequently, it was decided to broadcast daily, in English, a brief outline of European happenings, which has been well received by our listeners.

Another step taken early by Radiodifusion Ibero-Americana was to publish a monthly review, entitled "EAQ," and in this also it was found necessary to include an English section. This is one of the world's foremost reviews devoted to short-wave matters, and contains also the advance programs of station EAQ and an interesting literary section.

4,000 Mile Reception on 3 Tubes

(Continued from page 215)

The coupling between the R.F. stage and the detector grid coil is inductive, the turn ratio being 2:3. The effect of the regenerative adjustment on tuning is negligible. *Selectivity and tone are excellent.*

I have dubbed the set the "Consuelo Falcon," as it is a mighty efficient little aerial hunter, and strongly recommend it to the fans.

Am planning to build a similar set using the new 2A5 tube to obtain greater amplification and a lower "hum" level.

Your magazine is a delight, and I believe that I would prefer to go hungry rather than be without it. I hope that my experiment may prove of interest to your readers.

How To Use Peaked Audio

(Continued from page 232)

mathematics will have to be discarded and the trial and error method used to determine the value of the condenser.

A toggle switch is placed in series with the shunted condenser and is mounted on the panel. In the case of transformer coupling, where two condensers are required, a double pole-single throw switch is used. This switching arrangement gives you finger tip control for either C.W. or broadcast reception.

This is specialized reception; a peaked audio for *code* which gives greater volume and improved selectivity, and a flat curve response for broadcast or *phone* reception. With a little patience and a few fixed condensers one may easily revamp his receiver in accordance with the above description.

Transmitter Plate Supply

(Continued from page 232)

will be completed and when the key is released it will break the circuit. I have not had any trouble with any backwave with my outfit and I do not use a relay.

This method of getting plate supply has proved to be highly successful and very economical. I recommend its use to the fellow who has no A.C. current available.—*Orbra Harrell, W4BIN.*

3½ Inch WAVES!!

Read all about them in the NEXT ISSUE!

Hints on S-W Aerial and Receiver Circuits

(Continued from page 211)

a receiver for ordinary broadcast waves, but which in the case of short-waves have a great influence on the reception quality. It is a matter of the running of the wire from A to C in Fig. 5. It is to be as short as possible. Therefore the grid condenser with the grid-leak must be located right at the grid of the tube and on the other side of the grid condenser directly at point D the stator of the band condenser is to be connected. The wire ordinarily drawn in the figures, running from A to D, is to be made as short as possible in the technical execution of the set. *Long grid conductors* exercise a great damping effect and therefore injure in a high degree the selectivity and volume of the set.

The need of operating, on principle, very close to the critical point in short-wave reception (the point at which natural oscillation of the detector tube sets in), furthermore necessitates treating the cathode-side connection of the grid-leak somewhat otherwise than with broadcast 200 to 550 meter receivers. It is a question of making the oscillations start as gentle as possible, and this is attained in the tubes usual in detector hook-ups by operating with a fairly low plate voltage. To obtain at the same time an optimal detector effect of the tube in question, it is advisable to give the grid a weak positive bias relative to the filament. As regards the hook-up this is solved by having the regulating resistance in the positive filament wire bridged by a potentiometer of about 600 ohms and by having the end of the grid-leak toward the cathode put at the sliding "arm" contact of the potentiometer. At the same time the potentiometer lead-off is bypassed by the condensers C1 and C2 of 2000 mmf. (.002 mf.) each.

Another variation of the hook-up shown in Fig. 6 is given in Fig. 7. The bypass condensers lying between the two heater wires and the potentiometer have the same sizes as in Fig. 6. With this hook-up also the control of oscillation can be adjusted to the finest desired degree.

It is advisable to "choke" the heater wires. Figure 8 shows a hook-up of this plan. High frequency heater chokes suitable for this must have about 80 turns of No. 16 wire, wound on a form (or air supported best) about .8 inch in diameter.

The method formerly often used in radio reception, of changing the regeneration by bringing the tickler coil LR (Fig. 9) nearer the grid coil or further from it, is not at all useful for short waves. For one thing, it is much too coarse and for another, changing the distance between coil LR and the grid coil Lg influences the tuning of the grid circuit, upsetting your "logging" or dial setting for different stations.

Grid circuit coil Lg and tickler coil must therefore be rigidly placed with respect to each other and the degree of back-coupling (regeneration) must be adjusted by the rotary "throttle" condenser of about 250 mmf. (.00025 mf.) maximum capacity, lying between plate and cathode. Only this kind of adjustment does not give the desired degree of precision. It is therefore necessary to regulate the plate potential also within small limits. This is done by means of drop in potential, occurring at the resistance "W" lying in the plate circuit. If we connect greater ohmic values of this resistance, then the drop in potential increases and the tube gets a smaller plate potential. Thereby the back-coupling (regeneration) is made looser. It becomes closer, on the other hand, if we reduce the resistance W1. This change in resistance, together with the variable back-coupling condenser CR, gives very fine and precise regulation of the degree of coupling.

In the tubes generally used as detectors, which have a relatively small plate current consumption, the resistance W1 is to have a maximum value of 300,000 ohms. If one uses larger tubes as detectors, then with the greater plate current the resistance is to be proportionately lower. Here 10,000 ohms is enough for W1.

The bypass condenser C2, which bridges the plate current source, may have a capacity of 2 microfarads (700 volts test potential).

The "Regent-Four" Receiver

(Continued from page 217)

It consists of four tubes of the 2-volt type, including two of the S-30 tubes previously mentioned, a 34 screen-grid tube and a 33 power pentode. All of these tubes are of the 2 volt variety, which permits the set to be operated entirely from dry batteries.

The power pentode tube is coupled to the first audio tube through a transformer—thus stepping up the output to full loudspeaker volume.

The construction of the set is quite simple and anyone should be able to put one together from the data supplied. However, any information regarding the construction of the receiver or the kit will be supplied by the author.

Parts List for "Regent-Four."

1—Try-Mo "Regent-Four" Foundation Kit (including drilled panel and base)
1—Powertest special 2-gang condenser .00014 mf.
1—Powertest .00014 mf. variable condenser
1—Powertest set of 4 plug-in coils (Alden, or other make coils suited to operation with a .00014 mf. tuning condenser may be used. (See page 236.)
1—Powertest R.F. Choke, 60 mh.
2—Powertest .01 mf. condensers
1—Powertest 2 mf. condenser
2—Powertest 200,000 ohm resistor
1—Powertest 100,000 ohm resistor
1—Powertest 500,000 ohm resistor
1—Rheostat, 10 ohms
2—5-prong sockets (Eby, Na-ald, National or Hammarlund.)
2—4-prong sockets (Eby, Na-ald, National or Hammarlund.)
1—Powertest special phone jack
1—Audio transformer
4—Eby binding posts
1—Powertest .00015 mf. condenser
1—Powertest 5 megohm grid-leak
1—Powertest 7 wire battery cable
1—Powertest Regent dial with escutcheon plate
3—Matched knobs
3—Screen-grid caps
2—Triad S-30 tubes
1—Triad 33 power pentode tube
1—Triad 34 screen-grid tube
2—No. 6 dry cell batteries
3—45 volt "B" batteries
1—22½ volt "C" battery
2—tube shields

New S-W Circuits! APPEAR

In Mr. Palmer's Digest of "World-Wide" Short-Wave News in the Next Issue.

The Official Dope on Experimental Stations

● SO much confusion exists among amateurs and short-wave fans in general about "experimental" stations that we asked the Federal Radio Commission for a copy of its rules in this regard. These are quoted in full as follows:

General and Special Experimental Stations

Note: These extracts which are supplied for information purposes should not be considered as giving all rules concerning these stations. A complete copy of the Rules and Regulations of the Federal Radio Commission may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a cost of 45 cents.

302. The term "experimental service" means a service carried on by stations engaged in research or development in the radio art.

303. The term "general experimental stations" means a station equipped to carry on research or development in the radio art requiring the transmission of radio-frequency power and operating on frequencies designated by the Commission for general experimental service. It does not include other experimental stations hereinafter defined.

304. The term "special experimental station" means a station used to carry on special research or development in the radio art which, because of the nature of the experiments, requires frequencies other than those designated for general experimental stations.

307. Experimental licenses of all classes may be granted only to those who are engaged in fundamental research or improving the technique of the radio art and show satisfactory evidence of being able to contribute substantially toward its progress.

308. No experimental frequency will be assigned exclusively to any applicant. Where interference is experienced licensees shall be required to arrange for a satisfactory division of time.

309. The licensee of an experimental station may make any changes in equipment that may be deemed necessary or desirable, provided that, at no time, shall the transmitter be operated on other than its assigned frequency or frequencies, with greater than its licensed power, or with a frequency variation greater than the licensed tolerance.

310. Each licensee of an experimental station shall maintain adequate records of the operation of each station, including (1) the hours of operation, (2) frequencies, (3) power, and (4) types of emission. This information shall be made available, upon request by authorized Government representatives.

311. Each licensee of a station in the experimental service shall file reports with the commission with each application for renewal of license or at the end of the license period if no application is made for renewal.

312. These reports are for information of the commission and the contents thereof will not be disclosed without the permission of the licensee.

313. Each report shall include statements of the following in the order designated:

A. General and Special Experimental Stations

a. Ultimate objective to be reached by experiments.

b. General results accomplished during period of report, including reference to published reports of experimental work.

c. Technical studies in progress at time of filing of report.

d. Any major changes made in equipment.

e. Total hours of operation.

314. The following frequencies are allocated for use by general experimental stations:

1.592		8.650	
	1,594		8,655
1,596		8,660	
2,396		12,855	
	2,398		12,862.5
2,400		12,870	
3,490		17,300	
	3,492.5		17,310
3,495		17,320	
4,795		23,100	
	4,797.5	25,700	
4,800		26,000	
6,420		27,100	
	6,425	34,600	
6,430		41,000	
		51,400	
		*60,000 to 400,000	
		401,000 and above.	

*60,000 to 80,000 shared with experimental visual broadcasting. *(Continued on page 255)*

$500 Prize Contest Awards

(Continued from page 214)

Vawter, Route 2, Box 119, Boynton, Okla., for *"A Red Hot Transformer"*; C. F. Sarver, 300 Grant St., Turtle Creek, Pa., for *"Two Meet-her (meter) Reception."*

14th, 15th, 16th, 17th, 18th, 19th, and 20th PRIZES—Various radio parts to be selected by winner from Hammarlund catalogue, donated by HAMMARLUND MFG. CO., New York City, to J. H. Kadlec YMCA, 1000 Grove Street, Evanston, Ill., for *"Resistor, son, resist her!"*; F. M. Hudson, Box 715, St. Anthony, Idaho, for *"Interference From a Powerful Local"*; O. Willard, W9HOH, Box 588, Colfax, Iowa, for *"Parasitic Oscillations"*; A. J. Seitz, 1633 N. Wisconsin St., Racine, Wis., for *"When 'Mom' Gets Super-'Het'"*; K. Narf Sivad, 13562 Cedar Road, Cleveland, Ohio for *"Getting the BUGS out of the 'Set'"*; Harry M. Bednarski, 2403 W. Burnham St., Milwaukee, Wis. for *"So That's the 'Single Signal'!"*; Addison R. Niblack, Wheatland, Ind., for *"Foreign Reception with a Wallop."*

21st and 22nd PRIZES—One complete "Lynch" Short-Wave Antenna Kit, donated by LYNCH MFG. CO., New York City to Glen Windisch, 2542 Blaine Ave., Toledo, Ohio for *"Wanted, One Volume Control"*; G. C. Lemmon, 1207 So. 6th St., Ironton, Ohio, for *"Ma Damps the Waves."*

23rd and 24th PRIZES—One Short-Wave Tuning Condenser, donated by NATIONAL COMPANY, Malden, Mass., to Herman Gansert, 245 Jamesville Ave., Syracuse, N. Y., for S. O. S.—*"Static On Short-waves"*; P. H. Wilson, 5741 Holcomb Ave., Detroit, Mich., for *"A Ham in a Jam."*

25th and 26th PRIZES—One "Majestic" Output Transformer, Model 70 or 90, donated by MAURICE SCHWARTZ & SON, Schenectady, N. Y., to Leslie L. Haskin, Brownsville, Oregon, for *"Unfortunate 'Body Capacity' and An Unshielded Set"*; Pvt. Levi Biggs, Hq. Co., 25th Inf., Huachuca, Ariz., for *"The Local That Couldn't Be Tuned Out."*

27th, 28th and 29th PRIZES—Four each No. 27 type radio tube, donated by MAURICE SCHWARTZ & SON, Schenectady, New York, to Wm. D. Kelvington, Meadow Lands, Pa., for *"Lack of Shielding!"*; Don C. Smith, 108 East Tarrant St., Bowie, Texas, for *"An Unexpected Time Signal"*; Irwin Vetrove, 3012 S. Kostner Ave., Chicago, Ill., for *"Reception Verified."*

30th and 31st PRIZES—One "Stromberg & Carlson" High-Power Transformer and Prize 31—one "Dubilier" 11¾ mf. high voltage filter condenser block, both donated by American Sales Company, New York City, to Carl Ruecker, 2014 Oak St., Santa Ana, Cal., for *"Just Two More Nuts"*; E. P. Abrams, 5121 Granada St., Los Angeles, Calif., for *"Fixed Resistance in Short Wave Work."*

32nd, 33rd, 34th, 35th, 36th and 37th PRIZES—One year's subscription to SHORT WAVE CRAFT, donated by *Short Wave Craft* Magazine, 98 Park Place, New York City, to Carl E. Zeigler, 620 Wayne Ave., Ellwood City, Pa., for *"Trouble With Loud Speaker"*; Forrest A. Royder, Box 555, Baytown, Texas, for *"A Complete Fade-Out"*; J. E. Strickland, 2004 Edg. Ave., Chester, Pa., for *"Uncontrolled Regeneration"*; Lowell Ditmer, 1260 Colwick Dr., Dayton, Ohio, for *"Two Late"*; June L. Lehnherr, Towanda, Kansas, for *"Aw! Let Her Wave"*; Leonard Kamerer, 1997 High Street, Cuyahoga Falls, Ohio for *"This S. W. Receiver Even Gets Hades."*

He Heard Last From The "AKRON"

(Continued from page 222)

learned later she was the German tanker S. S. Phoebus, and that she had aboard four survivors whom she had picked up. I then realized what I had and forwarded this information to Lt. Com. Pennoyer at Lakehurst. He replied to me that he would be pleased to have the data I copied. This I did and shortly afterward I received a telegram requesting my presence at Washington on April 24. I also received two telegrams from Claude A. Swanson, Secretary of the Navy, to appear.

The inquiry board accepted my testimony as to facts and stated I had assisted them greatly, and felt that the ship had crashed in the air. Some of the reporters didn't give me much credit or publicity as to my long experience in radio and nearly all of them classed me as an amateur, whereas I have had twenty years' experience in the radio field as operator, editor, instructor, etc. I am a graduate of the Marconi Institute, now RCA, National Radio Institute and Gulf Radio School and was instructor at Philadelphia Military Training Corps. Have been a commercial operator and only became interested in amateur radio in the past two years. I taught many of the amateurs here and two real good commercial operators. At present I am chairman of Board of Directors of Cape May County Radio Club. I hold first-class operator's license and a degree of Certified Master Radiotrician.

Sincerely,
ARTHUR H. HULFISH,
224 E. Montgomery Ave.,
Wildwood, N. J.

P. S. The signals were on a low wave —I should judge about 33 meters.

2 Police Radio Cars Now Able to Talk Back

A two-way system of radio communication between patrol cars and Police Headquarters was inaugurated recently by the Police Department for the unincorporated section of the Town of Eastchester, N. Y. It was said that the town's two patrol cars were the first in the United States equipped with a broadcasting device as well as a receiving set.

In each of the cars is a hand microphone through which the motor patrolmen can call headquarters or each other. The broadcasting sets operate on a fixed wave length. The sending sets in the two cars are powered by dynamos operating on storage batteries supplying one-half kilowatt for the transmitter.

$20.00 Prize Monthly For Best Set

● THE editors offer a $20.00 monthly prize for the best short-wave receiver submitted. If your set does not receive the monthly prize you still have a chance to win cash money, as the editors will be glad to pay space rates for any articles accepted and published in SHORT WAVE CRAFT.

You had better write the "S-W Contest Editor," giving him a short description of the set and a diagram, BEFORE SHIPPING THE ACTUAL SET, as it will save time and expense all around. A $20.00 prize will be paid each month for an article describing the best short-wave receiver, converter, or adapter. Sets should not have more than five tubes and those adapted to the wants of the average beginner are much in demand.

Sets must be sent PREPAID and should be CAREFULLY PACKED in a WOODEN box! The closing date for each contest is sixty days preceding date of issue (August 1 for the October issue, etc.).

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

Articles with complete coil, resistor and condenser values, together with diagram, must accompany each entry. All sets will be returned prepaid after publication.

REQUIREMENTS: Good workmanship always commands prize-winning attention on the part of the judges; neat wiring is practically imperative. Other important features the judges will note are: COMPACTNESS, NEW CIRCUIT FEATURES, and PORTABILITY. The sets may be A.C. or battery-operated, Straight Short-Wave Receivers, Short-Wave Converters, or Short-Wave Adapters. No manufactured sets will be considered; EVERY SET MUST BE BUILT BY THE ENTRANT. Tubes, batteries, etc., may be submitted with the set if desired, but this is not essential. NO THEORETICAL DESIGNS WILL BE CONSIDERED! The set must be actually built and in working order. Employees and their families of SHORT WAVE CRAFT are excluded. Address letters and packages to the SHORT WAVE CONTEST EDITOR, care of SHORT WAVE CRAFT Magazine, 96-98 Park Place, New York, N. Y.

The "Argonaut" Short-Wave Receiver

(Continued from page 207)

from 200 meters down to 10 meters. Additional coils may be obtained for use with tuning condenser (10) which will permit tuning in any of the stations on the broadcast band, between 200 and 550 meters.

The *Argonaut* receiver offers the short-wave beginner a low-cost receiver which is certain to give satisfactory results. The design has been simplified to such an extent that the only tools necessary for the construction of this set are a pair of cutting pliers, a screw-driver and a soldering iron.

Parts List "Argonaut" Two Tube Short Wave Receiver

1—Acratest Triple Binding Post. Aerial and Ground Connections.
2—Acratest Twin Phone Tip Jack, Speaker or Phone Connections.
3—1¼" Piece of Bare No. 14 Wire wound over with appx. 14 turns of No. 18 insulated push-back hook-up wire.
4—Set of Four Plug-in Short-Wave Coils.
Coil A—200 to 80 meters
Coil B— 80 to 40 meters
Coil C— 40 to 20 meters
Coil D— 20 to 10 meters
A Four-prong wafer-type socket for the short wave plug-in coil is riveted to the chassis.
5—Acratest Short Wave R.F. Choke, 4 mh. inductance.
6—Acratest 4 to 1 Audio Frequency Transformer.
7—5 Megohm, ½ watt Acratest Resistor.
8—100,000 ohm Acratest Potentiometer.
9—6 ohm Acratest Variable Resistor.
10—.00015 mf. Acratest Variable Tuning Condenser.
11—.0001 mf. Acratest Mica Condenser.
12—.00025 mf. Acratest Mica Condenser.
13—.1 mf. 200 volt Acratest Tubular Condenser.
14—Four-Conductor Battery Cable.
15—Four-Prong Wafer type Socket, marked for 30 Tube, riveted to chassis.
16—Four-Prong Wafer type Socket, marked for 30 Tube, riveted to chassis.
17—Drilled Metal Chassis and Drilled Metal Front Panel. Three Four-Prong Sockets riveted to chassis.
Three Knobs
Special Acratest Short Wave Dial
Dial-Escutcheon Plate
Hook-up Wire
Piece of Bare No. 14 Wire for Item 3
Spaghetti
Hardware Assortment
1—Pair Headphones, or Extra Sensitive DX Phones, or Magnetic Speaker.
1—45-Volt "B" Battery.
2—No. 6, 1½ volt Dry Cells.
2—Triad or equivalent 30 type 2 Volt Tubes.

ARGONAUT PLUG-IN COIL DATA

Meters Wave-length	Grid coil turns	Tickler turns	Distance between 2 coils
200-80	52 T. No. 28 En. Wound 32 T. per inch	19 T. No. 30 En. Close wound (CW)	⅜"
80-40	23 T. No. 28 En. Wound 16 T. per inch	11 T. No. 30 En. C. W.	⅜"
40-20	11 T. No. 28 En. 3-32" between turns	9 T. No. 30 En. C. W.	⅜"
20-10	5 T. No. 28 En. 3-16" between turns	7 T. No. 30 En. C. W.	⅜"

Coil form—2½" long by 1¼" dia. 4-pin base.

The Doerle 3-Tube "Signal Gripper" Electrified

(Continued from page 212)

pure non-corrosive rosin-core solder.

Various Sources of Power Usable

This receiver can be operated from various sorts of power supply arrangements and is adaptable to any location whether A.C. power is available or not. For those having A.C. power it is suggested that this set be run from a regular power supply, delivering from 180 to 250 volts with a 2.5 volt filament winding. A 22 volt tap will be required for the screen of the detector tube, of course. It might be well to state here that the voltage applied to the screen should not exceed 22 volts under any consideration, because the sensitivity of the receiver will be very much affected by running the screen at a higher potential. Also the regeneration control will not operate smoothly if the voltage is not of this value. If one wishes to operate this set from batteries it can be done very nicely with no change in the circuit. It's just a matter of changing the tubes to the automobile type and running them from a six-volt storage battery and using "B" batteries for the plate supply. 135 volts will work very nicely, although higher voltage is recommended if full signal strength is to be had. For operating on a regular power supply from 110 volts A.C., a 58 will be needed for the tuned R.F. stage, a 57 for the detector, and a 56 as the output tube. When operating from a storage battery with "B" batteries for the plate supply, a 78 will be used for the R.F. tube, a 77 for the detector and a 37 for the audio tube.

Operation

The operation of this receiver is exactly the same as before it was changed, as far as tuning is concerned. The two tuning condensers will have to be tuned at the same time, and the stations formerly received on this set will be received on practically the same dial settings, because the new coils tune exactly the same as the old ones. Tuning of the R.F. stage, however, will be much sharper than before; in fact the selectivity of the whole set is far greater than when it used the 2 volt type tubes.

The author will be glad to hear from any one making the changes in either the two or three tube DOERLE sets, and will render assistance if necessary, provided a stamped and addressed envelope is enclosed.

List of Parts for the New "Doerle" 3-Tube A.C. Receiver

1—Drilled Metal Chassis, Radio Trading Co.
1—R.F. Choke Coil, Radio Trading Co.
1—Set of 4 Special Three-Winding Coils, Radio Trading Co.
1—Set of 4 Regular Doerle Coils, Radio Trading Co.
5—.01 mf. Fixed Condensers, Flechtheim.
1—.002 mf. Fixed Condensers, Flechtheim.
1—.5 Bypass Condenser, Flechtheim.
1—300 Ohm Resistor.
1—100,000 Ohm Resistor, Lynch.
1—250,000 Ohm Resistor, Lynch.
1—1 Megohm Resistor, Lynch.
1—2 Megohm Resistor, Lynch.
1—2,000 Ohm Resistor, Lynch.
1—2,000 Ohm Resistor, Variable.
3—Six Prong Sockets, Eby (National; Hammarlund; Na-ald).
1—Five Prong Socket, Eby (National; Hammarlund; Na-ald).
1—Four Prong Socket, Eby (National; Hammarlund; Na-ald).
2—Triple-Grid Tube Shields, Hammarlund (National).
1—.0001 Fixed Condenser, Flechtheim.
3—Hammarlund .00014 mf. Tuning Condensers.
2—Tuning Dials, National or other make.
1—Antenna Ground Terminal Strip, Eby.
1—Phone Terminal Strip, Eby.
1—Five Wire Cable.

Short-Wave Advances in the U. S. S. R.

(Continued from page 201)

Transmitter Set Into Operation By Push-Button

The transmitters are set into operation by means of a push-button control, a series of progressive magnetically-operated contactors closing the necessary circuits. The transmitters are equipped with two mechanical and electrical *kick-back* protectors, which assure safe and reliable operation. Electric lamp signals or *tell-tales* show the order for operating the control push-buttons, and also the exact points at which there may be any electrical trouble or disorder.

Long-Distance Transmitters

For *long-distance* radio-communication our engineers have designed and the factories are producing transmitters having as great a strength as 15 kilowatts in the antenna. These transmitters are designed to operate on a frequency range of 6,680 to 18,700 kilocycles. The powerful R.F. amplifier used in our transmitters utilizes tubes provided with *water cooling*. The water cooling system for the tubes is arranged so that the water supply is started flowing through the cooling element of the tube whenever the tubes are switched into circuit; in other words this system works automatically, so that the tubes are cut out of circuit if insufficient water passes through their cooling elements. This ingenious system prevents burning out tubes which would otherwise be burned out if they were switched into circuit with the water-cooling system not in operation.

For the high-powered transmitters the current for the amplifiers is derived from a large rectifier stage, which is provided with six gas-filled tubes of 10 amperes capacity each, the tubes being connected according to the Graetz system. The voltage applied to the screens of the tubes is regulated from a suitable potentiometer.

Short-Wave Receivers—U.S.S.R. Style

For the reception of short waves we of course have at our disposal a large variety of apparatus. We shall here refer only to two of the principal models of receivers employed.

For registering or *recording* the reception of signals we use principally a receiver having a range of 1,500 to 30,000 kilocycles, the antenna signal passing through three stages of radio frequency amplification. At this point the R.F. modulator current is mixed with the received antenna signal, through a heterodyne circuit and first detector, the *difference frequency* being 120 kilocycles; the signal at this new frequency is then passed into the *intermediate amplifier*, comprising three stages of amplification. Tubes of the screen-grid type are used in the R.F. pre-amplifier and also in the I.F. amplifier.

In the event of receiving telegraphic or code signals the output of the I.F. amplifier is fed into the usual second detector and also into the volume-control circuit. From this point the *signal currents* are then sent either to the line circuit leading to the recording laboratory or to the *tone* generator, for transformation into oscillations of a lower audio frequency.

Where the signals received are *voice* or *phone* signals the output, as taken from the second stage of the intermediate amplifier, is led through the second detector and thence through two stages of audio frequency amplification.

Where I.C.W. (interrupted C.W.) signals are to be received, no separate *beat oscillator* is necessary, but for interpreting C.W. signals (continuous waves) a second heterodyne or beat oscillator circuit is provided.

In the case of phone reception the strength of the signals as heard in the loud speaker or phones is automatically regulated, the oscillations from the I.F. amplifier, after rectification, passing onto the screens in the R.F. amplifier circuit and in this way regulating the amplification in the R.F. stages.

Multiple Reception On One Aerial

A very interesting filter system has been worked out by our engineers which permits the installation of as many receiving sets as desired in the same location.

We are at present developing a new receiver having a range of 1,500 to 15,000 kilocycles, this receiver employing two stages of radio frequency amplification, using screen-grid tubes, a detector and finally two stages of audio frequency amplification. All of the condensers for tuning the various stages are mounted on one shaft, thus giving single-dial tuning, a very desirable convenience of course.

Frequency Stability Without Quartz-Crystals

The development of short wave technique has proceeded so rapidly in the U.S.S.R. that our technicians have had a number of unusual problems to solve. Our laboratories have developed a new type of oscillator tube with screened plates. Considerable research has also been carried out in the development of new insulators which would show a minimum loss at radio frequencies, and a number of entirely new dielectrics have been perfected.

One of our newest developments and one which presented many baffling problems concerns a new automatic method of attaining *frequency stability* control without having to resort to the use of quartz crystals. Short-wave developments have already reached such large proportions in this country that we have produced several thousand transmitters of different strength in a single year and with each new year this branch of the radio industry continues to expand rapidly.

Short waves have found extensive application in the U. S. S. R., not only along the lines of general service, but also for use on railroad signaling systems, for maritime and river navigation, for aircraft communication, and again for use in the large timber camps in forestation work (the Soviet Union possesses one-third of the timber lands of the world!). Short-wave sets have also found a useful application in geological and mining excavations. Broadcasting is principally developed in the U. S. S. R. along the line of long waves so far, taking the form of powerful broadcasting stations having such strength as 100 kilowatts in the antenna! At the present time we have a more powerful broadcasting station than any other on the continent.

Future of Short Waves in the U.S.S.R.

Our broadcast receivers, built and in use so far, are mostly designed for long-wave reception, with a range of 200 to 2,000 meters, but some of them are capable of receiving from 200 down to 20 meters. The most popular type of receiver used here is the 4-tube receiver, but we are also building superheterodyne receivers.

Under plans being considered for covering the entire country with signals having a strong field strength, we aim in the near future to be able to supply the public with inexpensive 2-tube receivers, besides the more complex models. In the next four or five years we intend to effect a thorough reconstruction of our radio telegraph and telephone communication systems, pushing to the fore the use of *short-wave radio transmitting stations*. On the other hand we expect to make a wide application of low-power, short-wave transmitting stations, which will be set up in the smaller villages. Our peasantry has been organized into immense centralized farms, covering tremendous areas, not divided up into private family holdings. These vast areas are provided radio service by special technical offices or departments which have large parks for the hundreds of tractors and for all kinds of agricultural machinery and automobiles. Naturally such a scheme of agricultural organization requires special radio broadcasting arrangements, in the form of *portable short-wave transmitters*.

At the present time we have established more than 200,000 agricultural centralizations, and the demand for broadcasting stations, as will be seen, is extremely large.

Skeptical of Short Waves? we actually Guarantee Results

BUY GUARANTEED

These Are Fool-Proof Short-Wave Sets
READ WHY WE CAN GUARANTEE RESULTS

When a manufacturer offers such a broad guarantee—a *guarantee which is almost unconditional*—he must have a lot of confidence in his products. We have *that* faith in our short-wave receivers, because they are fool-proof. *They are fool-proof because they are simple.* EACH RECEIVER EMPLOYS A MINIMUM NUMBER OF PARTS TO MAKE ITS RESPECTIVE CIRCUIT OPERATIVE. ALL FANCY EMBELLISHMENTS, USUALLY FOUND ON "EXPENSIVE" SETS, HAVE BEEN ELIMINATED. If properly adjusted and carefully tuned, they will bring in most anything on short waves worth hearing, not only in this country, but anywhere.

Furthermore, only first-class parts have been used throughout. We realize that the separate parts for our sets can be obtained elsewhere, at a lower price, but we do not manufacture and sell sets employing cheap parts; for such receivers are not reliable; they may work, but erratically. We feel, therefore, quite safe in guaranteeing these wonderful sets to perform fully as represented.

And here are letters from those who have actually tried these Short-Wave sets:

THE OSCILLODYNE

HOW IT WORKS

I have constructed the OSCILLODYNE RECEIVER and boy! how it works!

The first day without any trouble I received Spain, England, France, and other foreign countries. Amateurs! why I never knew there were that many until now. With the one tube Oscillodyne, I bring in more stations on one plug-in coil than with a set of coils on different short-wave sets.

IF ANY ONE IS TRYING HIS LUCK ON SHORT-WAVE SETS, IT WILL BE WORTH WHILE TO CONSTRUCT THE ONE TUBE OSCILLODYNE.

PAUL KORNEKE, JR., N. S. Pittsburgh, Pa.

A PEACH

The oscillodyne receiver, believe me is a "peach." I get short-wave stations from Germany, France, Spain and Italy—not to mention the American stations, including amateurs all over the United States.

I heartily recommend this set to any Short-Wave fan.

HENRY TOWNSEND, Ramsey, N. J.

THE DOERLE RECEIVERS

SOME LIST!

Have just completed your **Doerle** two-tuber. I received the following on the loudspeaker: XDA, LQA, GMB, VE9DR, VE9GW, KKQ, W1XAZ, W2XAF, W3XAL, W3XAU, W8XK, W8XAL, W9XF, W9XAA, Bermuda, Honolulu, Budapest, Hungary, and "hams" in 38 states.

MAURICE KRAAY, R. F. D. 1, Hammond, Ind.

THIS IS GOING SOME!

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

JACK PRIOR, 9 Mosswood Terrace, Maplewood, N. J.

A DOERLE ENTHUSIAST

I have just completed my two-tube **Doerle**, and it surely is a great receiver! It works fine on all the wave-bands. Nobody could wish for any better job than this one. I can get W8XK and W9XAA to work on the loudspeaker at night, and the code stations come in with a wallop behind them.

SAMUEL E. SMITH, Lock Box 241, Graving, Mich.

FRANCE, SPAIN, ETC., ON LOUDSPEAKER

I hooked up my two tube Doerle Kit and I received France, Rome, Spain, Germany and England on the loudspeaker as well as over 100 amateur phone stations.

I am very pleased with the receiver and would not part with it for anything. I have listened to many factory built short-wave receivers, but believe me, my DOERLE is the set for me.

ARTHUR W. SMITH, Springfield, Mass.

REGULAR FOREIGN RECEPTION

A few days ago, I purchased one of your TWO TUBE DOERLE WORLD WIDE SHORT WAVE RECEIVERS. I just want to tell you that this set does all you claim. In the short time I have had the set, I have brought in stations in England, Germany, France and South America. Davenshire, England, and Nanen, Germany can be picked up daily with very strong volume. THE DOERLE IS A FINE SET.

ARTHUR C. GLUCK, Brooklyn, N. Y.

THRILLED BY DOERLE PERFORMANCE

I am very much pleased with the DOERLE S.-W. radio I received; the local amateur stations come in loud and clear. The first foreign station I received was DJA, Zeesen, Germany. I certainly received this station with a thrill. Your for success.

RANDOLPH GRAY, Quincy, Mass.

Order From This Page

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

The Oscillodyne 1 Tube Wonder Set
Latest Short-Wave Development
This Is The Ideal Beginner's Set

Rear View

If you have never operated a short-wave set before, this is the one with which to start! If, on the other hand, you are already a hard-boiled short-wave fan (and are therefore aware of the shortcomings of the average short-wave set), the *Oscillodyne* is the set which will instill you with new confidence. It is a set which will convince you that foreign stations CAN be tuned in whenever they are on the air.

We have acquired the **sole rights** from the publishers of *Short Wave Craft* to manufacture *exclusively* the Official *Oscillodyne* 1 Tube Set, as described in the April 1933 issue. **Read what the editor of Short Wave Craft says in that issue:**

A REALLY NEW CIRCUIT

We are pleased to present to our readers an entirely new development in radio circuits. Under the name of the *"Oscillodyne,"* Mr. J. A. Worcester, Jr., has developed a fundamentally new circuit. This circuits which is of the regenerative variety, acts like a super-regenerative sets although it does not belong in that class. Its sensitivity is tremendous. The editor, in his home on Riverside Drive, New York City, in a steel apartment building, was able to listen to amateurs in the midwest, *using no aerial and no ground.* With the ground alone, a number of Canadian stations were brought in, and with a short aerial of 40 feet many foreign stations were easily pulled in.

Here, then, is a set which brings in stations thousands of miles away; a set which frequently brings in Australia, loud enough to rattle your phones, and with power to spare; a set which, if you do not wish extreme distance, will bring in stations several thousand miles away *without aerial or ground.*

In our estimation, the *Oscillodyne* is one of the greatest recent developments in radio circuits, and the editors recommend it warmly to all readers.

ABSOLUTELY FOOL-PROOF

This set, as we sell it, may be had either completely wired, or in kit form. There is absolutely nothing to go wrong with the *Oscillodyne.* Simple directions and blueprints show you how to build and operate the set for best results. **It may be used either on A. C. or with batteries.** If A. C. is employed, a type 227 tube is used in conjunction with a suitable A. C. power pack (such as the one listed on the opposite page.) 2½ volts will be required for the filament of the tube, and 90 volts for the plate. If batteries are employed, a 237 tube should be used in conjunction with either a storage battery or four No 6 dry cells and two 45 volt B batteries.

Only first-class parts are used throughout. The panel is of aluminum, and the sub-base of Bakelite. There is no guess-work with this receiver—no disappointment.

Front View

Oscillodyne Wonder Set

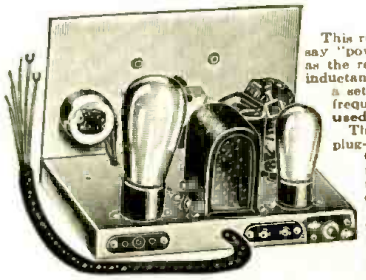
The set is exactly as illustrated here, size of aluminum panel is 6" high by 4½" wide, base 5½" long by 4½" wide. List of materials used:

No. 2146. Official One-Tube Wonder Set, completely wired and tested as per above specifications. YOUR PRICE **$6.22**

No. 2147. Official One-Tube Wonder Set, but not wired, with blueprint connections and instructions for operation, complete shipping weight 3 lbs. YOUR PRICE **$5.37**

No. 2148. COMPLETE ACCESSORIES, including the following: one 6 month guaranteed Neotron No. 237 tube; one set No. 1078 Brandes matched headphones; four No. 6 Standard dry cells; two standard 45-volt "B" batteries, complete shipping weight 22 lbs. YOUR PRICE **$5.12**

The Oscillodyne 2 Tube Loudspeaker Set
NO PLUG-IN COILS



Rear View

This receiver is one of the most powerful 2-tube sets ever built, and when we say "powerful," we *mean* powerful! It employs the same **Oscillodyne** circuit as the receiver listed above, but differs from that set mainly in that a tapped inductance coil covering the entire short-wave range is employed rather than a set of short-wave plug-in coils. Furthermore, a powerful stage of audio frequency amplification has been added so that **a loudspeaker can be used** on practically all stations.

The use of a tapped inductance coil does away with the necessity for using plug-in coils, to which many people object. It is only with a set of the **Oscillodyne** type that a tapped inductance can be used inasmuch as the "losses" introduced do not seriously interfere with the operation of the set. In other receivers, these very same "losses" may spell the difference between success or failure of operation. Under actual test, we have picked up signals half way 'round the world—12,500 miles—on the loudspeaker. Station **VK3ME, Melbourne, Australia,** was intercepted and reproduced on the loudspeaker without interruption and with excellent fidelity. Station **EAQ, Madrid, Spain,** and many other foreign stations were received regularly, night after night. There is no question but what this set will work in all parts of the country, under practically all conditions.

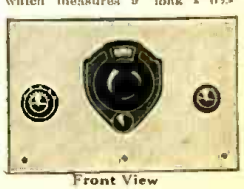
The principle of the **Oscillodyne circuit is a new one.** It is of the regenerative variety, yet acts like a super-regenerative set, although it does not belong in this class. Its sensitivity and selectivity are tremendous. The special band-selector switch affords complete band coverage in four overlapping stages.

Only parts of the highest quality, such as Hammarlund condensers, Yaxley switches, Kurz Kasch vernier dials, etc., have been used. These parts are mounted on a sturdy cadmium-plated metal chassis which measures 9" long x 6½" wide x 6" high. Complete set of blueprints and instructions included.

No. 2197. 2-Tube Oscillodyne Loudspeaker Set, Completely wired and tested. Ship. wt. 9 lbs.
YOUR PRICE **$10.87**

No. 2198. 2-Tube Oscillodyne Loudspeaker Set in kit form. Ship. wt. 9 lbs.
YOUR PRICE **$9.87**

No. 2199. Complete accessories for this receiver, including 1—type 56 tube, 1—type 47, 1—special short-wave hum-free AC power pack, No. 2149; 1—type 280 rectifier tube for the power pack; 1—B. B. L. magnetic loudspeaker. Ship. wt. 14 lbs.
YOUR PRICE **$11.22**



Front View

RADIO TRADING COMPANY, 100A Park Place, New York City

SHORT WAVE SETS

Sets Which Work At Your Command

And NOW The Electrified Official Doerle

2 And 3 Tube Receivers

Operate On Either A. C. or Batteries—May Also Be Had For 2-Volt Operation

3-tube Doerle Signal Gripper
REAR VIEW of A. C. Model — 2-volt Model does not have Tube shields or A. F. transformers.

Only **$14.22**

Short-wave receivers have come and gone, but never have there been produced short-wave receivers which have taken the entire country by storm as have the famous Doerle Receivers.

And Now These Doerle Sets Have Been Completely Electrified

Mr. Doerle described his first receiver, the now famous 2 TUBE 12,500 MILE RECEIVER in the Dec.-Jan. issue of *Short Wave Craft*, and his 3 TUBE SIGNAL GRIPPER in the Nov. 1932 issue.

If you are a reader of this magazine, you have undoubtedly been surprised at the great number of fan letters published in *Short Wave Craft*, praising these receivers to the skies—and for good reasons! We have sold many hundreds of these sets, and they are still going strong.

They are low-priced, yet pull in short-wave stations from all over the world REGULARLY, in practically ANY LOCATION, not only in this country, but anywhere!

These two receivers EMPLOY THE 2-VOLT, LOW-CURRENT CONSUMPTION TUBES, and are, therefore, most popular with people living in *rural* districts where electric service is scarce.

For the thousands of fans however, who enjoy the benefits of electric service, we have developed the *2 and 3 Tube* A.C. *Doerle sets*. These sets, employing the latest type triple-grid tubes, are naturally more selective and infinitely, more sensitive than the original Doerle receivers.

Furthermore, **not only can they be used on alternating current, but with batteries as well.** The 2 tube 12,500 Mile Electrified Doerle Receiver employs a type 57 triple-grid detector tube, which is resistance-coupled to the type 56 output tube. For operation on batteries the 57 is replaced with a 77-tube and the 56 with a 37. This set actually works a loudspeaker on all local and many distant stations. The 3 Tube Electrified Doerle Signal Gripper employs a 58 triple grid tube as a radio-frequency amplifier, followed by a type 57 detector, and finally, a 56 output tube. For battery operation the Type 78, 77 and 37 tubes are used. This receiver, in its sensitivity and DX ability, *equals* many expensive 5 and 6 tube short-wave sets.

Improved Circuit and Design

Despite the remarkable performance of the Doerle receivers, our technical staff felt that they could obtain better results by making slight modifications of the circuit. This is especially true of the 3 Tube Signal Gripper, both the new A.C. and 2-volt models. In the 2-volt model, the first type 30 R. F. tube was replaced by a type 34, which is a special-purpose screen-grid R. F. amplifier. In the A. C. model, a type 58 triple-grid, high-gain R. F. tube is employed. Furthermore, in this latter model the Antenna trimmer condenser has been eliminated through the use of inductive coupling. The detector plug-in coils are of the six-prong type, each having three separate windings. This means that the R. F. Stage is inductively coupled to the detector. Yet, despite these various changes, we have not increased the price of these receivers, to you.

By special arrangements with the publishers of *Short Wave Craft*, we have been given the *exclusive right to manufacture and sell* the Official Doerle Receivers, both the earlier 2-volt and the latest A. C. models—so that now, all short-wave enthusiasts who have ever wished to own any of these fine sets can buy them without the slightest doubt in their mind but what they *will perform 100%*. This means that all the usual "bugs" have been ironed out by us in such a way that in practically every location, anywhere, they will "do their stuff."

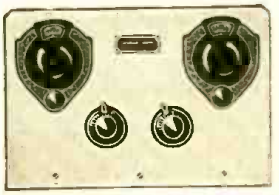
Only First-Class Parts Are Used

It may be possible to buy the parts or completed sets at a lower price—we admit this at once—but without concern. For we have used only the best parts available in the construction of our sets. We have done away with all usual "losses" which are incidental to the use of poor components. In these receivers, only the best tuning condensers, and that means Hammarlund-are used! These sets could be produced for a considerably less amount if we used cheaper condensers. We refrained from doing so, however, because then we COULD NOT GUARANTEE RESULTS! And this goes for everything else in these sets. . . .

If you are skeptical of the results obtainable with these receivers, read the letters from our many short-wave fans and friends printed on the opposite page.

Our Own Tests

Every one of these Doerle receivers, without exception, is tested in our laboratory *under actual operating conditions*. We refrain from giving you the astonishing list of stations which we, ourselves have logged during the course of our tests; for we do not wish to let our enthusiasm run away with us! We would much rather have you and our many other short-wave friends talk about the results. Incidentally, we have yet to receive a single complaint on any of these sets although we have sold many hundreds of them. *Each receiver is accompanied by schematic diagram and wiring blueprint, as well as a pamphlet of detailed instructions.*



FRONT VIEW showing general appearance of all Doerle receivers

Only **$8.92**

2-Tube 12,500 Mile Doerle Set
Rear View—Both A. C. and 2-Volt Models look alike

SPECIFICATIONS

No. 2174. Electrified 2 Tube 12,500 Mile Doerle Receiver, completely wired and tested, less tubes. Measures 9" long x 6" high x 6½" wide. Shipping wt. 5 lbs.
YOUR PRICE **$9.47**

No. 2175. Electrified 2 Tube 12,500 Mile Doerle Receiver in kit form, less tubes, but including blueprints and instructions. Ship. wt. 5 lbs.
YOUR PRICE **$8.27**

No. 2176. Complete set of tubes for above: either one—57 and one—56 for A. C. operation, *or* one—77 and one—37 for battery operation.
YOUR PRICE **$1.82**

No. 2177. Electrified 3 Tube Doerle Signal Gripper, completely wired and tested; less tubes. Measures 10½" long x 7" high x 8½" wide. Ship. wt. 7 lbs.
YOUR PRICE **$14.22**

No. 2178. Electrified 3 Tube Doerle Signal Gripper in kit form, including blueprints and instructions; less tubes. Ship. wt. 7 lbs.
YOUR PRICE **$12.77**

No. 2179. Complete set of tubes: either one—58, one—57 and one—56 for A. C. operation or one—78, one 77—and one—37 for battery operation.
YOUR PRICE **$2.72**

BATTERY SETS

No. 2140. TWO TUBE 12,500 MILE 2-VOLT DOERLE SHORT WAVE RECEIVER, completely wired and tested. Ship. wt. 5 lbs.
YOUR PRICE **$8.92**

No. 2141. TWO TUBE 12,500 MILE 2-VOLT DOERLE SHORT WAVE RECEIVER KIT, with blueprint connections and instructions. Ship. wt. 5 lbs.
YOUR PRICE **$7.72**

No. 2142. COMPLETE ACCESSORIES, including 2 No. 230 tubes; one set of Brandes Headphones; 2 No. 6 dry cells; 2 standard 45-volt "B" batteries complete, ship. wt. 22 lbs.
YOUR PRICE **$5.42**

No. 2143. THREE TUBE 2-VOLT DOERLE SET, completely wired, ready to use
YOUR PRICE **$11.87**

No. 2144. THREE TUBE 2-VOLT DOERLE SET IN KIT FORM, with blueprint connections and instructions. Ship. wt. 7 lbs.
YOUR PRICE **$10.52**

No. 2145. COMPLETE ACCESSORIES, including 2 No. 230 tubes; and one type 34, one set of Brandes Headphones; 2 No. 6 dry cells; 3 standard 45-volt "B" batteries; 1 B. B. L. 9 inch Magnetic Loudspeaker. Shipping weight 32 lbs.
YOUR PRICE **$11.02**

Special Short-Wave Hum-Free A. C. Power Pack

$6.27

Designed Especially For The Doerle Receivers

Everyone knows that an A. C. short-wave set is no better than the power pack which supplies its power! A power supply for short-wave use must be constructed with extreme care. It must be absolutely free from hum or other disturbances caused by insufficient filtering, poor wiring, or faulty equipment.

This unit has a two-section filter circuit, employing two-heavy duty 30 Henry chokes and a tremendous amount of capacity. This assures PURE D. C. with practically no ripple at all.

The power pack supplies 250 volts at 50 mils for the plates of the tubes, 22½ volts for the screens, and 2½ volts at 5 amperes, for the filaments. These various voltages are obtained from convenient binding posts on the side of the pack. Furthermore, provisions are made for energizing the field of a dynamic speaker. Any speaker having a field resistance of from 1500 to 2500 ohms may be thus energized. All the component parts of this pack are built into a sturdy, metal base which is black, crackle finished. The power transformer and one of the chokes are the only units which are mounted on top of the chassis. The pack employs a type 280 full-wave rectifier which is inserted in a socket on top of the base. A convenient on-off switch is mounted on the side. The pack is sold complete with four feet of connecting cord, terminating in a special Belden soft rubber plug. Measures 7½" long x 4" wide x 4⅝" high overall. *Sold complete with 280 tube.* Ship wt. 10 lbs.

No. 2149 Special Short-Wave Hum-Free A. C. Power Pack, including 280 tube.
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A Band-Spread "Superhet" Receiver

(Continued from page 205)

necessary to drill a small hole in both the condenser shield and the oscillator coil-shield to pass the wire through in connecting the two condensers in parallel. This wire should be shielded also.

If the parts are mounted as shown all important leads will be very short. Each by-pass condenser should be mounted as near as possible to the point being by-passed; otherwise the amplifier may break into oscillation and become erratic and noisy in operation.

A voltage divider has been incorporated in the high frequency unit, to obtain 22 volts for the first detector screen-grid. This is an improvement in that it allows any power unit to be used by merely running the high voltage into the receiver. A four-wire cable serves for the filament and high voltage connections.

When the set has been completely wired and is ready for operation it should be run with the filaments lighted and the plate voltage applied for about one-half hour before any effort is made to tune the I.F. stages. If the set were to be tuned when it was "cold" the stages would be out of resonance after it had been run any length of time at all.

For those who have worked on "superhets" the tuning up of this set will present no difficulties in the least. But on the other hand if one has never had this job, it is quite an undertaking and should be done with the utmost care. A *test oscillator* and an *output meter* of course are to be preferred in doing this job, but the average short-wave fan does not possess such elaborate equipment. The easiest method of doing this is to have a *noise-producing* machine, such as a vacuum cleaner or a buzzer, for that matter, and couple it to the input of the I.F. unit. Most manufacturers of I.F. transformers adjust them before they leave the factory and when installed in a set they will show some signs of being near proper alignment. For those living near a 550 K.C. broadcast station, and wishing to use this intermediate frequency, the station can be tuned in with the adjustment of the compensating condensers, using a very short wire connected to the input side of the I.F. unit. After the I.F. stages are lined up as near as possible, connect an antenna to the high frequency (first) detector and proceed to tune from this side of the receiver. Set the main tuning dial at the *low end* of the dial and tune the first detector trimming condenser until the back-ground noise is heard. This will be heard in most cases on two settings of this condenser; the low-frequency setting of this condenser is the one we wish to use; now when the high frequency unit is lined up, readjust the I.F. unit for loudest signal.

When we get this far, the next thing is to locate some kind of short-wave station, and adjust the high frequency padding condenser so that the first detector and high frequency oscillator will track at the intermediate frequency we are using. The final adjustment of the I.F. stages is done after all else is finished.

The next operation is to put the low-frequency *beat oscillator* into use. Set the *beat oscillator* panel tuning condenser at about mid-scale or 50 on the dial, turn on the switch controlling this oscillator and then tune the condenser located in the shield can, until a hissing sound is heard, or if we are listening to a station, a whistle will be heard. Leave this condenser at this point and do all future tuning with the panel control.

It will take quite some time for one to become accustomed to the operation of a set of this kind and maximum results will not be obtained until one gets the "feel" of the dials.

With the set described above, it is possible to bring in many "DX" stations on an antenna but several feet long, and with a regular antenna the operator has *the world at his finger tips!* As for selectivity—well! it is just a matter of detuning the low frequency oscillator, and one side of any C.W. station is reduced to almost inaudibility, while the other half remains full strength, and we then have what is almost a *single-signal* receiver for amateur operation.

PARTS IN DIAGRAM.

C1—.01 MF Mica Condensers.
C2—.5 MF. By-Pass Condensers.
C3—.002 MF. Mica Condensers.
C4—.0001 MF. Mica Condensers.
C5—.000035 MF. Hammarlund Midget.
R1—300 OHMS.
R2—50,000 OHMS.
R3—10,000 OHMS.
R4—50,000 OHMS.
R5—50,000 OHMS.
R6—15,000 OHMS.
R7—75,000 OHMS.
R8—250,000 OHMS.
R9—1 MEG.
R10—2,000 OHMS.
R11—100,000 OHMS.
R12—250,000 OHMS.
R13—100,000 OHMS.
All Resistors 1 Watt.

LIST OF PARTS FOR "I.F." UNIT

8 .01 mf. mica condensers.
2 .5 mf. by-pass condensers, Flechtheim.
3 .002 mf. mica condensers.
1 .0001 mf. mica condensers.
2 300 ohm resistors, Lynch.
3 50,000 ohm resistors, Lynch.
1 15,000 ohm resistor, Lynch.
2 100,000 ohm resistors, Lynch.
1 2,000 ohm resistor, Lynch.
1 1 Meg. resistor, Lynch.
2 25,000 ohm resistors, Lynch.
1 10,000 ohm resistor (variable).
1 75,000 ohm resistor, Lynch.
4 6 prong sockets. Eby, (National, Hammarlund, or Na-Ald).
1 5 prong socket, Eby, (National, Hammarlund, or Na-Ald).
1 R.F. choke, Hammarlund, shielded, (10 m.h.)
2 I.F. transformers, Hammarlund, 465 kc. Each coil has 1.2 m.h. inductance, tuned by mica type trimming condensers of 140 mmf. max. capacity.
1 Beat oscillator unit, Hammarlund, 465 kc. 1.2 m.h. coil, L-1, shunted by small mica trimmer condenser of 140 mmf. max. capacity.
3 Tube shields, Hammarlund.
1 35 mmf. Hammarlund midget condenser.
1 S.P.S.T. switch.
1 speaker terminal strip, Eby.
1 National "B" type, vernier dial.
1 Blan aluminum base, 7"x10"x1"
1 Blan aluminum panel, 21"x7".
1 Voltage divider, 22,440 ohms; tapped at 2,500 ohms.
3 type 58 tubes, Triad.
1 type 57 tube, Triad.
1 type 56 tube, Triad.

Short Wave League

(Continued from page 228)

ever, I am of the opinion that five-meter work will present more difficulties than the lower frequencies and it would require knowledge of the subject to successfully operate there. As yet the ultra-high frequencies are really undeveloped, but due to the present almost unbearable operating conditions on eighty meters, I believe there will be a general exodus from this band in the near future, some of which will be to the 160-meter band and a great deal of which will be to the five- and ten-meter bands. Of course, these bands, because of their inherent characteristics, will necessarily have to be confined to more or less local operation, and who wants to have his rag-chew washed out by somebody fooling with a phone transmitter and not knowing what it's all about? All of the bands at present assigned to amateur communication belong to the licensed C. W. ham.

"I, for one, am utterly opposed to any modification of the radio laws which would permit any person without knowledge of the art of radio communication to operate. There are at present some thirty-five thousand licensed operators in the United States, say nothing of the number of our brother Canadian operators, and the bands at present assigned to amateurs are entirely inadequate to permit comfortable operating, so there is no reason in the world why these bands should be opened to anyone who is not willing to take a little time to learn what it is all about, and by so doing avoid greater confusion than that which already exists.

"If I had any influence in the matter I would modify the radio laws to require a rigid examination which would restrict the use of amateur bands to operators who hold amateur extra first-class licenses, and do away with ordinary first-class licenses. I believe this would insure comfortable operating conditions and would eliminate most of the poor operators. In other words, I believe that a man should earn his right to use the air in pursuit of his hobby and if he were not capable of earning it, there should be no place for him where he could make life miserable for the operator who has devoted his time and energy to make himself a good ham.

"I would like very much to see this article in print if you have space for the reason that it goes into both sides of the question, which the other letters on the subject appearing in your magazine do not."

● ONE of the things that amateurs and would-be amateurs must bear in mind is the fact that amateur short-wave radio is not a purely *local* proposition, but is highly *international* in scope. Nowhere in the world does the amateur enjoy such privileges as in the United States. Although practically every other form of license involves a tax of some kind, the amateur operator and station licenses do not cost the applicant a cent, yet the amount of clerical work involved is enormous. At every international radio convention, the authorities of foreign countries always try to restrict the amateurs more and more. Any move to make amateur licenses any easier to obtain than they are at present in the United States is sure to be opposed.

Although we ourselves believe that a lifting of the code requirement for the 5-meter band alone would enable many serious experimenters to get "on the air," we also wish to emphasize the fact that a knowledge of the code greatly increases the enjoyment that a man can obtain out of short-wave radio. For every phone station on the air there are actually thousands of code stations, the identification of which is much easier and much more definite in code than by voice.

From an Old "Key-pusher"

Editor, SHORT WAVE CRAFT:

I have been more or less actively interested in short-wave radio communication for a number of years, and have been a rather consistent reader of your publication. The present controversy (in the December issue) over code and phone transmission is quite amusing to me. Both amusing, and interesting—since I'm inclined to classify myself among the "oletimers," watching the "young sprouts" discuss their ideas of the important and also the inconsequential phases of the art. A decade ago I operated an amateur station, but on entering the commercial telegraph field allowed my amateur activities to drop. And, as an old "brass-pounder," I believe the fellows are overlooking the most fundamental basis of radio, when they neglect to learn the code. It isn't hard to learn after all, and to my own biased and prejudiced mind, a radio amateur isn't very "hot-cha" if he can do no more than "listen" to phone transmission and pass over code signals as unintelligible. In fact, I think an amateur who can't master the code, can't go very far toward mastering the art of radio anyway. But, I have been wrong at times. Sincerely,

JIM WICKER,
148 Adair Street
Decatur, Ga.

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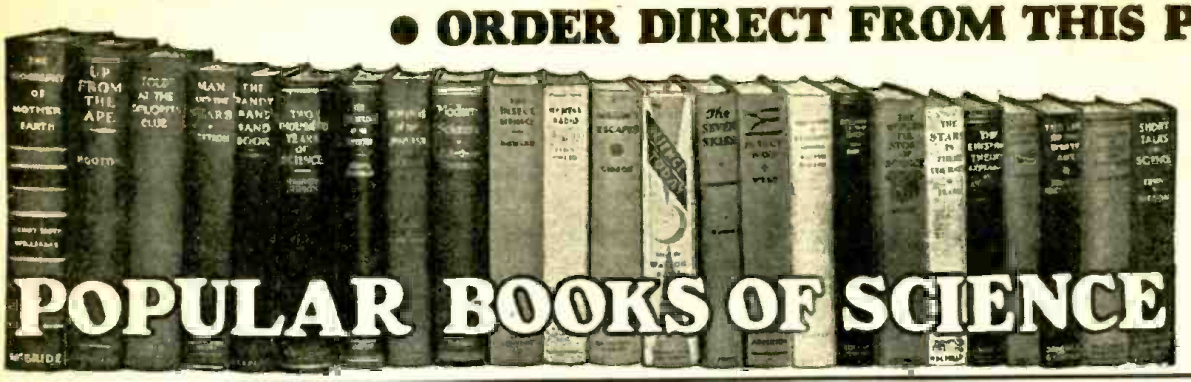

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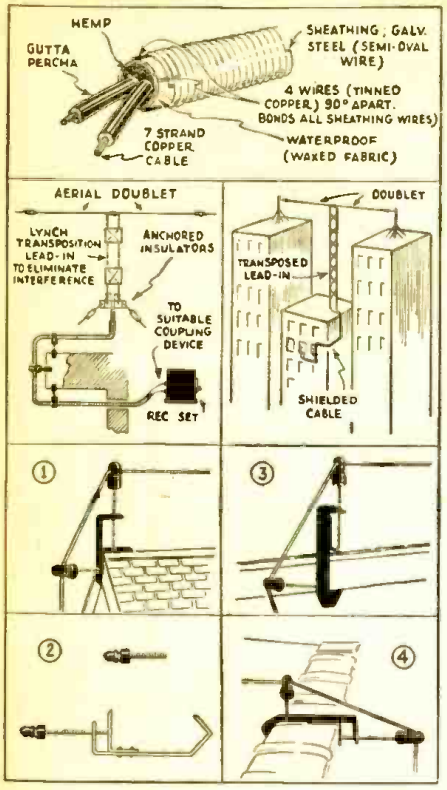
Shielded Twin-Conductor Lead-In Cable



Sectional view of new twin conductor, shielded lead-in cable; also various methods of installing it by means of special insulator brackets. (No. 115)

● **FREQUENTLY,** when short-wave antenna installations are to be made, it happens that the receiving set is located at a considerable distance from the antenna. In some cases, the problem is solved by running the required length of lead-in or feeder with the wires transposed about every 15 inches by means of the new Lynchite transposition blocks. As one of the accompanying drawings shows, the receiving set is not always located directly under the aerial and in such an event the latest and preferred method is to bring down the lead-in vertically from the antenna doublet suspended between poles or roofs, and then to continue the twin-conductor circuit from the point where the transposed lead-in meets the roof around to the point where the receiver itself is located.

The accompanying drawings show an ingenious malleable iron bracket which is adjustable as to size and which, moreover, has one end formed like a hook, so that the bracket with its special large sized insulators may be secured at almost any angle on all sorts of rough edges, parapets, etc. The insulators fitted on these brackets have large holes in them suitable for passing the new Lynch shielded lead-in cable through. The lead-in cable, with its two stranded copper conductors embedded in pure gutta percha, can, by means of these brackets be carried nicely over the edge of the parapet walls, around the corners of buildings horizontally, and at the same time keep the cable away from the building and incidentally providing long radius curves and not sharp bends.

A word about the cable itself: It measures about ⅜" in diameter and lengths up to 150 feet have been tested and found to cause a loss of less than one decibel. The two stranded copper conductors within the cable are highly insulated in gutta percha; the two insulated conductors within the cable are given one turn every six inches in the manufacturing process. These two insulated conductors have some filler materials such as jute packed in between them and around this assembly there is woven a heavy waxed fabric. Over this fabric there are placed four tinned copper wires 90° apart, and over these the sheathing of semi-oval galvanized iron wire is tightly wound on a special cabling machine.

Contrary to the installation of most shielded lead-in cables, such as the single-wire type, the outer metal sheathing is not grounded. The two conductors at the free end of the cable when they reach the receiving set, are connected to the receiver in any one of several well-known ways, through a suitable coupling device such as a coil placed within the inductive field of the first R.F. transformer in the receiver.

(Name and address of manufacturer furnished upon receipt of stamped and addressed envelope.)

World-Wide Short-Wave Review

(Continued from page 219)

Ultra-Short Wave Reception

these wavelengths, it will be found advisable to use anode (plate) grid, and filament chokes. For plate and grid, the chokes may consist of about 50 turns of fine (No. 32 to 34) wire on a form ¼ inch in diameter. To avoid the possibility of these chokes resonating and causing the circuit to act as a tuned plate-tuned grid circuit at their natural wavelength, it is advisable to wind them with resistance wire, and to arrange that they shall either have a different number of turns or be wound on forms of different diameters. The filament chokes are most conveniently wound together on one form ½ inch in diameter in *bifilar* (non-inductive) fashion.

Another successful method of controlling generation is by means of a separate absorbing circuit L, C, R, at Fig. A (a) variably coupled to the detector circuit. Regeneration may be controlled (after suitable adjustment of the detector plate voltage) either by varying the coupling between the circuits, the tuning of the absorbing circuit (varying C) or the resistance R. The most convenient method seems to be to set the tuning and resistance to optimum values and vary the coupling. Usually the absorbing circuit may consist of a simple ring or closed loop of wire. On these wavelengths (below 3 meters) it is usual to employ a half-wave dipole aerial, coupled to the detector by means of a two-wire feeder. The coupling coil of the feeder may be used as the reaction control quite conveniently.

It is advisable to screen (shield) all the circuits carefully. A very compact and efficient set for portable work is shown at Fig. B. It consists of a self-quenching detector, coupled to a pentode.

A 5 Meter Super Regenerative Receiver

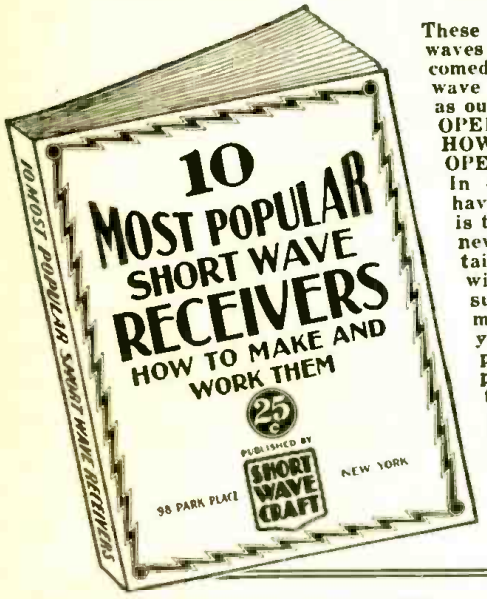
the detector is oscillating. Then put in the "super" and listen for the characteristic mushy hissing noise which indicates that it is working. You only hear this, by the way, when the detector is oscillating and you should set the reaction condenser so that it is not oscillating too hard (although the setting is not at all critical).

Don't worry about what will appear to be a loud background noise—as soon as you tune in a signal of any strength *the noise disappears!* A carrier wave without any modulation on it will appear as a hole in the mush. Tune around the band very slowly, listening for any diminution in the mush. A really weak station will only cut it down slightly, but you should be able to hear speech and music through the noise that remains.

NOW READY

The Two NEW SHORT WAVE BOOKS

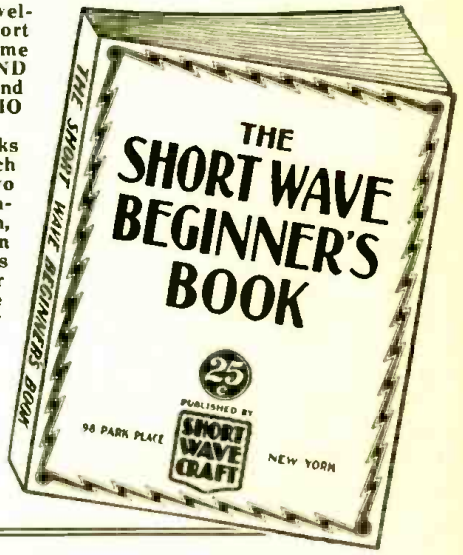
Here is Great News!



These new books contain everything on short waves worth knowing and the books will be welcomed by all short wave experimenters, short wave fans and short wave enthusiasts, the same as our former two books HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS, and HOW TO BECOME AN AMATEUR RADIO OPERATOR.

In conformity with the times these books have been priced at 25c instead of 50c, which is the price of our other books. Yet the two new 25c volumes that we are offering, contain a tremendous amount of information, with the type and illustrations chosen in such a manner as to give you almost as much for your 25c as you received for your 50c before. Only by increasing the press run enormously and making other printing economies has it been possible to price these books at such a low, popular price.

You make no mistake in getting either or both of these new and popular books and we know from our many years of experience with short wave enthusiasts that you will thank us for having made these books possible.



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

This new volume is a revelation to those who wish to build their own short wave receivers. The editors of SHORT WAVE CRAFT over a period of years have learned to know what short wave experimenters and set builders want. They have selected ten outstanding short wave receivers and these are described in the new volume. Everything worthwhile about every one of the ten receivers is described in the text. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hookup and all worthwhile specifications. Everything from the simplest one tube set to a 5-tube T. R. F. receiver is presented. Complete lists of parts are given to make each set complete. Select any or all receivers and know beforehand that you will be able to successfully build and operate such a receiver and not waste your money. You are shown how to operate the receiver to its maximum efficiency.

CONTENTS

IMPORTANT

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

PRICE 25c PREPAID 40 PAGES
OVER 75 ILLUSTRATIONS

The Short Wave Beginner's Book

Here is a book that will solve your short wave problems. It contains everything that you would wish to know in connection with short waves, leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

The book is profusely illustrated with all sorts of photos, explanations and everything worthwhile knowing about short waves—the book is not "technical." It has no mathematics, no "high-faluting" language and no technical jargon. Wherever technical words are used, explanations are given. You are shown how to interpret a diagram and a few simple sets are also given to show you how to go about it in making them. Everything has been done to make it possible to give you a complete, fundamental understanding of short waves.

After reading this book, you will never be at a loss for short wave terms, or will have to consult other text-books or dictionaries. The editors of SHORT WAVE CRAFT who have edited this book have seen to it that everything has been done to make this volume an important one that will be used as reference for years to come.

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

Partial List of Contents

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☐ I enclose 50c for which please send me, prepaid, your two books, "Ten Most Popular Short Wave Receivers. How to Make and Work Them," and "The Short Wave Beginner's Book."

(Send money order, check, cash or new U. S. stamps. Register letter if it contains currency or stamps).

Name .....

Address .....

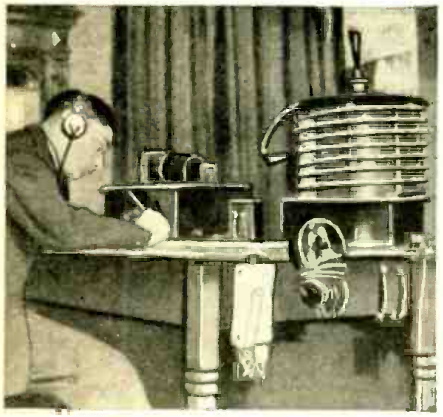
City ..... State .....

Amateurs who made good

Arthur H. Lynch

● I BECAME a ham in about 1908, when I was going to high school. Nearly all of the men in the neighborhood were drafted into service for the erection of my first mast, at Jamaica, L. I. Here, I used to listen to the old spark transmitter at WCC (Cape Cod) for code practice. It was here that I was able to pick up Vaughn De Leath, when she sang her first radio program for Dr. deForest.

Here, too, I used to operate my little station and communicate back and forth with Alfred Grebe, when he was a commercial operator on the Panama line.



Arthur H. Lynch in his early station, vintage of 1912.

In those days operators used the American Morse code, as distinguished from the Continental code now used commercially. The call letters for the commercial station at Atlantic City were AX. At about the time the Atlantic City station was shut down, American operators began to use the Continental code and Morse became obsolete on the sea. My initials are A. L., which in Continental is the same as the old A X in Morse. There was no government regulation of amateur operations at that time and I gave myself the call letters A X. I have been using this same sign for a number of years.

I received my first commercial license in 1912 and the accompanying photograph was taken at my station in Brooklyn, N. Y., during a period between trips to Panama.

My commercial license has expired, but I still retain an amateur license as well as an amateur station license. I also do a lot of amateur work in connection with short wave radio and aircraft.

[Arthur H. Lynch's name is well known to the radio fraternity today. He is president of the Lynch Manufacturing Company with offices at 51 Vesey Street, New York City, with a factory at Cranford, New Jersey. Mr. Lynch is an indefatigable worker and due to his persistent research he has been responsible for the development of a highly improved line of cartridge resistors and has lately brought out a new system of insulators and coupling transformers for an improved transposition type antenna lead-in and allied apparatus. Mr. Lynch has written several books on the subject of radio and was formerly editor of Radio Broadcast. Later he was Editorial Director of a group of magazines including RADIO NEWS, SCIENCE AND INVENTION, and AMAZING STORIES.—*Editor.*]

Book Review

ULTRA SHORT-WAVE AMATEUR-BAND COMMUNICATION, by James Millen, M. E. Stiff paper covers. 32 pages. Size 8½"x11¼". Profusely illustrated with halftones and line drawings; excellent typography and good quality paper. Price 25c. Published by the National Company, Malden, Mass.

This valuable book will be cherished by every student of short waves and especially the ultra short wave band, that is, the transmitters and receivers operating on various wavelengths below ten meters. Some of the vital and well illustrated subjects discussed in this book are—Transmission and Reception Below Ten Meters—A Valuable Bibliography or list of references to ultra short wave articles in various periodicals, with the names and dates of issue—Receiver and Converter Designs For Use Below Ten Meters—An Ultra High Frequency Converter for the 56 Megacycle Amateur Band—A Three to Ten Meter Superheterodyne—How To Construct a 56 Megacycle Magnetron Transmitter—Constructional Data For a Practical Crystal-Controlled 56 Megacycle Transmitter—How The Amateur Can Make Accurate 5-Meter Measurements, Including Diagrams and Instructions for using the "Lecher Wire" Method of Calibrating Frequency Meters—Practical Working Data and Photos of the Apparatus for Transmission on ¾ Meter, including the method of measuring the wavelength.

STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS, Frank F. Fowle, Editor-In-Chief. Sixth Edition, revised and enlarged to date (1933); 2816 pages, thumb indexed; size of book, 5"x7¼"x2¾" thick, gold edges; elaborate cross index of 77 pages; price $6.00. Published by McGraw Hill Book Company, Inc., New York, N. Y., 1933.

The vast array of electrical and radio subjects covered in this remarkable handbook is so broad and comprehensive that it is beyond the scope of any short review to do anything like justice to this most valuable work. Each section dealing with the various electrical and allied subjects have been carefully prepared in a comprehensive and complete form by well-known experts, among whom we find such names as Kennelly, Karapetoff, Underhill, Lincoln, Hobart, and Fowle.

Each section as outlined in a list of sections and authors appearing in the front of the book, is instantly located by turning to the index number which is printed in gold on black "thumb-index" indentations.

A very valuable section of the handbook covers Radio and "carrier" communication by Edward L. Bowles and M. D. Hooven, Jr., S.B.; Electron Tubes and Electric Wave Filters by Edward L. Bowles. Other valuable sections which include the "boiled down" essence of the basic engineering aspects of the subjects in each case are—Electric and Magnetic Circuits—Electrical Measuring Apparatus — Induction Coils, Magnets, Resistors, and Condensers, including radio types, power-factor correction, Electrolytic types, etc.—Transformers and Reactors, including theory, design and radio types—Alternating Current Generators and Motors—Direct Current Generators and Motors—Converters and Rectifiers, including inverted converters—Dynamotors and Rectifiers of the following types: hot-cathode, mercury-arc, electrolytic, junction, mechanical and cold-cathode, gas rectifiers.

Storage batteries of both the lead and alkaline type, charging, etc.—Wire Telephony and Telegraphy, Fire and Police Alarm Systems, Carrier Telegraph Systems, Telephone and Telegraph Cables, Testing Methods, etc.

The last section, "Miscellaneous Electrical Applications" covers a host of most interesting topics, including Radio-Activity, the Theory of Electrons—Ozone—X-Rays—Ultra-Violet Radiation—Public Address Equipment—The Telegraphone—Static Machines—Thawing Water Pipes—Electricity in Agriculture—Windmill-Electric Plants, etc.

Letters from Short-Wave Fans

(Continued from page 222)

(Thanks, Samuel, for your letter.

The trouble with many people is that they have fixed ideas on certain subjects and cannot bear to listen to other peoples' opinions. SHORT WAVE CRAFT *has no voice of its own when it comes to matters of this kind, AND THAT IS WHY OUR COLUMNS ARE OPEN TO ALL. It is an exchange for various types of ideas.*

If everyone thought alike, we would all be morons. The latest presidential election showed violent differences of opinions—which in the end, is a good thing for the country.

We approach all letters from readers with an "open mind." It is not for us to say whether their opinions are right or wrong, as far as they refer to controversial subjects. Even a radio hook-up may be done a hundred different ways and still be right. For this reason, we publish your letter in full to give the other side of the problem.

That has been our custom, and in the future we will adhere to this policy of giving each side its views.—Editor)

Code Class in Baltimore

Editor, SHORT WAVE CRAFT:

Will you kindly publish this in the next edition of your magazine.

"To all Baltimore persons who desire to learn the amateur radio code, please communicate with Marritt Kronberg, secretary of the Baltimore Amateur Radio Association. A code class will be formed if enough persons are interested."

I would appreciate your kindness greatly if you will publish this.

Respectively,
MARRITT L. KRONBERG,
5114 Cordelia Ave.,
Baltimore, Md.

(Glad to publish this good news. Hop to it, Boys! Here's a chance for all Baltimore Short Wave enthusiasts to learn the code.—Editor.)

Log of Stations Received On Super-Regenode

Editor, SHORT WAVE CRAFT:

The set was operated as a two tube set, because I broke the pentode by accident and haven't as yet obtained a new one.

The antenna used with this set is twenty-five feet long and is stretched between two rooms. The ground used is a steam heat radiator.

CLEMENT K. CHASE,
410 Oak Lane,
Wayne, Pa.

(My, that's a fine list of short wave stations that you received on Mr. Denton's Super-Regenode Receiver. We have had a great number of letters from our readers who built the Super-Regenode and who had phenomenal results with it. Your list of stations is certainly very imposing and shows what a little careful tuning and real study of a set will result in. (See list below.)—Editor.)

Call (U. S. Stations)	Location	Kilocycles	Wavelength	Dial Setting Left	Dial Setting Right	Coil
W1XAZ	Springfield, Mass.	9,570	31.33	55–47		2
W2XAF	Schenectady, N. Y.	9,530	31.48	56–47		2
W8XK	Pittsburgh, Penna.	6,140	48.83	46–35		3
W8XK	Pittsburgh, Penna.	11,880	25.24	24–11		2
W8XK	Pittsburgh, Penna.	15,210	19.72	56–49		1
W4XB	Miami, Florida	6,040	49.67	49–38		3
W9XF	Chicago, Ill.	6,100	49.15	48–35		3
W9XAA	Chicago, Ill.	6,080	49.31	48–38		3
WAEF	Newark Airport, N. J.	5,560	54.00	60–51		3
W3XAU	Philadelphia, Penna.	6,060	49.50	48–37		3
W3XAL	Bound Brook, N. J.	17,780	16.87	35–22		1
WCAU	Philadelphia (4th Harmonic)	.....	.....	20–05		4
(Foreign Stations)						
VE9GW	Bowmanville, Ontario	6,095	49.17	47–37		3
YV2BC	Caracas, Venezuela	6,000	49.97	48–38		3
FYA	Pontoise, France	11,750	25.53	27–09		2
FYA	Pontoise, France	11,905	25.16	24–10		2
FYA	Pontoise, France	15,240	19.68	56–48		1
G5SW	Cheimsford, England	11,750	25.55	25–12		2
GBU	Rugby, England	12,290	24.41	17–05		2
I2RO	Rome, Italy	11,820	25.40	25–12		2
DJB	Konigswusterhausen, Germany	15,210	19.72	56–49		1
VK2ME	Sydney, Australia	9,590	31.28	55–46		2
VK3ME	Melbourne, Australia	9,510	31.55	53–48		2
(U. S. Amateurs)						
W6CNE	Hollywood, Calif.	20 meters	.....	64–59		1
W2AIH	Peekskill, N. Y.	80 meters	.....	.....		4
W3AIF	Philadelphia, Penna.	80 meters	.....	.....		4
W3ALZ	Royerdford, Penna.	80 meters	.....	.....		4
W3CGW	Gladwyn, Penna.	80 meters	.....	.....		4

2-Tube Band-Spread set a Wow!

Editor, SHORT WAVE CRAFT:

I bought a copy of the February issue of SHORT WAVE CRAFT. It carried a 2-Tube A.C. Short-Wave Band-Spread set described by you. Well I built this set and here's the "S-O-C-K" it has: VE9GW, Bowmanville, Ont., Canada; KDKA, Pittsburgh; W9XF; W9XAH; W3XAL; W2XE; W3XAU; VE9DR, Drummondville, Quebec; XDA, Speaker, Mexico; YVQ, Maracay, Venezuela, testing (put phones in a pot and whole family heard them testing); FYA, Pontoise, France; GSA & GSB, Daventry, England; DJA, Konigswusterhausen, Germany; I2RO, Rome, Italy; and last but not least VQ7LO, Nairobi, Kenya Colony, British East Africa.

Oh Boy! What a man and what a set! If Mr. Doerle deserves a medal for his set, you certainly deserve three medals. You could not have described a better set. I built my set and have everything as described except that I have a Pilot condenser .00005 13 plate with 2 rotors taken out and 1 stator. Well, here's good luck and 73.

EDWARD SCHMEICHEL,
3001 Haynes Ct.,
Chicago, Illinois.

(Thanks a lot for your interesting letter, Edward, and we are mighty glad to know that you had such fine success in picking up distant stations on Mr. Shuart's 2-Tube A. C. Short-Wave "Band-Spread" Receiver, which was illustrated and described in the February issue. Mr. Shuart has had many years of experience in designing and constructing both broadcast and short-wave receivers, and you will find another very interesting and unusual short-wave receiver described by him in the last and present numbers—"The Band-Spread Short-Wave Converter." The editors feel particularly proud of this set, as the great "bug-a-boo" of most of the short-wave converters has been that they crowded the stations around the dial, especially on the amateur bands, but with a clever spark of genius Mr. Shuart has at last solved this problem and spread the bands over the dial on his new converter. We know you will be "tickled pink" with this new converter.—Editor.)

Finds Our "Coil Charts" Accurate

Editor, SHORT WAVE CRAFT:

I have been a diligent reader of the *best* magazine for short-wave work ever printed. In fact I am a proud reader and I pass the good news along. During the past year I have constructed about three sets and, by the way, they work satisfactorily.

In reading your magazine for March I have found just the thing I have been looking for, and that is the (graphic or chart) calculation of short-wave coils. I have checked the values of the graphs by mathematical calculations and found them very accurate. During the past few weeks I have found this same information in our library only in the form of mathematics. These graphs are sure a "short-cut" for one who cares little for the "math" that is involved. In the past I have calculated all the coils

(Continued on page 253)

See Important Announcement on Page 196

When to Listen In

By Robert Hertzberg

F. Maybarduk, 236 East 28th Street, Brooklyn, N. Y., reports as follows:

"Have verified WOU, ship to shore radiophone at Green Harbor, Mass., and find they operate on a frequency of 2590 kc. HJ3ABF, Bogota, Colombia, is on 45.25 meters. EAR125, Madrid, Spain, is on Sundays 5:00 to 6:00 p. m."

* * *

Another successful short-wave listener is K. J. Hallock, 3125 Rolla Place, St. Louis, Mo., whose recent letter is worth printing:

"I have picked up quite a number of short wave stations and have a few logged that I cannot find listed in any index of short wave stations. I get these stations consistently and am certain I have the proper information.

"RXF, Panama City, Panama, on 14.485 megacycles. This is a commercial phone to WNC at Hileah, Fla. I pick them up very good in the afternoons on this wave.

"HJB at Bogota, Colombia, S. A., on 14.940 mc. Another commercial phone to WNC in the afternoons mostly.

"YVQ at Maracay, Venezuela, S. A., on either 22.38 or 22.28 meters. Cannot distinguish between the 3 and 2. This is still another commercial phone to WNC. WNC on 15.055 mc. seems to be the key station for the above.

"Now I receive TI4NRH on 9.670 mc., located in Heredia, Republic of Costa Rica, after 4:00 p. m. C.S.T. Have you any information on OCJ at Lima, Peru, which is a phone to Santiago de Chile? I get them very good but have never heard them announce their wavelength.

"I have received a total of 56 short wave foreign broadcasters and will give you more information as soon as I am sure I have them all properly named and located as to frequency and time on the air."

Police Stations

Here are a number of changes in the police radio situation, as noted in the official statements of the Federal Radio Commission: KSW, City of Berkeley, Cal. Modification of license for change in frequency to 1712 kc. KGZQ, City of Waco, Texas. License covering construction permit for 1712 kc., 50 watts. KGZR, City of Salem, Ore. Granted police service license, 2442 kc., 25 watts. WPFY, City of Yonkers, N. Y. Granted construction permit for police service, 2414 kc., 100 watts. WPDM, City of Dayton, Ohio. Granted modification of license to increase power from 150 to 400 watts. W3XU, City of Philadelphia, Pa. Granted license, special experimental mobile, initial location Philadelphia, 2470 kc., 50 watts. WPEM, City of Birmingham, Ala. Granted license, police service, 2414 kc., 150 watts.

Owners of ultra-short-wave receivers should not be surprised if they hear police alarms in the five-meter region. The Federal Radio Commission has granted experimental licenses to a number of cities for mobile stations in police vehicles, the idea being to determine the feasibility of rapid inter-communication for emergency police service. This is in line with some predictions made several months ago in SHORT WAVE CRAFT.

Television Activity at Last?

The Atlantic Broadcasting Corporation of New York, N. Y., which is the license-holding unit of the Columbia Broadcasting System, has obtained a renewal of its visual broadcasting license for 43-46, 48.5-50.3, and 60-80 megacycles, under the call letters W2XAX. We wonder if this means a revival in television broadcasting, which at the present time is exceedingly limited.

Another South Pole Expedition?

Although nothing about the matter has appeared in the newspapers, we place great significance on the application of F. E. Meinholtz, of New York, for a whole mess of portable licenses, initial location ANTARCTICA! Fred Meinholtz happens to be in charge of the radio activities of the New York Times, and handled most of the radio traffic of the first Byrd Antarctic Expedition. Possibly this means that plans for

another great trek into the South Polar wastes are quietly under way.

A subsequent release from the Federal Radio Commission states that the application has been granted. The terms of the grant are very interesting, so we quote them as follows:

Granted CP, Private Coastal, Coastal telg. service, freq.: Calling—500, 3105, 4140, 5520, 6210, 8280, 11040, 12420, 16560 and 22080 kc. Working—457, 3115, 4150, 5515, 6230, 8300, 11025, 12450 and 16580 kc., 15 watts. Also granted 1 year license covering CP.

Granted same as above, except freqs.: Calling—3105, 4140, 5520, 6210, 8280, 11040, 12420, 16560 and 22080 kc. Working—3115, 4150, 5515, 6230, 8300, 11025, 12450 and 16580 kc.; power 500 watts. To communicate primarily with mobile station WHD in New York; Antarctica land stations, and with maritime mobile stations, and 2nd with amateur stations provided no interference is caused to commercial communication. Also Granted 1 year license covering CP.

Granted Aviation license, freqs.: Calling 500, 3105, 4140, 5520, 6210, 8280, 11040, 12420, 16560 and 22080 kc.; working—457, 3115, 4150, 5515, 6230, 8300, 11025, 12450 and 16580 kc.; 100 watts.

More About Friend Cespedes

"Believing that the following will be of interest to a great number of your readers, I am taking the liberty of writing you.

"I have just received a letter of verification from the 'World's smallest broadcasting station,' TI4NRH, Heredia, Costa Rica, in which the owner, Senor Amando Cespedes Marin, states his new hours on the air. He also encloses a 'Certificate of Reception,' very elaborate, and to the collectors of verifications, worth writing for. I quote the following from his letter to me:

'TI4NRH, Heredia, Costa Rica, is working for fun ever since May 4th, 1928, day in and day out, and with 7½ watts did conquer the whole world; from Alaska to Argentine, from Australia to Africa."

'It is working now every afternoon from 4:30 to 5:30 p. m. Central Standard Time, (like in Chicago), and on Sundays from 4:30 to 6:00 p. m., with local talent and beautiful Spanish music."

'Power is now 150 watts; wavelength is 31 meters, in mid-ocean, hi hi hi, or between Schenectady and Madrid in your dials."

'Thanking you for your noble report, and wishing you to advise friends about us, I have the pleasure to sign me,

Yours sincerely,
Cespedes.'

"Hoping that the foregoing may be of assistance in compiling the 'best short-wave station list in the world, (and that is my opinion of SHORT WAVE CRAFT'S list), I am,

Very truly yours,
Edward Kroeger,
3711 Laclede Ave.,
Cincinnati, Ohio.

Letters from S-W Fans

(Continued from page 251)

that I have used in my sets, without the use of graphs. Now that I have the "short-cut" I will make use of them in conjunction with mathematics.

Yours very truly,
ADOLPH ARENDT,
3637 E. Willis Ave.,
Detroit, Mich.

(You are a man after our own hearts, Adolph, for we have always been very rabid when it comes to anything like short-wave inductance and capacity curves. We used to do a lot of higher mathematics, mixed up with a few "logs" and lengthy inductance formulas, but as you say in your letter, all one has to do now is to refer to Mr. Denton's excellent direct-reading charts, published in the March number, and solve his problems without perspiring over a lot of tricky equations.—Editor.)

The "Supertone" 4-Tube A. C. Receiver

(Continued from page 216)

variable condenser connected between the R.F. choke and ground, the second regeneration control being the 25,000 ohm potentiometer, the arm of which connects to the shield grid of the 57 detector tube.

The output from the detector stage is resistance coupled as shown into the first audio stage which uses a 56 tube. This tube is biased by a 2,000 ohm resistor shunted by a 1 mf. condenser. Out of this first audio tube we pass into a resistance-coupled network, and once more into the grid of the output stage tube, which is a 2A5. 250 volts B plus plate supply is applied to the screen-grid and plate of the 2A5, through the loud speaker transformer as shown in the diagram.

Both the R.F. and detector stages are tuned by means of .00014 mf. variable condensers and standard plug-in coils, which have been described many times in this journal, as well as the present number, can be used with them. The antenna stage utilizes a 4-pin base coil having two windings on it; the detector stage employs a 6-pin base coil, having three windings on it, a primary, secondary, and tickler winding. A wavelength range from 15 to 200 meters is thus made available by the use of these coils, which can be easily purchased on the market or wound from data given in this as well as past numbers of SHORT WAVE CRAFT. The potentiometer used to regulate the voltage applied to the screen grid of the detector besides acting as a regeneration auxiliary control, also serves the useful purpose of a *volume leveler*. The R.F. choke used in the plate circuit of the detector may be one of the Hammarlund type, the new 10 MH., size being all right. If *motor-boating* should result a lower value of grid resistors in the audio circuit may be used than those shown. If *motor-boating* occurs one may also try using lower value plate resistors in the resistance-loaded plate circuits. Note that the 400 ohm biasing resistor for the 2A5 output tube is shunted by a high capacity electrolytic condenser, having 20 mf.

Power Supply Unit Details

A great deal of experimenting was done on not only the placement but also the make-up of the plate supply unit, and as the diagram shows it is very simple in its make-up. As a protection against *tunable hums* being transferred through the power transformer from the 110 volt A.C. 60 cycle supply circuit, 0.1 mf. condensers are connected from either side of the 110 volt primary circuit to ground.

One of the most usual sources of hum, whenever an A.C. operated plate supply unit is employed, lies in the filter circuit; in the particular filter network two 30 henry iron-core chokes are used together with the field winding on the loud speaker as an additional inductance to smooth out the rectified current. As but two plate voltages, 45 and 250 volts respectively, are necessary for operating this set, two resistors, one of 3000 and one of 30,000 ohms, only are required to form the voltage divider. Three liberal sized electrolytic condensers are used in the high voltage filter, two of 8 mf. each and one of 16 mf. No condenser is used between the B minus side of the filter and the juncture between the speaker field winding and the 30 henry choke.

List of Parts

COILS:
One set of UX-base short-wave plug-in coils, four coils to a set. (See page 213.)
One set of six-pin, three-winding, plug-in coils, four coils to a set. (See page 213.)
One Hammarlund radio-frequency choke coil.

CONDENSERS:
Three Hammarlund 0.00014 mf. tuning condensers.
Six 0.01 mf. condensers.
One 1 mf. bypass condenser.
One 20 mf. electrolytic bypass condenser.
One 0.0001 mf. grid condenser.

RESISTORS:
Two 400-ohm pigtail resistors.
One 0.1 meg. pigtail resistor.
One 2 meg. pigtail resistor.
Two 0.25 meg. pigtail resistors.
Two 0.5 meg. pigtail resistors.
All above resistors are 1 watt.
One 25,000 ohm potentiometer.

OTHER REQUIREMENTS:
Four six-pin and two UY sockets (extra UY is for voltage cable, extra six-pin per coil; one UX socket, for other coil).
One dynamic speaker for 2A5 output, with output transformer "built in;" field coil, 1,800 ohms. Cone diameter is 6 inches.
One chassis.
Two vernier dials.
Two knobs.
Two tube shields and bases.

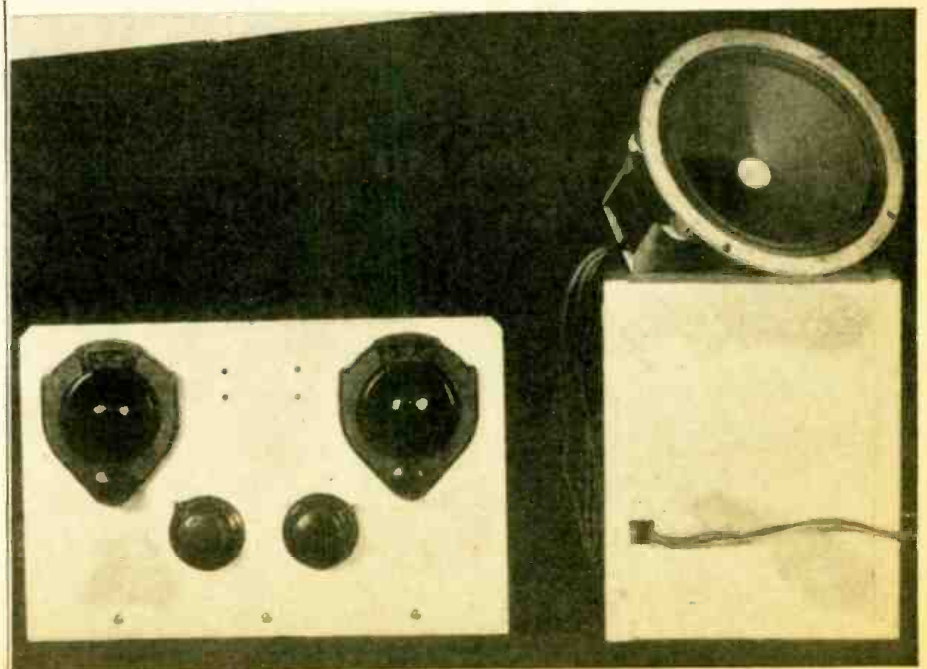


Photo showing front panel of Receiver at left; at right speaker and power supply.

One 58, one 57, one 56 and one 2A5 tubes.
One front panel.

List of Parts for Power Supply Unit

COILS:
One power transformer.
Two 30-henry B chokes.
(Field coil in speaker is listed under receiver parts.)

CONDENSERS:
Two 0.1 mf. condensers (not electrolytic).
Two 8 mf. electrolytic condensers.
One 16 mf. electrolytic condenser.

RESISTORS:
Two 30,000 ohms (0.03 meg.) pigtail resistors, 1 watt.

OTHER REQUIREMENTS:
One A.C. cable and plug.
One output cable and UY plug. (Grey grid, 45 volts; Brown cathode, B minus; yellow plate, maximum B voltage; H and H, 2.5 volts A.C.)
One chassis.
One shield box for chassis.
Two UY sockets (for speaker and voltage supply) and one UX socket (for rectifier).
One 280 tube.

S-W Signals from Interstellar Space

(Continued from page 199)

will see that this continual shifting of the stars must occur, because while the earth turns over 365 times a year, with respect to the sun, its revolution around the sun makes it turn an additional rotation with respect to the background of the stars. So that really the earth revolves 366 times with respect to the universe of stars. And so each day all the stars appear to rise one 366th of a day earlier, or 4 minutes earlier than the day before.

"Evidently then, the radio waves or hiss Mr. Jansky was picking up was coming from some definite spot in the sky of stars, entirely independent of the sun's changing position among the stars. The instruments were detecting a stream of radio coming from some fixed point in the universe of stars, outside of the earth, the sun or the solar system—*radio impulses from the stars themselves!*"

The Official Dope on Experimental Stations

(Continued from page 234)

315. Special experimental stations may be licensed only on frequencies other than those allocated for use by general experimental stations and only for special purposes under exceptional circumstances, provided:

a. Such purposes are fully stated by the applicant in his application.

b. A satisfactory showing is made that the general experimental frequencies are unsuitable.

c. The applicant accepts the license with the express understanding that the authority to use the frequency or frequencies may be canceled without advance notice or hearing in case interference is caused to the commercial use of the frequency.

d. In any case where there is possibility of interference with the regular service on the frequency sought to be used experimentally, the applicant shall submit with his application a statement from the licensee on such frequency, or in case of a frequency on which transmissions are received in the United States a statement from the one receiving on that frequency, that there is no objection on his part to the special experimental use of the frequency.

320. General and special experimental stations may be used only for experimental purposes. They shall not be used to conduct general message traffic of any kind, to transmit regular programs for direct entertainment, to rebroadcast the programs of any other station, or to render any commercial communication service or communications involving advertising, either directly or indirectly.

.... SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE ....

THE following list of short wave essentials has been prepared from the suggestions to the LEAGUE by its members. A number of months were consumed in creating these short wave essentials for members of the SHORT WAVE LEAGUE. All essentials listed are approved by headquarters of the 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.**

One of the aspirations of the SHORT WAVE LEAGUE is to enhance the standing of those engaged in short waves. To this end, the SHORT WAVE LEAGUE supplies members with membership letterheads and other essentials. 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 and handling charges.

Another consideration which greatly benefits members is that they 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. The radio industry realizes that, the more earnest workers there are who boost short waves, the more radio business will result therefrom; and a goodly portion of the radio industry is willing, for this reason, to assist SHORT WAVE LEAGUE members by placing them on a professional basis.

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

All the essentials listed on this page are never sold to outsiders. 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.).

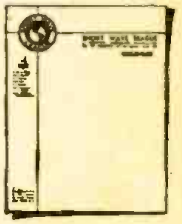
If, therefore, you order any of the short wave essentials without filling out the blank (unless you already enrolled as a LEAGUE member), your money will be returned to you.

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

SHORT WAVE LEAGUE LETTERHEADS

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

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



A—50c per 100

OFFICIAL SHORT WAVE LEAGUE LOG AND CALL BOOK

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

B—Official Log and Call Book ..... 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.

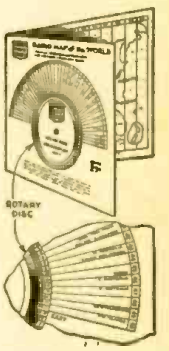
E—SHORT WAVE LEAGUE lapel button ..... Prepaid **35c**

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

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**



C—25c each

SHORT WAVE MAP OF THE WORLD

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

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

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

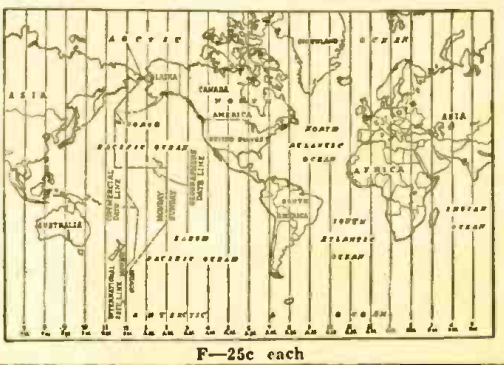
Send all orders for short wave essentials to SHORT WAVE LEAGUE, 98 Park Place, New York City.

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

SHORT WAVE LEAGUE, 98 Park Place, New York, N. Y.

D—$1.25 each

G—15c for 25



F—25c each

E—35c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE (8-33)
98 Park Place, 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, 98 Park Place, New York, N. Y.
Gentlemen:
I am already an enrolled member in the SHORT WAVE LEAGUE ☐
I am a new member and attach my application to this coupon ☐
Please send me the following short wave essentials as listed in this advertisement:

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for which I enclose $..... herewith.
(The LEAGUE accepts money order, cash or new U. S. Stamps in any denomination. Register cash and stamps.)

Name .....
Address .....
(8-33) City and State .....
Country .....

The
NATIONAL
Seven-Tube
Short Wave
Superheterodyne

Incorporating many features usually found only in commercial receivers, the FB-7 anticipates the requirements of even the most advanced enthusiast. Tremendous sensitivity is taken for granted in modern short-wave receivers, but such vital features as stability, high signal-to-noise ratio, true-tracking and strictly single control tuning make the FB-7 outstanding. Write for a complete description of this remarkable receiver, then go to your dealers and compare it with any other receiver.

NATIONAL COMPANY, Inc., Malden, Mass.

FB-7

TWO WINNERS!

We *Specialize* in *Manufacturing* the *Latest Type*

RADIO TUBES

Leading Tubes for Short Wave Receivers

Type		Volts		Amps.
2A3	Power Amplifier Triode	2.5	AC or DC	2.5
2A5	Power Amplifier Pentode	2.5	AC or DC	1.75
2A6	Detector Diode Triode	2.5	AC or DC	.8
2A7	Pentagrid Converter	2.5	AC or DC	0.8
2B7	Duplex Diode Pentode	2.5	AC or DC	0.8
5Z3	Full Wave Rectifier	5.	AC	3.
6A4	Amplifier Pentode	6.3	AC or DC	.3
6A7	Pentagrid Converter	6.3	AC or DC	0.3
6B7	Duplex Diode Triode	6.3	AC or DC	0.3
12Z3	Half Wave Rectifier	12.6	AC or DC	.3
25Z5	Rectifier Doubler	25.	AC or DC	0.3
30	Detector Amplifier	2.	DC	0.06
31	Amplifier	2.	DC	0.13
32	R. F. Amplifier S. G.	2.	DC	0.06
33	Amplifier Pentode	2.	DC	0.26
56	Triode Amplifier Detector	2.5	AC or DC	1.0
57	Amplifier Detector S. G.	2.5	AC or DC	1.0
58	Control Amplifier S. G.	2.5	AC or DC	1.0
59	Amplifier 3 Grid	2.5	AC or DC	2.0
77	3 Grid Detector Amplifier	6.3	AC or DC	0.3
78	3 Grid Control Amplifier	6.3	AC or DC	0.3
80	Full Wave Rectifier	5.	AC	2.
82	Full Wave Rect. Mer. Vap.	2.5	AC	3.
83	Full Wave Rect. Mer. Vap.	5.	AC	3.

We make *all* tubes which are *needed* for replacement in *millions of sets in daily use.*

You can order these tubes of *your local dealer* who may obtain them through their jobbers. Providing you cannot obtain these tubes from your local distributor write us direct for prices or location of our nearest agency.

All tubes manufactured by us are unconditionally guaranteed.

Write for our circular, prepared by competent engineers which will give you valuable technical information regarding the various types of tubes now being used. Don't delay. Get educated on the most important part of your radio set.

Gold Seal Manufacturing Co., Inc.

East Newark, N. J.

The Oldest Licensed Tube Manufacturers Under R. C. A. Patents