THE RADIO EXPERIMENTER'S MAGAZINE

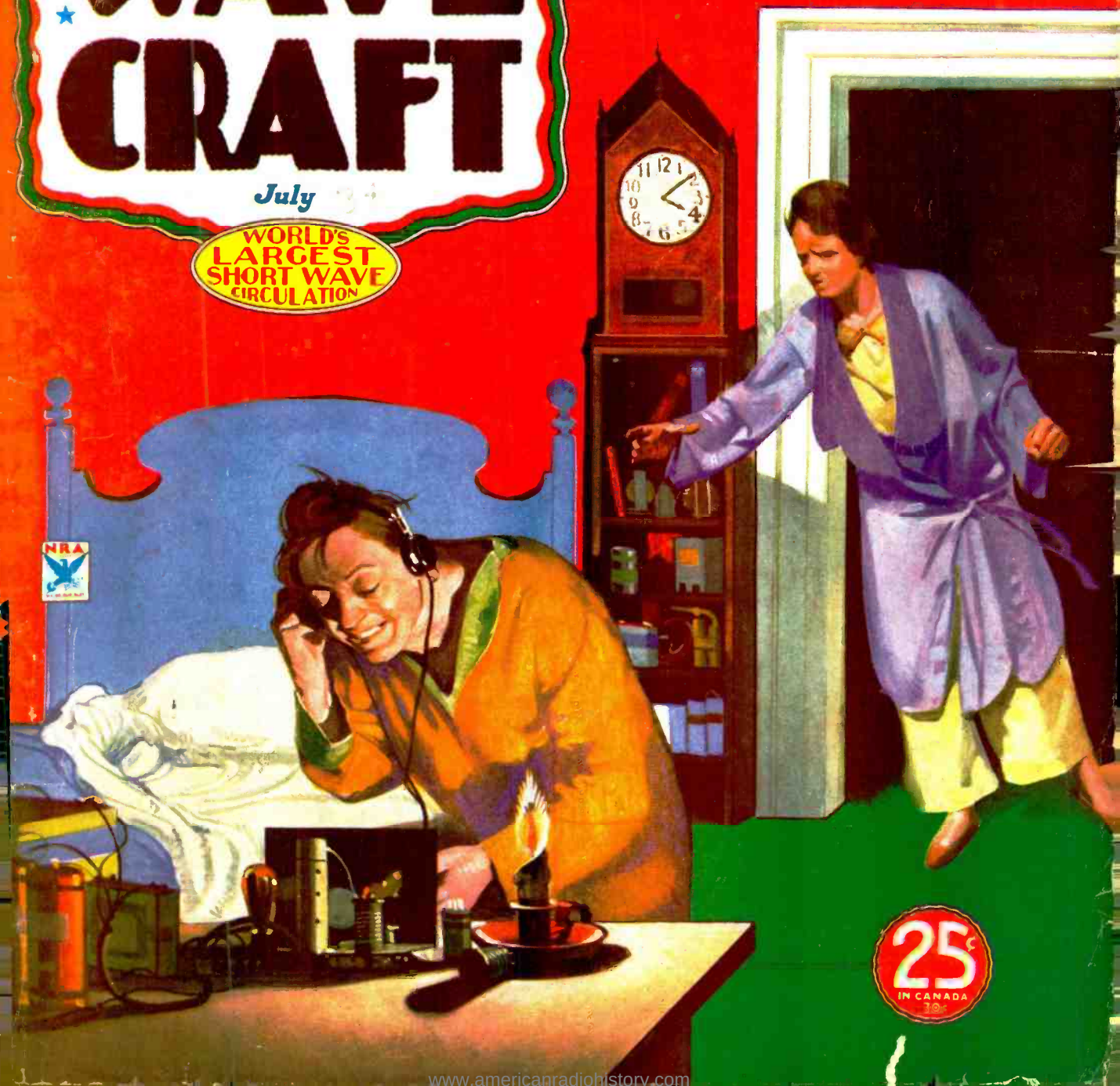
HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

July

WORLD'S LARGEST SHORT WAVE CIRCULATION

"AUSTRALIA at 4 A. M."



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Special set of headphones..... .95

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National Radio Institute,
Department 4GB3, Washington, D. C.

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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Denton . Shuart . Mayo . Carter . Victor . Palmer

HUGO GERNSBACK
Editor

SHORT WAVE CRAFT

H. WINFIELD SECOR
Managing Editor

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The Improved "Bear-Cat" 5-Meter Receiver, by Clifford E. Denton.

A 2-Tube Self-Powered "Booster" for any Short-Wave Receiver, by George W. Shuart, W2AMN.

Latest "Plugless" Short-Wave Receiver.

A Crystal-Control "Portable" Transmitter of High Quality and Low Cost.

My Idea of a Good Battery "All-Wave" Portable, by Mander Barnett.

A Low-Cost Power Supply for the S.W. Receiver, by Leonard Victor.

A Dandy 4-Tuber for "Beginner" or "Old-Timer," by J. Caleb Phipps...

Certified Circuits

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

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

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

OUR COVER

● THE subject for our cover illustration this month shows a "critical moment" which happens in the lifetime of every young "dyed-in-the-wool" Short-Wave "Fan"—and who among us, who have been really bitten by the short-wave "bug"—have not at one time or another gotten up at 4 A.M. in the morn to be thrilled by hearing the call of Australia—the famous Kookaburra.

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say these Short Wave fans—

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It was well worth waiting for.

Many thanks.

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

"WOULDN'T TAKE $10.00 FOR IT"

Gentlemen:—

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

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

Very truly yours,
(s) LOUIS SCHMADEBECK,
Beaver Dam, Wis.

"WORTH MORE THAN YOU ASK FOR IT"

Dear Mr. Gernsback:

I am in receipt of the 1934 OFFICIAL SHORT WAVE RADIO MANUAL, and wish to state after looking it over I think it is one of the finest Manuals I ever saw published on Short Waves, and I certainly wish to congratulate you on your effort of compiling such a fine Manual. It is sure filled full of good Radio Material, and I am proud of my Manual.

It is worth quite a bit more than what you ask for it.

FERREL THOMAS,
1328 Locust Street,
St. Louis, Mo.

"GLAD TO OWN ONE"

Gentlemen:—

I received my "SHORT WAVE RADIO MANUAL" and it is a real joy to read and study the book. I waited long for it, but it was worth waiting for.

I am introducing it around to all of my friends, and I am glad to own one of these books.

Yours respectfully,
(s) VINCENT KRAJNAK,
100 West 119th Street,
New York City.

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

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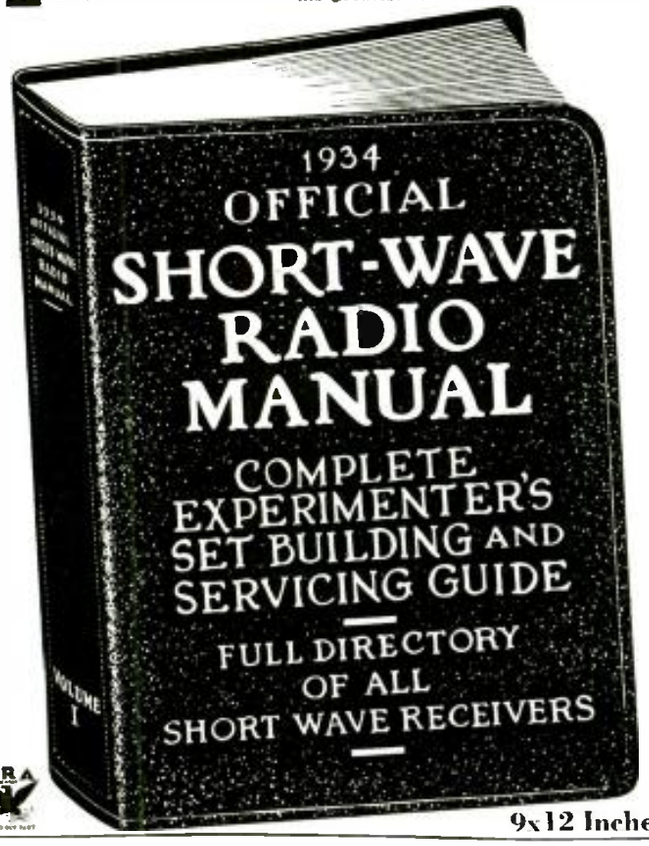
It is a big book in which you will find everything on short waves, regardless of what it might be. It is not only a complete manual, but a veritable encyclopedia of facts, information, hookups and illustrations. Lack of space does not permit a complete description of this comprehensive volume.

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

$2.50 List



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15 VALUABLE FEATURES

- A large section featuring the most important Short-Wave Receivers and how to construct them.
- Short-Wave Transmitters in all their phases.
- A complete Ultra Short-Wave Section featuring construction of 1, 3, 5 and 10 meter receivers.
- A complete Short-Wave Beginner's section. These vary from 1 to 7 tube receivers.
- A section devoted exclusively to coil winding with all information about it.
- A section on Commercial Short-Wave Receivers. Every important commercial receiver, including all-wave sets, is represented. **Full servicing data is included which makes it invaluable for Service Men.**
- A section devoted to A.C. Short-Wave Power Packs and how to build them.
- A section for the Short-Wave Experimenter and short-wave kinks—hundreds of them.
- A section on the important new art of Short-Wave Therapy (treatment of diseases by short waves).
- A section devoted to Short-Wave Converters and their construction. Full servicing data on all commercial models is included.
- A special section on Short-Wave Antennae and noise eliminating procedures.
- A section on Short-Wave Superheterodynes. This section tells how to build them, including many commercial models of receivers. The latter with complete service data.
- A section on Amateur 'Phone Transmitters and how to build them.
- A Short-Wave Physics section on theoretical short-wave data for the advanced experimenter and radio student.
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Gentlemen: I enclose herewith my remittance of $2.50 for which you are to send me, POSTAGE PREPAID, One Copy of the 1934 OFFICIAL SHORT-WAVE RADIO MANUAL. (Send remittance in check or money order. Register letter if it contains cash, stamps or currency.)

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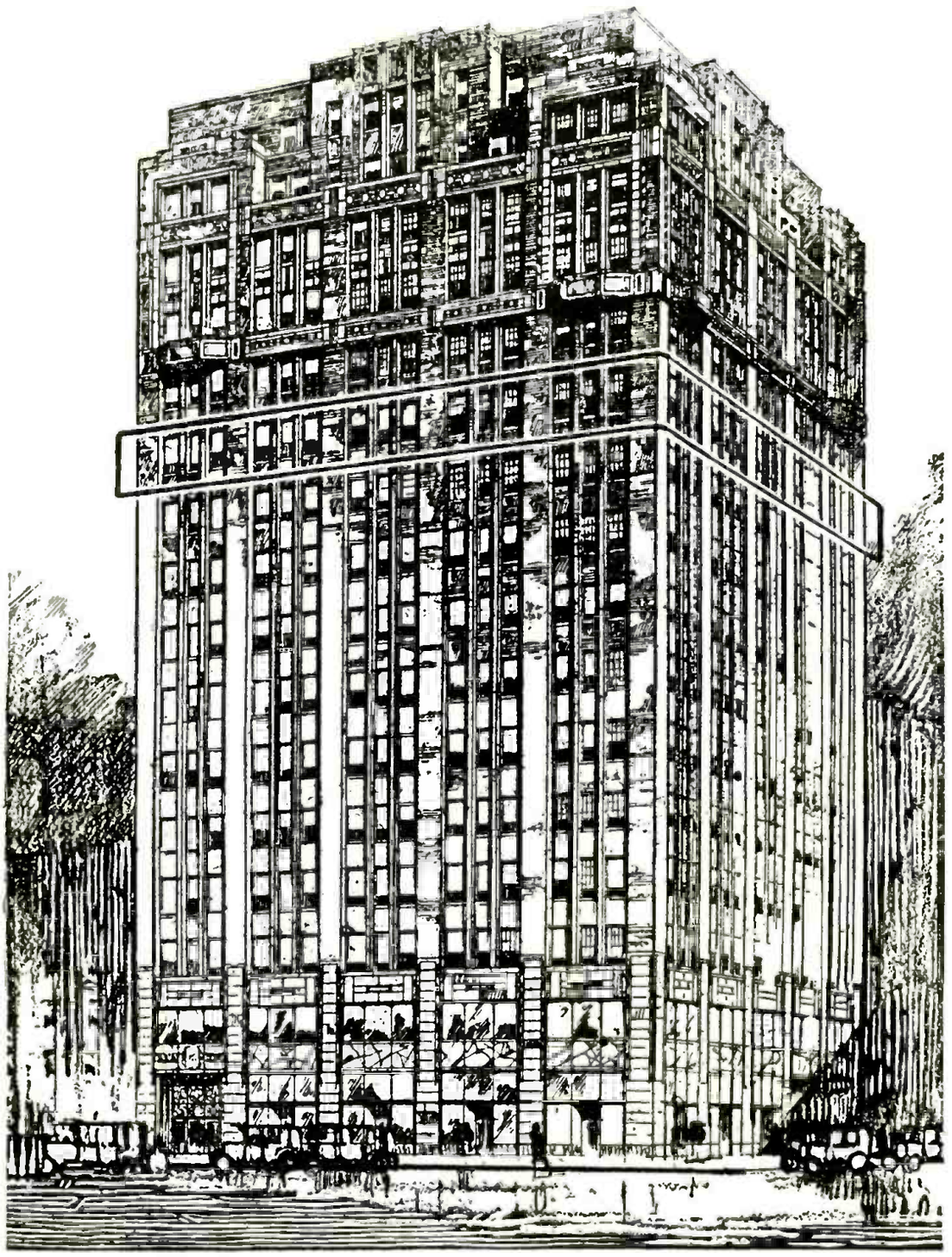
OUR NEW HOME



DUE to the rapid expansion of our business, we were obliged to seek larger quarters. We have leased the *entire eleventh floor* in the seventeen story building located at 99-101 Hudson Street, corner Franklin, New York City. The size of the floor is 100x100—10,000 square feet of space.

The increased space will give us the opportunity to carry out *important developments* that we had in mind for the past two years, and which will *greatly enhance the value of your magazine.*

We wish to thank our readers and advertisers for their generous support, which made this move possible. When in New York, may we have the pleasure of your visit?

SHORT WAVE CRAFT,
Hugo Gernsback, Publisher.

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Short Wave Entertainment

A Primer for Short Wave Beginners

An Editorial By HUGO GERNSBACK

● A GENTLEMAN who has been a reader of SHORT WAVE CRAFT for some little time, recently built a short-wave set described in the pages of this magazine, and after it was all finished, he wrote a letter to the writer and wished to know whether it is possible that with a short-wave set music and speech can be received from European and other foreign countries, or whether the set is only good to receive code!

This may sound laughable, to most of our short-wave readers. The trouble is not with the reader, but perhaps more with ourselves. Hence, this article has been written in the hope of acquainting newcomers to short-waves what it is all about.

Remember, that one-half of the world never knows what the other half is doing, and that the thing which is most commonplace to us, may be of great perplexity to the other fellow who never knew anything about it. The telephone switchboard operator works the board almost automatically, without thought. It has become commonplace with her. The efficient stenographer operates her typewriter automatically or subconsciously; it has become commonplace with her. But the other fellow, who is neither a switchboard operator nor a stenographer, will find it very intricate simply because he doesn't know anything about it.

Exactly so with short-waves. The fundamentals of short-waves, in simple language, may be stated thus:

Assume that you are sitting at the shore of a lake. A breeze makes a wave motion in it. Throw a cork on the water and it will bob up and down, riding on the waves. In radio, we have the same thing. A radio station sends out a wave. The plain waves cannot be heard on the loudspeaker or head phones. If, now, we *superimpose* upon the wave a "cork" (from our water analogy) then, we begin to hear something in our loudspeakers.

The cork, in this case, may be dots and dashes, or it may be speech, music or what not. The radio engineer calls this *modulating* the radio wave. When radio first started, we had only dots and dashes These were heard in the phones as long and short buzzes. We still hear them today, because long and short waves still carry *code* dots and dashes. Then broadcasting came along, and our "cork" in this instance became *speech, music, singing,* etc. The waveband that broadcasting embraces is from 200 to 545 meters, in this country. Short waves, the ones the average "fan" is interested in, run from 200 meters down to about 15 meters. On these short waves, too, we have speech, music, and other forms of entertainment.

For all practical purposes, it might be said that nowadays the *broadcast* range really extends from 15 meters to 545 meters.

The large set manufacturers have lately recognized this truth, and are now putting out so-called "All-Wave" sets, which tune from 15 meters to 545 meters. In this range, you receive every impulse that is put out on the radio waves, i.e., all the entertainment features It embraces, therefore, not only broadcast entertainment, intelligible to anyone, but also the following, which are not intelligible. These comprise ordinary code, such as Morse code, and International code—the so-called dots and dashes. These are usually transmitted into space by tapping a key by hand. Next, we have "machine" transmission where, instead of using the hand and key method, a punched tape with holes is fed through a high-speed transmitter. This is also dots and dashes, but is much more rapid. Next, we have a wholly unintelligible signal, such as are radiated by the Radio Corporation of America. This is used in sending impulses through space for picture transmission. It is usually done on the short waves. These are various dots and dashes of different time duration, and they give a peculiar sound on your loudspeaker. When received at the receiving station, these peculiar dots and dashes are caused to blow vaporized ink in a fine modulated jet, on to a sheet of paper wrapped around a cylinder. When the message is finished, we have a surprisingly good reproduction of a photograph.

Next in order of the unintelligible signal is a sort of *gibberish* across which every short-wave listener runs every so often. This gibberish is recognized as speech of some kind *but it cannot be understood.* It is so-called *inverted* speech. It is secret talk flashed across the Atlantic Ocean in Trans-Atlantic telephony. Special radio apparatus are necessary to reconstruct this inverted speech in order to make it intelligible to the listener. The arrangement is secret and requires special apparatus not available to the general public.

Next in order we have a high pitched whining noise that rises and falls in a peculiar crescendo. These are television impulses, and once heard are never forgotten.

Next, we come to the intelligible signals, which are music, speech, and all sorts of vocal and instrumental entertainment. We listen to these nowadays by means of our short-wave sets, as well as our broadcast sets.

From this, it will be seen that the normal short-wave set can, and does, receive ALL the signals enumerated above.

The one thing that the average short-wave beginner does not appreciate is that the tuning of short-wave sets is more difficult than broadcast sets. This difficulty lies solely in handling the tuning controls. You must have a fine hand to tune short waves. Look at this letter—I—; the width of this letter is very narrow. Yet, in this width—less than 1-64"—may be three or four short wave stations, all crowded together in this narrow space. From this, it becomes apparent how careful we must tune, because the merest motion of a hundredth of an inch is enough to throw "out" or "in" a distant station.

Success in short-wave reception lies in CAREFUL TUNING!

SHORT WAVE CRAFT IS PUBLISHED ON THE 5th OF EVERY MONTH

This is the July, 1934, Issue—Vol. V, No. 3. The next Issue Comes Out July 5th

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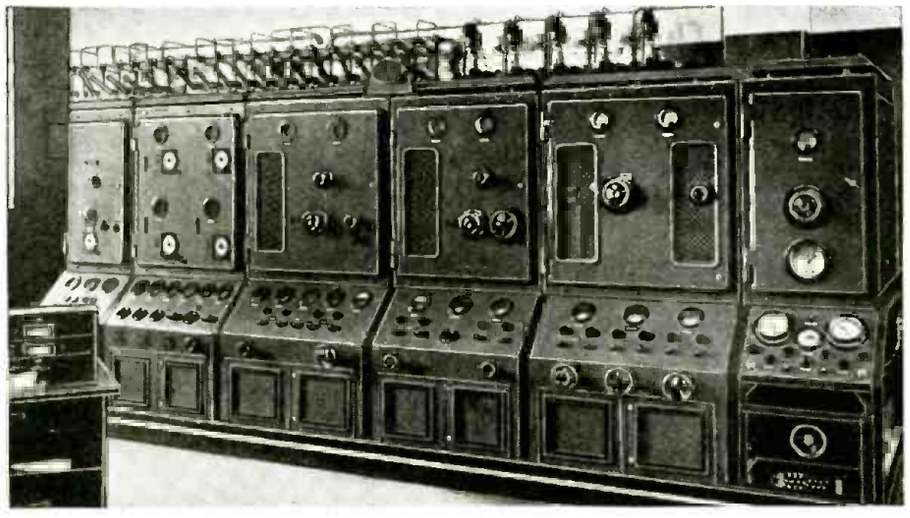
ZEESEN—Germany's Short

By KARL TETZNER
(Leipzig)



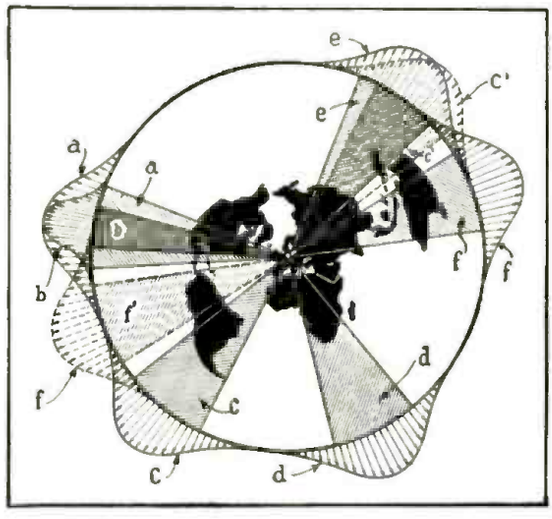
Above—Appearance of the new high-efficiency, short-wave transmitter at Zeesen, rated at 20 kw. power.

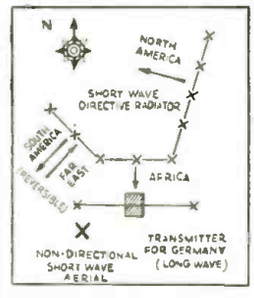
● EVERY real short-wave fan has heard the programs broadcast by the German world-wide broadcasting station at Zeesen. Like those of the British Empire Stations and the transmitter at Madrid (EAQ) the programs from Zeesen are well known to listeners in the countries overseas.

Many zealous "fans" will undoubtedly remember hearing the old transmitting station at Königswusterhausen, which was built in 1929; at first transmission was carried on with a single dipole aerial. (See photo of old transmitter.) The energy used, even at that time, was 20 kilowatts. In 1931 an experimental *directional* antenna to North America was tested.

The new transmitter shows some remarkable technical details (see photo). It was built toward the end of 1933 by the C. Lorenz Company, according to plans made by a commission of the Reichsrundfunkgesellschaft, and made Zeesen (together with the new type *directional* antennas) one of the most modern short-wave broadcasting stations to be found anywhere

The transmitter line-up is arranged in eight stages: Stage one is the master oscillator. The element which determines the frequency is quartz crystal. As is well known the frequency of quartz crystals is dependent somewhat on the temperature surrounding them; the oscillator stage—the output of which is only 0.1 watt, was put into a thermostat controlled "oven" and kept always at a temperature of 55 degrees Cels. The holder of the crystal is variable, it permitted deviations of plus and minus 2,000 cycles; the deviation of the wavelength or frequency can be read off directly on a dial. The following stages, numbers two to five, are amplifier stages.



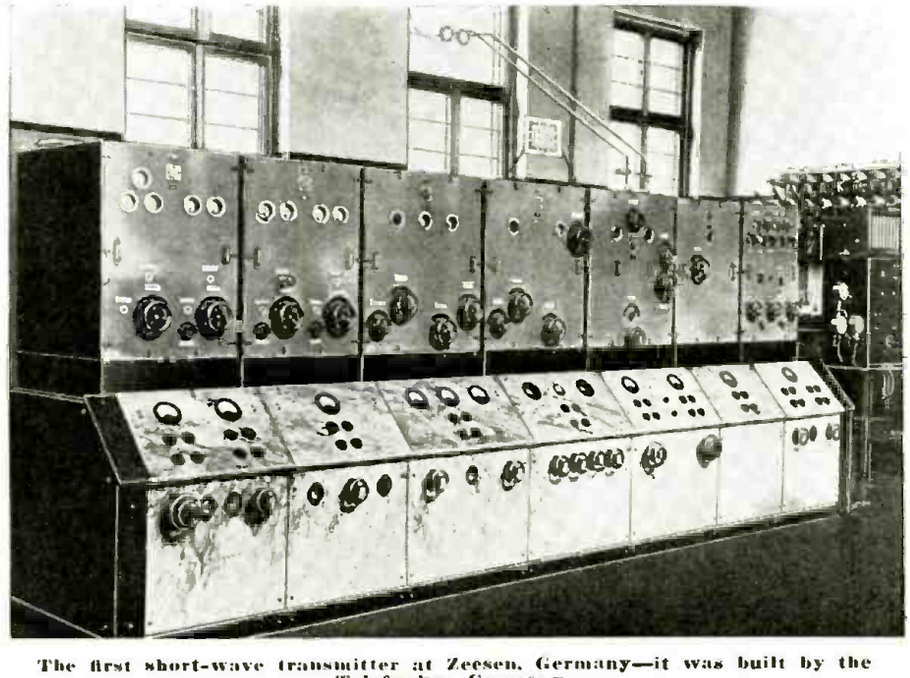


The directional antenna map at left shows the various beams broadcast from the Zeesen station in the direction of North and South America, Africa, Australia, and the Far East. Above: Plan of directive short-wave antennas at Zeesen.

The output of the stages is: Stage 2—0.5 watt, in stage 3 it is 1.5 watts; in stage 4 the output increases to 10 watts and in stage 5 it goes up to 100 watts. The following stage, No. 6, is a multiplying-stage, in which the output reaches 250 watts. In both final stages of the transmitter, the amplification has gone up to 20 kilowatts. This last stage, the power transmitter proper, has water-cooled tubes. The heating current for them is taken from a 40-volt generator and the tubes work with a plate potential of 8,000 volts. The cooling water is taken from a special pump-station, and is checked four times. First the water temperature is measured as it enters the tubes; second the water pressure is read; third the operator observes the water temperature at the exhaust, and fourth the water is optically examined.

The wavelengths or frequencies of the station at Zeesen are now well-known. They are: 49.824 m., 31.381 m., 25.510 m., and 19.737 m. In the sixth stage the oscillator wave will multiply in the proportion 1 to 2 or 1 to 3. This results in a wave-range of the transmitter from 5,000 to 20,000 kc. (60 to 15 meters).

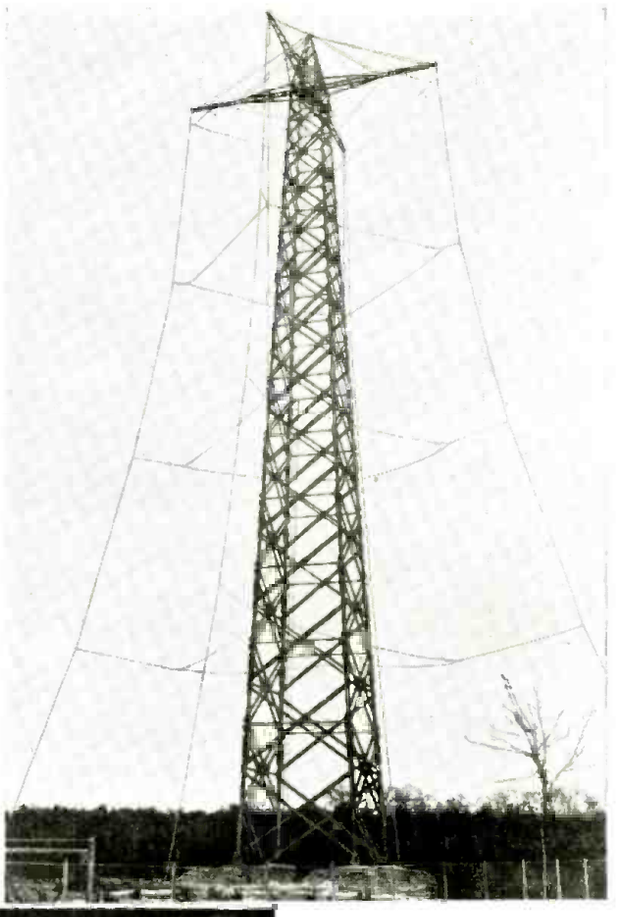
There was erected a completely new style of transmitter building. The casing box or cubicle of the transmitter was built of duralumin and as we see in the photo of the transmitter, it is easy to open the transmitter cabinet after having folded down the front and also



The first short-wave transmitter at Zeesen, Germany—it was built by the Telefunken Company.

Wave VOICE

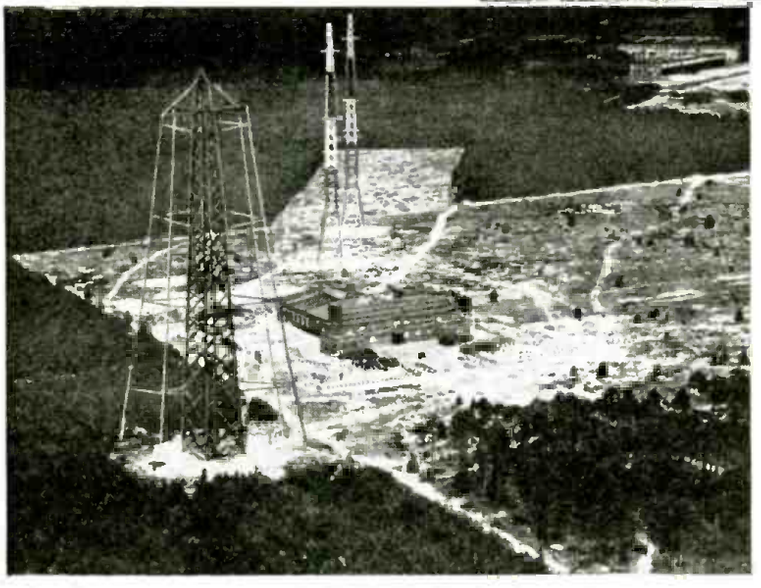
American short-wave "fans" have reported excellent reception of symphony orchestras and other musical, as well as vocal programs transmitted from the powerful German short-wave station located at Zeesen. With their customary thoroughness the German technicians have developed the transmitting apparatus and antenna system used at Zeesen to a very high degree of efficiency, which accounts, of course, for the excellent strength and quality of the programs heard in America and other countries as well. The new Zeesen transmitter is rated at 20 kw. and a signal having a strength corresponding to a much more powerful station is broadcast in specific directions by utilizing special directional antennas. In fact the gain in field strength at a given receiving station is from 4 to 6 times as compared with reception from the ordinary antenna, which radiates in all directions.



the back. It is possible therefore to repair the transmitter very quickly; also one can change the wavelength easily by changing the coils. When it is necessary, one is able to use any other wavelength than the four pre-arranged standard frequencies.

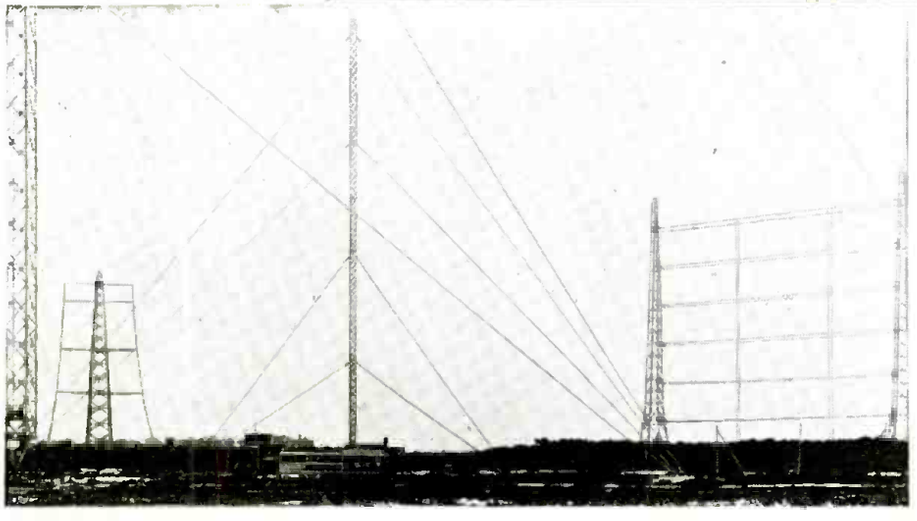
Still more interesting than the transmitter itself perhaps are the directional antennas employed. At Zeesen the engineers soon departed from the usual dipole antenna, which radiates the energy equally in all directions Soon after opening the first short-wave broadcasting station at Zeesen, there was built up the round-radiation antenna (Rundstrahler), see photograph, which was used up till the end of 1933; it is also utilized here and there today. By adjusting or placing 4 dipoles one upon the other, it is possible to concentrate the energy within a path or ray formed opposite to the earth's surface at an angle of ten degrees. By an angle of 40 degrees, for instance, the radiation is still only 28% of that of the main radiation. With this antenna we gain a field strength increase of from four to six times at the receiving antenna.

The azimuthal projection of the map of the world with Zeesen at the center shows some interesting facts. We see that Mexico is "farther to the north" than New York, and Rio de Janeiro more to the "south" than Buenos Aires. Important, however, is the fact, that Japan is on the same parallel as South America. The directional antenna to South America was built up in such a manner, that by simple switching, it is possible to reverse the reflector wires, which are spaced ¼ the wavelength from the transmitting dipoles. This eliminates the necessity for additional reflectors in order to have the system directed towards Asia.



Above—The "round-radiation" antenna, "rundstrahler", used for vertical concentration of the radiated waves. Left—Aerial view of transmitting station at Zeesen, showing the masts supporting the directional antennas and also the building housing the transmitting equipment.

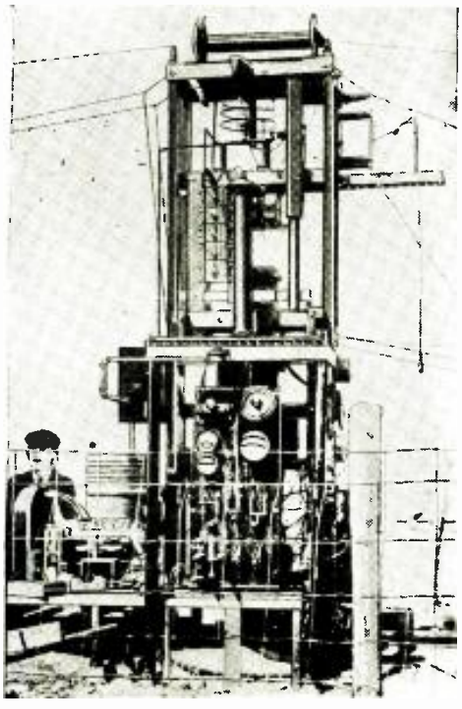
Below—Directive antenna to North America at right of photo; mast at center for long wave aerial; short-wave "rundstrahler" at left.



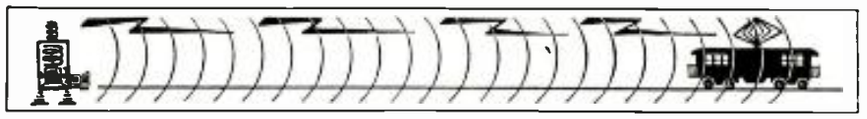
One of the photos shows a complete view of the Zeesen antenna system. At the left can be seen the round-radiation antenna (Rundstrahler); in the background the second mast of the antenna of the Deutschlandsender (Long waves —1,571 meters for local German broadcasting; also European reception in general), the main broadcasting station of Germany. At the right of the picture we can see a part of the "North America" broadcasting directional antenna. Below the beam aerial arrays are the the antenna-transformers, which obtain

(*Continued on page* 180)

Can We Transmit



"Radio Power" transmitting apparatus used, so newspaper reports stated, to transmit power by short waves to a small railway car for a distance of seven miles. Don't fail to read the opinion of one of America's foremost radio engineers, Dr. Alfred N. Goldsmith, in the accompanying article.



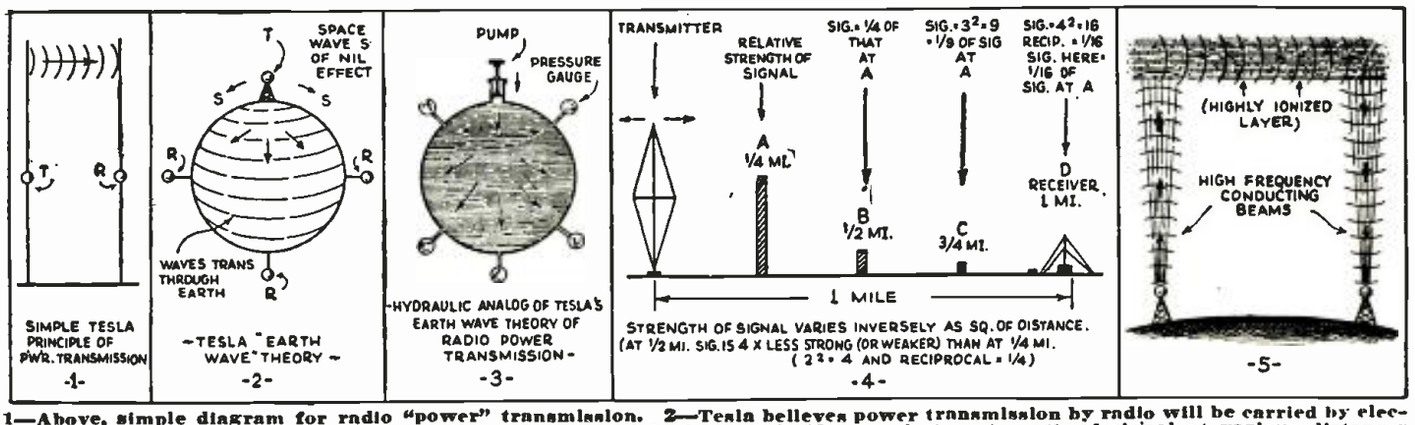
The question of whether we shall be able in the near future to transmit any practical quantity of power by means of radio waves comes up for discussion recurrently. The latest exciting news comes from the Daily Press to the effect that a small railway car has been driven a distance of seven miles by short-wave "radio power" transmission in a secret test made on the Santa Fe Railway. In the accompanying discussion the opinion of one of the highest radio authorities in this country, Dr. Alfred N. Goldsmith, is given.

● THE transmission of usable quantities of electrical power by means of radio waves instead of the usual metallic transmission lines, has been the dream of many electrical experts for the past forty years or more. The latest news in this direction comes through newspaper stories emanating from Boise City, Oklahoma, and these dispatches recite the fact that in a recent secret test made on the Santa Fe Railroad system in that locality, a small railway motor car was propelled a distance of seven miles *by an electric motor operated with power transmitted by radio.* We are able to reproduce on this page a photograph of the short-wave transmitter. The various news dispatches state that with larger equipment the inventor of this newest power transmission system, Mr. M. E. Gregory, a California inventor, hopes to be able to demonstrate the operation on a five-car train, with no material connection between the source of power supply and the cars.

The writer has interviewed at various times the leading radio and electrical engineers in this country, and owing to a very important basic electrical law which states that *the energy received at a given distance falls off "inversely" as the square of the distance,* most engineers have dismissed the practical possibility of *transmitting power by radio,* when they stop to consider this important fact.

In the November, 1933, issue of this magazine there appeared an interesting article entitled, *"Cooking With Short Waves,"* and in the same article the demonstration by Westinghouse Engineers at the *Century of Progress* Exposition in Chicago of the radio transmission of power was described. The important thing to remember is that in this demonstration at the Chicago Fair, 10 kilowatts or nearly 14 horsepower of radio-frequency energy was used in the 5-meter transmitter, while a ½ H.P., D.C. motor was caused to operate a propeller at a distance of 30 *feet* from the transmitter. When we stop to consider the underlying law which says that the energy falls off *inversely as the square of the distance,* we find that if this same motor was to be operated, for instance, in driving a small car, at a distance of only 500 feet from the transmitter, that we would need 2,770 kw. at the transmitter.

Judging from the photograph of the transmitter used in the Santa Fe Railroad tests conducted by Mr. Gregory, the oscillator tubes used probably did not use much more energy than the high-power Westinghouse oscillator tube used in the Chicago Fair demonstration referred to At this rate, one can easily imagine the tremendous power that would be required to operate the small railroad car mentioned in the news dispatches at a distance of seven miles from the transmitter. The editor asked for further details of Mr. Gregory's demonstrations but no information has been offered. In one of the reports some technical information is given to the effect that the Gregory apparatus uses a standing wave oscillator, a large double-end vacuum tube of cylindrical shape, about four feet long and six inches in diameter. Current from a motor-generator set at a pressure of about 7500 volts is supplied to the plates and grids of the double-end tube. This report states further that as the car moves along the railway it picks up the radio power on a small aerial, which passes it through rectifying tubes, which smooth out the undulating current into a direct current suitable for driving the electric motor which propels the car.



1—Above, simple diagram for radio "power" transmission. 2—Tesla believes power transmission by radio will be carried by electric waves through the earth. 3—Hydraulic analog of Tesla's theory. 4—Shows relative strength of signal at various distances from transmitter. 5—One theory of radio power transmission requires conducting beams to and from a highly ionized atmospheric layer.

Power by RADIO?

H. WINFIELD SECOR
Associate Member, American Institute of Electrical Engineers

Dr. Alfred N. Goldsmith Speaks His Opinion

The writer asked Dr. Alfred N. Goldsmith, one of the foremost radio experts in this country, what he thought of the reported success of radio power transmission by Mr. Gregory's system, and also the general possibilities of applying this long dreamed of theory. Dr. Goldsmith said that it would of course be indiscreet to take a definite stand and state that it was "impossible," because many new developments in electrical and radio arts are being shown daily. However, the Doctor said that it may be interesting to consider for a moment the amount of power that can be received at a distance of one mile from the most powerful radio transmitter in this country at present, the new 500 kw. (500,000 watts!) transmitter operated by station "WLW" at Cincinnati, Ohio. At a distance of one mile, this authority stated, a signal having a potential of about 5½ volts per meter can be picked up. In other words, if we had a small railway car located at that distance and fitted with a small antenna, we could probably pick up an antenna current of possibly 10 to 15 volts potential, and a current of a small fraction of an ampere; in other words we might pick up a few watts! But, said Dr. Goldsmith, to propel a car along railways, even a small car, we should be thinking in terms of *kilowatts* and not watts! And again, do not forget that this really insignificant amount of power picked up at a distance of one mile, is that made possible by utilizing the most powerful radio transmitting station in the country with half a million watts exciting the antenna!

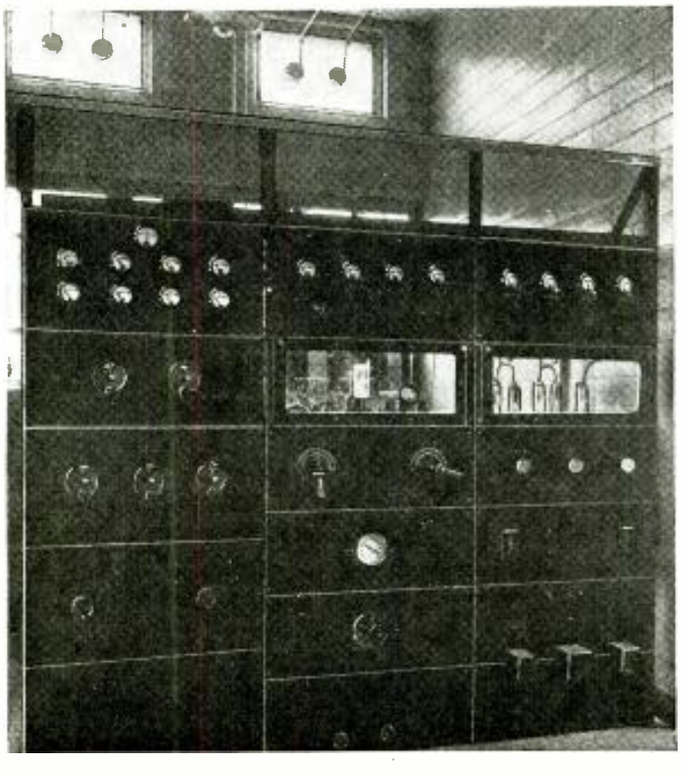
Dr. Goldsmith stated further that it is a very peculiar scientific paradox perhaps, but the fact nevertheless remains that if we try to concentrate the total energy in the 500 kw. transmitter mentioned above into a single beam, that we would then find that we needed a focusing antenna system which would occupy thousands of feet of space, both horizontally and vertically (considering we were using a wavelength of 1.300 to 1,400 feet). In the next breath, if we endeavor to broadcast power from such a 500 kilowatt station in the form of short waves, then we run into another "stone-wall," for our engineers so far have not been able to build very large short-wave transmitters, the most powerful so far being rated at 40 kw.

This situation would become all the more aggravated at the present state of development in "ultra-short-wave" apparatus, if we attempted to use waves as short as 10 cm. or about 4 inches in length. As Dr. Goldsmith pointed out, even if we were able to build a very powerful ultra-short-wave beam transmitter, it would practically become paramount that the beam be trained on the moving car or other vehicle. To follow the car on some of our winding railway tracks in certain localities, the beam would have to take a "cork-screw" path along the curving track in order to follow the car.

Among other serious factors we have to reckon with in the radio transmission of power, whether broadcast in all directions from the antenna, or focused in "beam" fashion, is the fact that we have all sorts of absorption losses in mountains, hills, etc., to contend with.

(*Continued on page 167*)

A power tube of the type here shown was used in the experiments conducted by M. E. Gregory in a reported demonstration before Santa Fe Railroad Officials. Tube shown is one of those used at KDKA. Note comparative size of man.



Here we have a view of the power-control switchboard of the short-wave transmitting station, W3XAU, located at Newtown Square, Pa. The three units comprise — the exciter, 1 kilowatt amplifier, and high voltage rectifier.

W3XAU—Well Known S-W Transmitter

● THE 1-kilowatt short-wave transmitter, W3XAU, located in the 50 kilowatt transmitter building of WCAU at Newtown Square, Pa., consists of three units, namely—the exciter, 1 kilowatt amplifier and high-voltage rectifier.

The exciter unit consists of the crystal oscillator, frequency doubler, two screen-grid intermediate amplifiers, the modulated amplifier, speech amplifier and modulators. The modulated amplifier makes use of the two type 203-A vacuum tubes connected in a push-pull circuit, and modulated by two type 212-D vacuum tubes connected in a parallel arrangement. The modulated amplifier excites the 1-kilowatt amplifier directly.

The 1-kilowatt amplifier tube is a water-cooled type 20-B, which is rated at 5 kilowatts. This tube is operated as a linear amplifier and delivers a carrier output of 1 kilowatt at 100 per cent modulation. In the 1-kilowatt amplifier unit are the tuned output circuits, filament transformer and apparatus associated with the water-cooling protective circuits.

The transmitter operates into a 500 ohm radio-frequency *transmission line* which is properly matched to the impedance of a half-wave vertical copper rod, erected on an 85 foot wood pole. There are two antenna systems, of this type, except for different constants, to allow for operation on 9,590 kilocycles and 6,060 kilocycles. Switching between the two systems is accomplished by means of suitable switches located in the transmitter building.

A HAM at SEA

By JOHN T. FRYE, W9EGV

"Using the B-Plus wire as a key and sending very deliberately, Jack began: 'SOS-SOS-SOS—we are adrift in launch with dead motor about thirty-five miles east of Garner Point Mass.'"

● "What is the matter with Jack?" Mr. Arnold asked as he sat down at the breakfast table. "Isn't he up yet?"

"Oh, yes," Mrs. Arnold replied. "He has been up for two or three hours, but he is tinkering with that radio as usual. When I called him a few minutes ago, he said that he was working a *veekay*—whatever that is."

She was interrupted by the quick gallop of rapidly descending feet on the stairs, and the next moment a towsled boy burst into the room.

"Boy, oh boy!" he exclaimed, his eyes shining brightly with enthusiasm. "Is my rig hot this morning! I worked two ZL's and just got QSA/5 R/7 from a VK!"

At that moment his eye fell upon his father's countenance, and the expression he saw there caused him to stop his jumping about and to sit down quietly and begin a strategic attack on his grapefruit. The expression was one that indicated Mr. Arnold's indifference or even aversion to his son's enthusiasm.

"Sorry I was late for breakfast again," the boy mumbled.

"We shall let it pass for this time," Mr. Arnold said with what Jack considered unnecessary emphasis on *this*. "Now translated into English, just what was your morning's accomplishment?"

"Why it means that I contacted stations in New Zealand and Australia, and that my signals were especially strong in the latter."

"What did the people in those countries have to say of interest?" Mrs. Arnold inquired indulgently.

"Oh, we didn't talk any; we just swapped reports. You see we wanted to be able to write '100% QSO' on the QSL's."

"I must say that this amateur fraternity seems to be a garrulous and highly original lot," Mr. Arnold burst forth. "From what I have read over your shoulder when you were copying, a report on your signals, a remark about the weather, and the giving of their location seems to leave them mentally exhausted. I have heard one or two mental giants become so talkative as to describe their equipment, but these loquacious persons are not to be confused with the taciturn, run-of-the-patch type of amateur. *His* vocabulary is limited to a few numerals such as 73, 88, and 99 together with a group of cabalistic letter combinations such as *QSO*, *QRM*, and *XYZ*. For the life of me, I fail to see what is so exciting about talking shop with a fellow in Australia, when you can do a much better job of that with Jimmy Palmer across the street."

"Well," Mrs. Arnold murmured, "it is just barely possible that he gets a thrill from that for the same reason that his father travels fifty miles to the coast to throw away his bait when he could catch twice the fish with half the effort right here in Lake Webster."

Son Has Other Ideas

"No connection at all, no connection at all," her husband stoutly denied, although he could not keep a twinkle of amusement from appearing in his eye at this well-placed shot. "By the way, Jack, what say we run down to the cottage tomorrow for a couple of days. We haven't been fishing together since you were bitten by this radio bug. We could fish tomorrow and the next day until noon. What do you say?"

"Why I'm sorry, Dad, but I had planned to rebuild the rig. I want to take out that '10 buffer and put in a '46, and—"

"See here, son," his father interrupted. "I haven't said much, but I am afraid that you are losing your perspective a bit. I like to see you have a hobby and take a keen interest in it, but you must remember that a hobby is a good thing only so long as you ride it. The moment that it starts riding you, it becomes a menace to your mental balance. After all, a monomaniac is just as seriously unbalanced as is any other type of insanity. Now, I think that you had better reconsider and give your transmitter and your brain a rest. Anyway," he finished wistfully, "it's no fun fishing by yourself."

Jack was touched by the lonesome note in his father's voice.

"You're perfectly right, Dad, and I'm sorry that I have been such a fool. At the rate I have been going, I'll be a full-fledged radio nut in another month or so. Fishing it is, and I am giving you fair warning that I intend to show you up."

"Oh, is that so?" Mr. Arnold exclaimed with a happy light in his eye. "Well, any old time a young whipper-snapper of a city slicker like you thinks that he can show his old dad anything about taking them in out of the briny, its time some of the conceit was taken out of him. Rods and coffee at breakfast, Sirrah!"

"I accept the challenge," Jack laughed.

Ten o'clock the next morning found the two heading out from the shore in the thirty foot launch which Mr. Arnold kept at his seashore cottage. Both were dressed in the usual costume which the city-dweller considers appropriate for such occasions, and, as a result, resembled a cross between a dapper matinee idol, a Hollywood director on location, and a tramp who had seen better, much better, days.

"Looks like we're going to have a fine day for it," Jack shouted back to his father at the stern.

(*Continued on page* 171)

● ● ●

Ham radio has played the rôle of hero in many newspaper and other published accounts. The editors know that you will like Mr. Frye's very interesting narrative, in which the advantage to every young man of knowing something about radio transmitting and receiving is very forcibly brought home to Jack Arnold's father, when they are lost in a fog at sea while on a fishing trip.

Top—Left: Joe Simpson experimenting with his "P.A." system; right: Another corner of the "Lab."; center: "Mike" available for "P.A." amplifier and electrical recording. Lower photos—Left: The author with some more of his radio apparatus; right: Television at extreme right and on shelf, historic collection of vacuum tubes from the earliest de Forest to present-day types.

My 20 Years of Radio Thrills

By JOE SIMPSON

Here is a radio experimenter after our own heart—not only has Joe Simpson dabbled in "short waves", but he has also played with television and all branches of radio. When Joe throws a party most anything is liable to come out of the loudspeakers scattered about the house—from a "foreign" musical concert via short waves, down to a reproduction of some friend's voice recorded on his electric phonograph.

● BEFORE describing these pictures and being in a reminiscent mood, I might say, that this is the result of over twenty years experience in radio, purely as a "hobby."

I have built many sets, starting with the metal filings coherer and electrolytic detectors, even to trying coal as a crystal detector. With the advent of broadcasting and with this pre-knowledge, I recall many thrilling hours including boxing bouts, baseball games and the first political broadcast by Mayor Hylan from 2ZV in Richmond Hill.

The first real piece of apparatus was the old variometer vari-coupler with a UV200 detector and 2 audio stages of 201's with the Magnavox speaker. This set cost approximately $350.00! It was used in the living room of the writer's home.

Among the memorable broadcasts there was the Democratic Convention in New York City with "24 votes for Underwood" and the night the airship *Shenandoah* broke loose in the storm, when WOR's announcer broadcast news of its whereabouts from the roof of their building.

The thrill of picking up broadcast "DX" caused me to try *short waves*. In 1927 I made my first *short-wave* receiver. This was known as a "copper-clad" receiver, using a 222, 200A, 112 and 171. With this receiver I obtained verifications on June 28, 1929, of PCJ, Eindhoven, Holland; G5SW or 2LO, London, England, August 8, 1929, and W6XN, which was the old KGO at Oakland, California, on March 15, 1928 (on 23.35 meters).

The opening of HVJ, Vatican City, Rome, Italy, Feb. 12, 1931, I prize highly, as a personally signed "veri" (verification card) by Mr. Marconi himself was sent me.

Short waves is nothing new to me now. My attention around 1929 turned toward *television* with image transmission by station WRNY, New York City. My television reception success was about the average, with what knowledge I had of this fascinating art.

As the picture shows, I am still interested in *television* reception. Have seen images from W2XR, New York City, and W9XG, Purdue University, Indiana. The scanner with the large magnifying glass is a Jenkins Model No. 202—1200 R.P.M. with the drum and shutter action.

Using a two-inch neon tube, the receiver observed just back of the author in the picture uses two RF. 235's, a 24A detector, a 24A first audio, 45 power tube and an 80 rectifier; this is a commercial receiver "pepped up" by yours truly.

I have a midget receiver (200-550 meters) purchased four years ago,

(Continued on page 184)

The "CLIP-COIL

Are you looking for a new way to overcome the "plug-in coil" problem? Here's the latest idea—the "Clip-Coil". You merely move a pair of spring clips along the coil to change the frequency band to which the set will respond. With one or two coils, the whole short-wave spectrum between 15 and 200 meters can be covered. Very fine reception of "foreign" and other short-wave phone stations were obtained in numerous tests made by the editors. Due to the form of circuit especially designed for use with the "Clip-Coil" unusually fine reception is provided. We are sure our readers will want to give it a whirl.

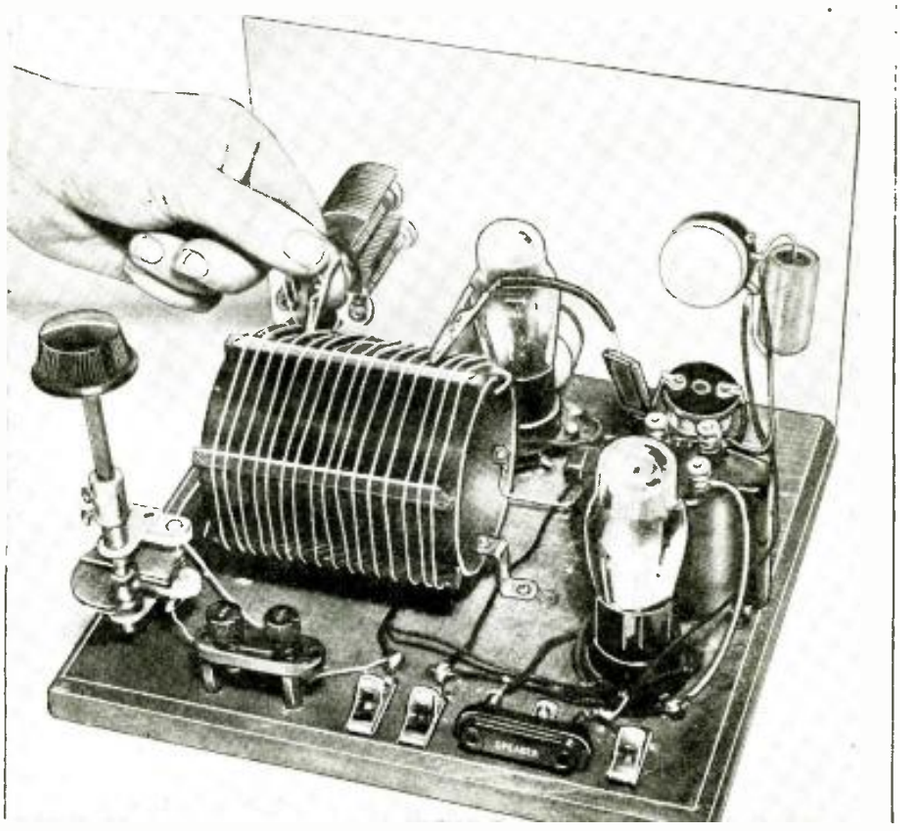
Mr. Shuart takes a whirl at the dials of the "Clip-Coil Two"—a radically different idea in short-wave receivers. The Clip-Coil does away with the need for plug-in coils.

● SHORT-WAVE fans are always on the alert for the latest news regarding some method which will eliminate the *plug-in coil*.. The "Clip-Coil" here introduced, represents a radical departure from the usual plug-in coil and all that is necessary to change the bands is to move the two spring clips along the coil. One might ask quite naturally—"Why bother with the clip, when switches could be used just as well?" Tests by engineers, however, have frequently shown that the light contact form of switches commonly used on short-wave receivers, frequently do not make *perfect contact* between the blade and the switch points, whereas there is slight, if any chance of a good spring clip failing to make a perfect contact when it is properly clamped on the wire.

"The proof of the pudding lies in the eating thereof"—runs an old saw—and, "results" galore were obtained both by the authors and the editors, in numerous tests made in different locations with the "Clip-Coil Two". The first crack out of the box—the German transmitter at Zeesen bounced in, with comfortable sharpness of tuning. Part of the nice operating features of this set are undoubtedly bound up in the "Clip-Coil" itself, due to its optimum shape and size.

Changing wave-bands in short-wave receivers has always been a "bugaboo". Many switching arrangements, of course, do away with plug-in coils and these have been described from time to time. The *Clip-Coil* set shown in the photographs and described in this article is one of the most efficient methods of changing wave bands with a minimum of complications. The grid and tickler coil are both part of one winding. This is accomplished by center-tapping the coil and using one-half for feed-back or regeneration, and the other half for tuning the grid circuit. This coil is designed to take in all of the short-wave broadcast bands from 19 meters up to approximately 80 meters. It is possible to tune to 200 meters by adding a few more turns to the coil. Four or five turns would do nicely and could take in the popular "police" and 160 meter amateur bands.

Common methods of controlling the regeneration were tried out, using this "clip-coil" arrangement, but the one shown is the only method which proved absolutely foolproof. The usual method has been to vary the capacity of the condenser C3. However, this has a considerable effect on the tuning and stations could be tuned in or out with this condenser, making it almost impossible to obtain an optimum adjustment on the weaker foreign station. The one-half megohm variable resistor used in the plate circuit of the detector tube provides about the smoothest form of regeneration control we have had the pleasure of using. A complete swing of the variable resistor does not completely detune any one station. Therefore, it can be seen that a small variation necessary near the point of oscillation will have practically no effect on the tuning. The proper method of adjusting the coil is to set the feed-back or *tickler clip* at a point which provides ample regeneration with the proper setting of the resistor, R1, which is the variable plate resistor or regeneration control. In other words some tubes may be more sensitive detectors with high plate voltage, while others may require very low plate voltage. This may be taken care of by adjusting the amount of feed-back with the clip and then controlling regeneration with the variable plate rheostat. In constructing the coil,



The operator is shown in the act of adjusting one of the clips on the new Clip-Coil featured in the receiving set here described. The degree of regeneration is adjusted by changing one of the clips, while the wavelength to which the grid circuit can be tuned is changed by adjusting the second clip.

TWO" Rolls 'em In!

By Clifford Denton and G. W. Shuart, W2AMN

cut six strips of 3/16 inch bakelite, ¼ inch wide and 4 inches long. Place these at equal points around the 3½ inch diameter bakelite tube, which should also be 4 inches in length, then proceed to wind 16 turns of No. 20 tinned copper wire over the whole form of the tube. This will leave approximately 3/16 inch spacing between turns. Make sure the winding is tight and in order to secure it, drop small amounts of household cement at the point where the wires cross the ribs of the form. Enameled wire could be used with the insulation removed at points where the clip is attached. However, the bare copper would oxidize and in time would cause considerable trouble unless it was frequently cleaned.

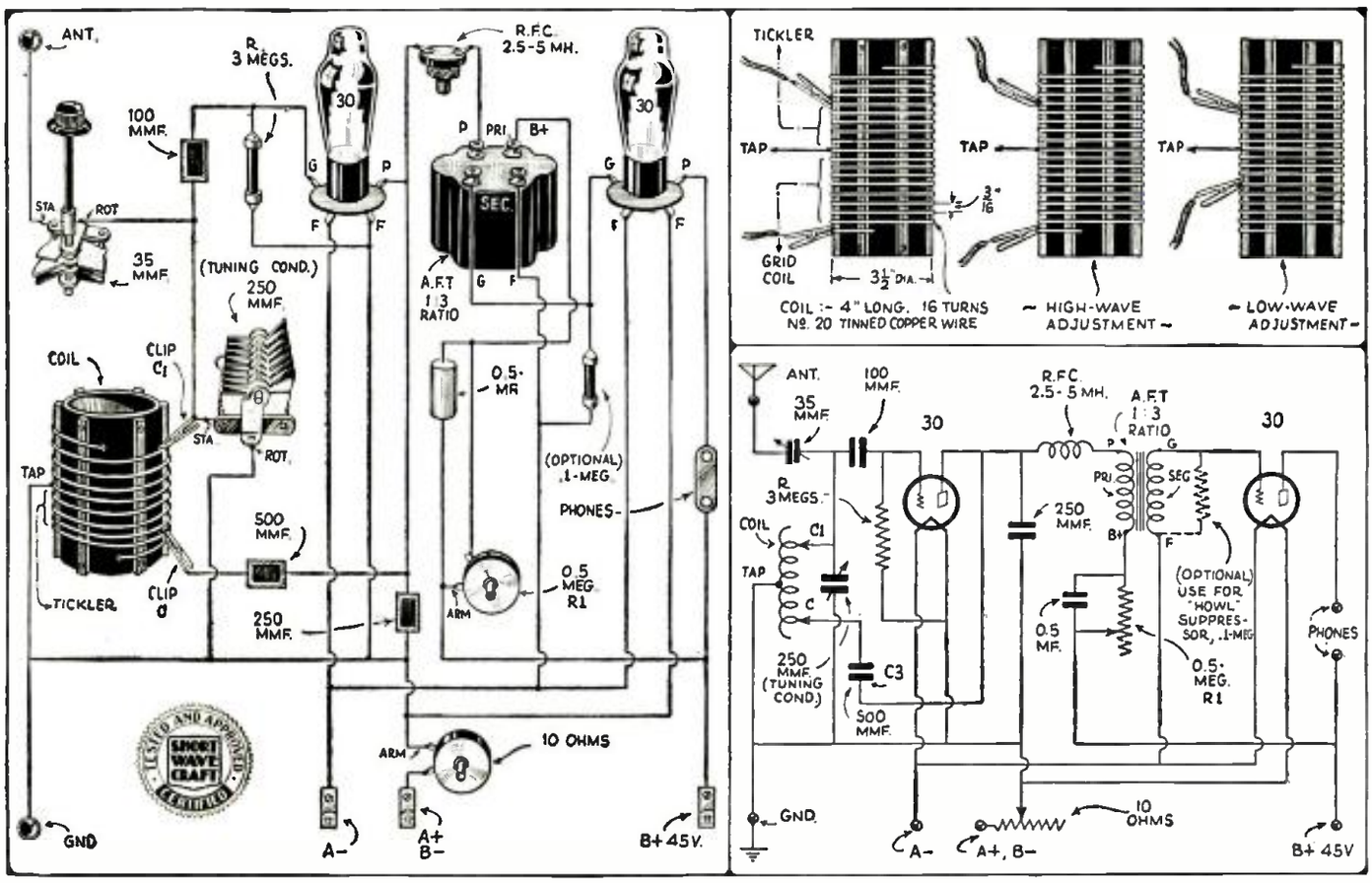
In order to get a complete frequency coverage it is necessary to use a .00025 mf. grid condenser. While this capacity may seem very high no appreciable loss in sensitivity is apparent. The high amount of capacity is only present on the lower frequencies. In all cases, it is advisable to use as many turns as possible on the coil with a minimum of tuning capacity. This will result in less critical tuning. The entire set is mounted on a 9 inch by 10 inch baseboard with a 7 inch by 10 inch front panel. Looking at the front the regeneration control is on the left and the tuning condenser is on the right, with the filament control rheostat in the lower central portion. The antenna tuning condenser has a maximum capacity of 35 mmf. but the plates should never be turned more than half way in for smooth operation.

If the wiring diagram and constructional hints are followed carefully, the builder should experience no difficulty in getting wonderful results with this receiver. The audio stage is conventional and thoroughly illustrated by the diagram. As for results with the "Clip-Coil Two", we can heartily recommend it to the "beginner" and "old-timer" alike. It provides an excellent method of covering the short-wave spectrum. less the cumbersome arrangement of plug-in coils and the set is absolutely as sensitive and provides as much volume as any other 2-tube set using the type of tubes shown in the diagram. All the principal *foreign* broadcasting (phone—i.e., voice and music) stations operating have been heard on this receiver with plenty of volume and over a considerable length of time as it has been in the experimental stage for the past few months. The builder is not. of course, limited to the type 30 tubes. Any other tubes, commonly used in short-wave receivers, could be incorporated in this set. A screen-grid detector could be easily used with the variable resistor located in the screen-grid lead, in order to control regenera-

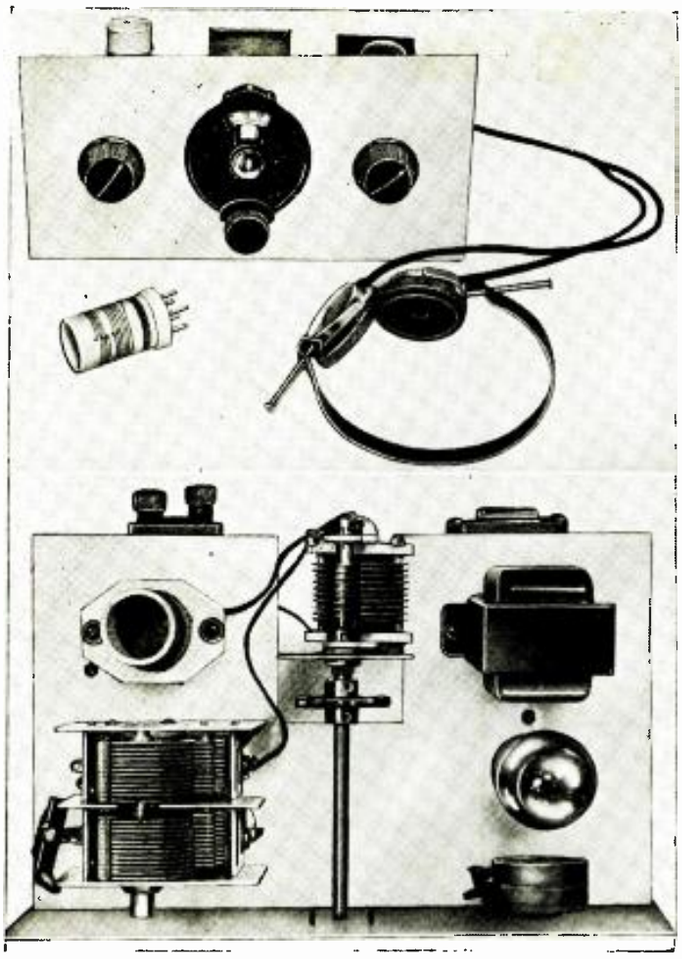
(*Continued on page* 188)

Parts List "Clip-Coil" Set

- 1 Panel and Baseboard—see text.
- 1 Special "Clip-Coil" (see drawing for data). Gen-Win.
- 1 .00025 mf. Variable Condenser. National (Hammarlund).
- 1 .0001 mf. Mica Condenser. Polymet.
- 1 .0005 mf. Mica Condenser. Polymet.
- 1 3 megohm Grid-Leak, ½ watt. Lynch.
- 1 .5 mf. By-Pass Condenser. Polymet.
- 1 500,000 ohm potentiometer.
- 1 3:1 ratio Audio Transformer.
- 2 4-prong Tube Sockets.
- 1 Antenna Ground Terminal Strip.
- 1 Phone Ground Terminal Strip.
- 1 2.5 mh. R.F. Choke. National (Hammarlund).
- 2 230 RCA Radiotrons (Arco).



The circuit used with the new Clip-Coils is extremely simple. The top inset drawing shows relative clip positions along the coil for "high" and "low" wave adjustments.



The CONSTANT Band-Spread TWINPLEX

By J. A. WORCESTER, Jr.

Left—Front and top views of the "Constant Band-Spread" Twinplex Receiver. One tube performs the dual functions of detector and A.F. amplifier.

The most important feature of this receiver is that it covers the entire short-wave spectrum with CONSTANT "BAND-SPREAD". Only two plug-in coils are used and the same degree of band-spread can be maintained on any wavelength from 18 to 200 meters. The popular 19 "twin-triode" tube functions in this famous Twinplex Circuit as a regenerative detector and one stage of audio.

● THE receiver described in this article possesses several features which should make it of more than passing interest to the short-wave fan. In the first place, *only two coils are required to cover the short wave band extending from* 18 *to about* 200 *meters.* This is, of course, only half the number of coils generally required to cover the above band and results in a substantial cost saving as well as eliminating to a marked degree the inconvenience of plug-in coils. This saving in coils is effected by employing a tuning condenser having a maximum capacity of 365 mmf. An attempt to employ such a large tuning capacity in conventional circuits would result in unsatisfactory operation for two reasons.

In the first place, extreme station congestion would result from this procedure. Since a frequency change of better than three to one is possible with complete dial rotation when using a 365 mmf. condenser, it is possible to cover with one coil the frequency range extending from 6 to 18 megacycles. This results in a 12 megacycle band coverage which is nearly 24 times the range covered with an ordinary broadcast receiver. The practically intolerable station congestion that would result is evident.

It might appear to the average reader that this difficulty might be overcome by connecting a small band-spread condenser in parallel with the large condenser. With such a large tuning condenser as is used in this receiver, however, the above procedure would result in a generally unsatisfactory solution to the problem. Anyone who has used this band spreading arrangement in conjunction with the ordinary 140 mmf. tuning condensers, is undoubtedly familiar with the fact that the frequency range covered by the band-spread condenser varies appreciably with the large tank condenser. The frequency variation produced by the band-spread condenser is always greater when the tank capacity is at its minimum value since the rotations of the band-spread condenser will result in a much greater change in the total circuit capacity than when the tank capacity is a maximum. The ratio of the frequency range covered by the band-spread condenser at the two extremes of the tank capacity will be at least five to one when using a 140 mmf. tank condenser. When using a 365 mmf. tank condenser this ratio will be at least 15 to 1 so that if a 500 kc. spread is selected when the tank capacity is a minimum, the band spread will only be about 30 kc. when the tank capacity is a maximum. The latter band spread is far too slow for satisfactory tuning; necessitating a large number of tank capacity adjustments for complete coverage of the range available. On the other hand, if the spread is made 500 kc at the other extreme of the tank capacity, the spread will be over 7,000 kc. at the opposite extreme; which results in tuning which is far too fast; entirely defeating the object of the band spread control.

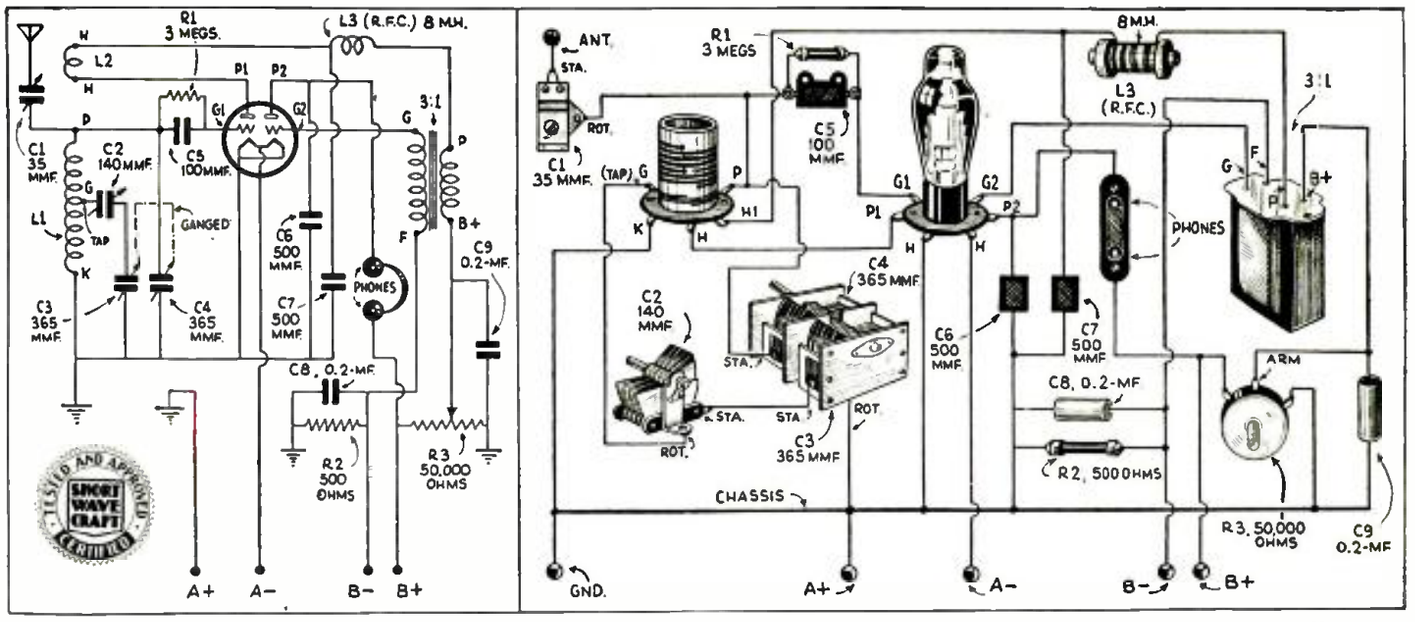
The above difficulties are eliminated in this receiver by employing a special band-spreading circuit developed by the author. In this circuit, the band-spread is automatically maintained constant regardless of the setting of the tank capacity.

It will be noted from the schematic diagram that C4 is the tank capacity and C2 is the band spread condenser. The object of condenser, C3 which is connected in series with C2 and ganged to C4, is to decrease the effective capacity of C2 as the tank condenser is decreased. This results in a band coverage of C2 which is substantially constant regardless of the setting of C4.

In this receiver a band-spread of about 500 kc. is chosen which provides a rate of tuning which is approximately half as fast as that provided by the usual broadcast-band receiver. This results in a tremendous simplification in station tuning and undoubtedly will enable the average listener to hear a good many stations which he previously missed due to the large tuning range covered by a 140 mmf. condenser. This is especially true of the higher frequencies such as the 19.25 and 30 meter broadcast bands.

Another factor that would decrease the efficiency of an ordinary circuit if a large tuning capacity were employed is the lower voltage which is produced across a high "C" circuit. In this receiver, this difficulty is overcome by using a "high-gain" regenerative circuit, by critical adjustment of which it is possible to increase the impedance of the tuned circuit to the desired level.

The circuit employed in this receiver is the well known and efficient *twinplex*, developed some months ago by the author. This circuit employs a type 19 Radiotron, which is in effect two tubes in one envelope. Since the cost of this tube is only slightly more than a single type 30, the saving involved in not only tube cost but simplified layout as well, is immediately evident.



Practically anyone, even though they are not familiar with the construction of radio sets, can by carefully following the diagrams above, successfully build the "Constant Band-Spread" Twinplex Receiver. This receiver combines so many desirable features that you will surely want to try it.

It is strongly recommended that batteries be employed for both the filament supply and plate potential as their use will result in much quieter performance than is generally possible when using a rectified and A.C. filtered supply If the latter is used, it should be very well filtered; containing at least two chokes and plenty of capacitv. If two dry cells are employed in a series connection to heat the filaments, a series rheostat should be employed to reduce the voltage across the filaments to two volts. If a voltmeter is not available, the voltage should be decreased until it is just possible to see a faint dull red filament glow.

The general layout of the various parts can easily be noted by inspecting the photographs. The chassis is constructed from 14 ga. aluminum and is 10 inches wide, 6 inches deep, and 1 inch high. The front panel, also aluminum, measures 5 by 10 inches.

On the front panel are mounted the vernier dial and potentiometer. On top of the subpanel are mounted the variable condensers, coil socket, A.F. transformer and antenna compensating condenser Underneath are mounted the fixed condensers, resistors and choke. The wiring, it will be noted, is very simple.

When mounting the 140 mmf. bandspread condenser, C2, it is necessary to insulate it thoroughly from the chassis. This is done by boring a sufficiently large hole to clear the threaded bushing and by employing bakelite washers on each side of the bracket. This conden-

(*Continued on page* 178)

Effect of Time and Season on Short Wave Reception

● WHILE the tuning in of short-wave stations is such as to require no especial skill or previous experience, the full possibilities can be realized only by those familiar with the general characteristics of transmission on the shorter wavelengths. The following notes are a summary of extensive data compiled mainly by experimentation and should be found both interesting and helpful, especially to beginners in the field of short-wave reception.

Broadcast transmission at 49 meters is most reliable when received from a distance of 300 miles (500 kilometers) or more, although good reception at distances greater than 1,500 miles (2,400 kilometers) can be expected only when a large portion of the signal path lies in darkness.

Thirty-one (31) meter stations afford greatest reliability of service to receivers situated at a distance exceeding 800 miles (1,300 kilometers). Good reception from distant stations in this band is possible both day and night.

Reception from stations operating in the 25 meter band is most common when a span of 1,000 miles (1,600 kilometer) or more separates the receiver and transmitter. Such transmission over distances of less than 2,000 miles (3,200 kilometers) will be received best during daylight hours. The more distant stations, however, can still be heard well after nightfall under favorable conditions.

In the 19 meter band, stations situated at a distance of 1,500 miles (2,400 kilometers) or greater will be found most satisfactory. Signals in this band will generally be heard during daylight hours—rarely after nightfall or when any appreciable portion of the transmission path is in darkness. Wavelengths below 19 meters are useful only when transmitted entirely through daylight and over long distances (2,000 miles or more); ordinarily they cannot be received after sunset.

Transmitted signals of any wavelength are known to divide into two components—the "ground" wave and the "sky" wave. The former remains close to the earth's surface, providing reliable service only over short distances from the broadcasting station. The sky wave, however, travels into the higher layers of the atmosphere and is reflected back to the earth's surface at an appreciable distance from the station. With short-wave signals, the sky wave usually does not return within the radius covered by the ground wave, resulting in a so-called deadspot region within which reception is impossible or extremely unsatisfactory. The length of the region wherein such conditions are effective is known as the skip distance, varying greatly from day to night and from summer to winter approximately as shown in Table I.

When attempting to receive distant or foreign stations, the time standards observed at various longitudes throughout the world must be considered. At 8:00 P. M. in New York or 7:00 P. M. in Chicago, it is of the next day—1:00 A. M. in London, 2:00 A. M. in most of Europe and 11:00 A. M. in Australia. On the American continents, therefore, regular evening broadcasts from Europe will be received in the late afternoon and from Australia in the early morning. Special programs, however, are frequently transmitted from European stations at times chosen for evening reception in America.

Although reception on the short wavelengths is less affected by atmospherics or static and good results may be had in midsummer even during a thunderstorm, the reverse is true of man-made interference. Electrical machinery such as trolleys, dial telephones, motors, electric fans, automobiles, airplanes, electrical appliances, flashing signs and oil burners created far more interference to the shorter waves than to frequencies in the standard broadcast band.

While the foregoing statements are valid, many other factors may so influence the transmission of short waves that exceptions are probable in certain locations. Experience in the operation of short-wave receivers in a given location is the best guide as to what to expect in reception at various times.

Courtesy RCA Victor Co.

EFFECT OF TIME OF DAY AND SEASON ON S-W TRANSMISSION*

Wavelength (Meters)	Ground Wave Range		Sky Wave (Mid-Summer) Approximate Range				Sky Wave (Mid-Winter) Approximate Range			
			Noon		Midnight		Noon		Midnight	
	Miles	Kilom.	Miles	Kilom.	Miles	Kilom.	Miles	Kilom.	Miles	Kilom.
100	90	145	—90	—145	90—600	145—960	90—100	145—160	90—2500	145—4000
49	75	120	100—200	160—320	250—5000	400—8000	200—400	320—640	400—∞	640—∞
31	60	97	200—700	320—1125	1000—∞	1600—∞	500—2000	800—3200	1500—∞	2400—∞
25	50	80	300—1000	480—1600	1500—∞	2400—∞	600—3000	960—4800	3000—∞	3200—∞
19	35	56	400—2000	640—3200	2500—∞	4000—∞	900—4000	1450—6400	X	X
15	15	24	700—4000	1125—6400	X	X	1500—∞	2400—∞	X	X

∞—Unlimited distance. X—Ordinarily cannot be heard.

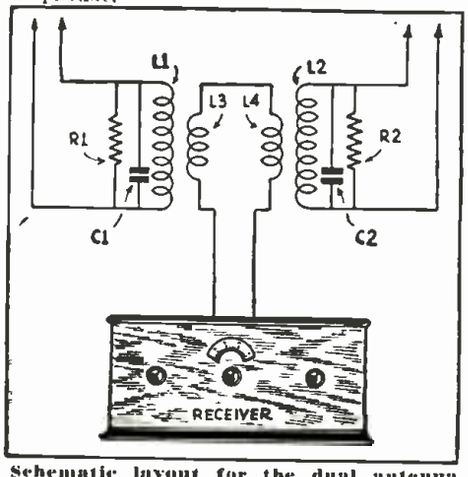
WORLD-WIDE SHORT-

Double Efficiency With a S-W Set

● A DESCRIPTION of a new German patent appeared recently in *Radio Welt*, a German magazine.

It is concerned with directional waves. Two dipole aerials with counterpoises are installed and coupled to the receiver in the manner shown in the diagram. The aerials are so placed that one acts as a *reflector* for the other.

Two resistors, R1 and R2, are inserted in each feeder across the receiver and the length of the conductors are selected so that the two wave trains reach the coupling circuits L1C1 and L2C2 in the same phase. The coupling coil L3L4 impresses on the receiver a signal of double the previous amplitude.



Schematic layout for the dual antenna arrangement. This will prove of interest to American short-wave "fans".

A 56 Megacycle Transceiver

● TRANSCEIVERS have been receiving their share of attention recently, with their increasing usage by amateurs in portable operation on ultra short waves.

The T & R *Bulletin*, the official publication of the Radio Society of Great Britain, recently ran the description of an interesting unit of this variety for 5 meter work.

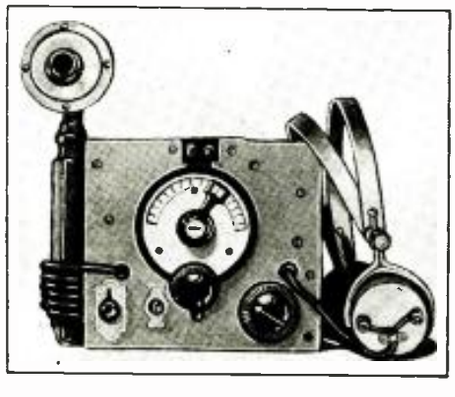
The circuit is quite simple. While transmitting, the oscillator is plate-modulated by the pentode. When receiving, the modulator is connected as an A.F. amplifier. A three-pole switch makes the necessary change-over.

No super-regenerative coils are used, but by using suitable values of grid-leak and L.C. ratio for the tuned circuit, the detector tube is made to produce super-regeneration in itself.

The inter-tube transformer serves the additional purpose of microphone transformer, this being obtained by the use of an extra winding. The phones are used as the *modulation choke*, and although this method may not be quite as efficient electrically, it saves space and weight, while also providing an easy method of monitoring transmissions.

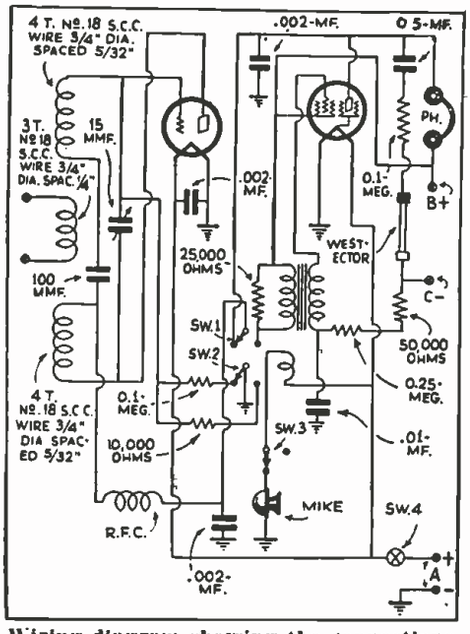
The only part of the circuit which may be new to American readers is the Westector current-economizer. This circuit possesses most of the advantages of class "B" amplification but requires only a small part of the apparatus. The pentode is given about twice the usual grid bias, thus reducing the plate current to a fraction of the normal value. When there is a signal coming in, however, a small portion of this signal is rectified by the Westector (which is a metal oxide rectifier) and fed back to neutralize the high value of grid bias, so that the plate current increases to normal.

The values of all parts are indicated in the circuit diagram. The extra winding on the inter-tube transformer consists of 250 turns of number 32 enamel wire, wound outside the secondary.



This photo shows the compact arrangement of the portable 5-meter "Transceiver.

● **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.**



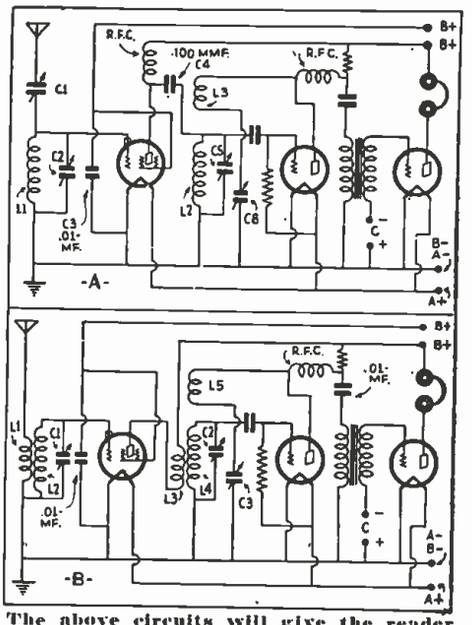
Wiring diagram showing the connections for the type 30 and type 33 tubes used for both transmission and reception at ultra high frequencies.

Short Wave T.R.F. Amplification

● SHORT-WAVE fans are beginning to realize more and more the necessity for multiple tuned circuits in their S.W. sets. Anyone who has operated a regenerative set on one of the amateur phone bands or some of the frequencies used by foreign broadcast stations realizes this need.

In a recent issue of *Australian Radio News*, this need was firmly explained, and two circuits for adding a stage of tuned radio frequency amplification to an existing set of the regenerative variety were given. These circuits are repeated here for our readers.

The first circuit is for the type of set in which the aerial is coupled directly to the grid of the detector tube. In this type of set, the circuit at A is used. The construction of the tuning coils should correspond as closely as possible to the coils used in the original set, and the new tuning condenser should be the same make and type as that used in the detector circuit, if possible, so that the dial readings can correspond closely on the two dials. (While the condensers could be "ganged," this is not advisable due



The above circuits will give the reader an idea of the type of tuned R.F. circuits used by foreign S-W "fans".

Behind the panel view, showing how the various parts of the 5-meter "Transceiver" are mounted.

WAVE REVIEW.. Edited by C. W. PALMER

to difficulties in getting the circuits to line up on high frequencies. The values depend on the type of tubes used, etc.

The other type of circuit is for that type of regenerative set in which the aerial is coupled to the detector through a small coil, called the primary coil. This is probably a more common type of circuit than the first.

Here, the R.F. tube is coupled through the coil which was formerly the aerial coil to the grid of the detector. In this case, it may be necessary to increase the size of the primary coil when it is used to couple a screen-grid tube to the detector. This coil should have about ½ to 2/3 the number of turns on the grid coil.

▼ ▼ ▼

An All-Wave Superheterodyne

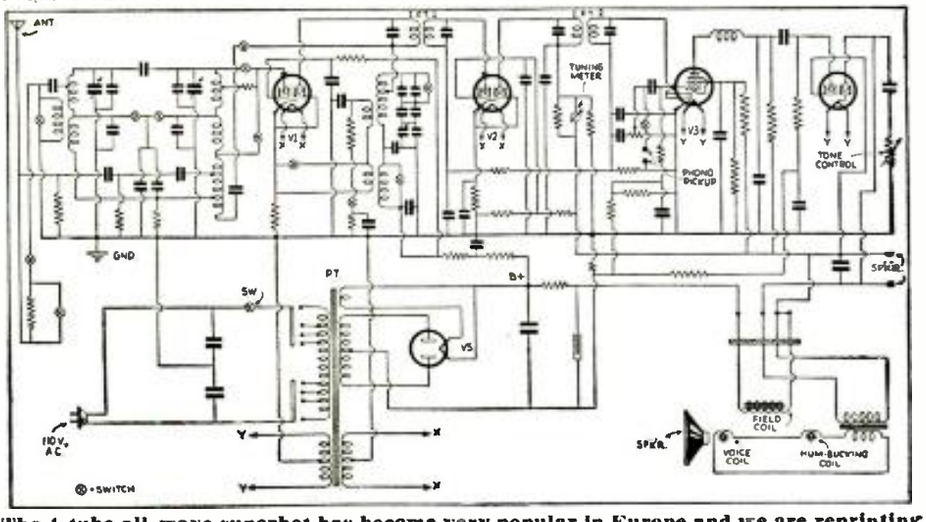
● IN a recent issue of *Radio-Amateur*, an Austrian publication, an interesting superheterodyne set was described. The circuit of the set is shown here.

This is a 4-tube superhet, with a short-wave range which gives good S.W. reception on account of its high amplification factor and a very efficient automatic volume control. The main tuning knob is of the friction type and has ratios of 1:10 and 1:120; this latter is very convenient for short-wave reception. Besides having a tone control and volume control, the receiver is provided with a special switch which is used to prevent the first tube from being overloaded in case the incoming signal is too strong.

An interesting novelty is the illumination of the dial. Instead of an ordinary white light, three differently colored bulbs are used and are operated from the band-selector switch. Thus the illumination of the dial is different for operation on long waves, short waves or phonograph. Another novelty is the arrangement which completely disconnects the set from the power line whenever the back is removed from the cabinet, to make it safe and convenient for repairs and adjustments.

The first stage is the *mixer* and serves simultaneously for the reception of the incoming signal, as a local oscillator and as an I.F. amplifier. The incoming signal of long and regular broadcast waves is transferred to the control-grid of the first tube through a double capacity-coupled band-filter which assures sufficient pre-selection. On short waves the aerial is capacity coupled through a T-element directly to the oscillatory circuit.

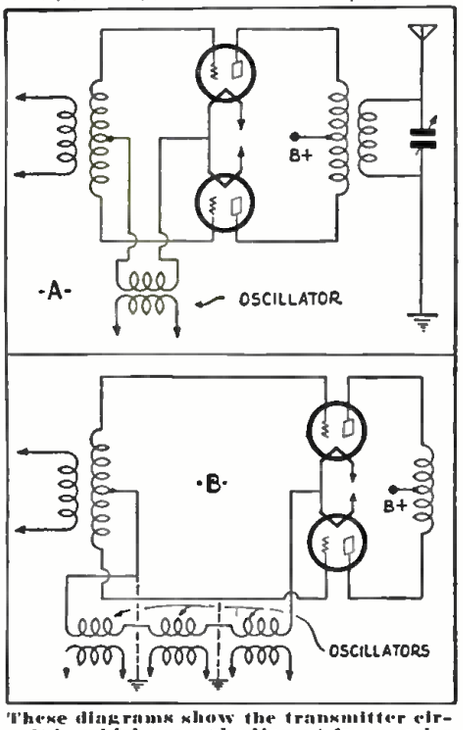
This interesting diagram shows how European commercial all-wave sets are being designed and manufactured.



The 4-tube all-wave superhet has become very popular in Europe and we are reprinting the diagram for one here, illustrating the band-switching arrangement.

A Cure for S.W. Fading

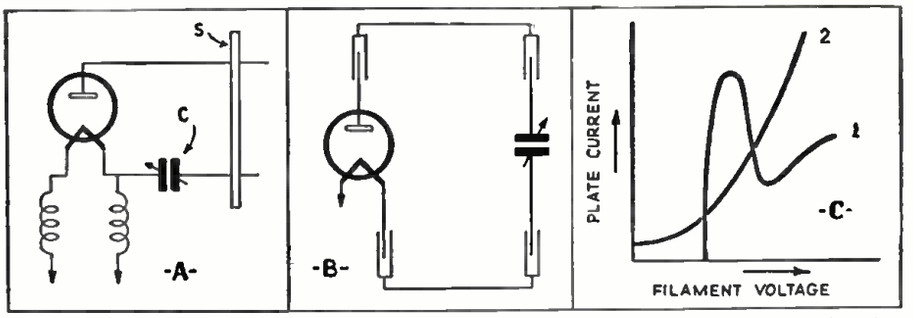
● UNLIKE the various expensive arrangements which use multiple antennas with the corresponding separate last stage amplifiers, an anti-fading arrangement both simple and efficient was described in *Radio Welt, recently.* (*Continued on page* 190)



These diagrams show the transmitter circuit in which several adjacent frequencies are used to reduce fading.

Ultra Short Wave Generator

● IN a recent issue of *Radio Welt*, this interesting article on the generation of ultra-high frequencies appeared. It should be of interest to everyone who experiments with those waves and for this reason a translation of the entire article is given.



The above diagrams show the circuit for obtaining ultra high frequency oscillations with a two-element tube.

For the generation of ultra-short waves, circuits are ordinarily used in which the oscillations are due not to the feed-back action between grid and plate, *but to a vibratory motion of the electrons within the tube.* To this group belong the oscillator circuits of Barkhausen-Kurz and the Magnatron. In both cases, the electrons do not arrive directly at the plate but move back and forth several times in the space between the electrodes before they are definitely attracted by the plate; the plate current being increased or decreased accordingly. Generally, in order to generate ultra-short waves, it is sufficient to arrange the electrodes of the tube in such a manner or to select the voltages at such a value that in their flight to the positive electrode, many of the electrons miss their goal; continue their movement further and then return back to the same positive electrode, which may again be missed, etc. To cause such a *vibratory movement* the presence of a grid is not absolutely necessary. An ordinary half-wave rectifying tube will give satisfactory results if the plate is of such a form that it is not always hit by the electrons. For experimental purposes an anode was made of large-mesh screen, which permitted a certain number of the electrons to go through (similarly to the screen-grid of a pentode).

However, much better results were obtained with the following arrangement. The center is occupied by a rod shaped anode (plate), around which, at an equal radius are located indirectly heated cathodes. Instead of separate cathodes it was originally planned to use a plain incandescent cylinder surrounding the anode (plate), which should have emitted electrons from its entire surface. On account of mechanical difficulties this plan was abandoned. When a high potential is applied between the cathodes and the central "plate," the electrons are directed towards the center of the tube. To the neighborhood of the plate they crowd together and create a high negative field, which interferes with the movement of the next arriving electrons. Their trajectory is changed and thus a vibratory movement of the electrons is created. According to the initial velocity of the electrons, their speed is sooner or later reduced and they arrive at the plate, following a larger or smaller curvature. The vibratory movement of the electrons does not proceed with a uniform rhythm, and the generator has not a well-pronounced natural frequency.

The resonance is controlled by the oscillatory circuit alone, as for instance by the Lecher wires which are connected to the grid and plate as shown at "A." A slotted copper disc is used instead of a wire jumper to bridge the Lecher-wire system.

(*Continued on page* 190)

Short Wave SCOUT News

The second "Trophy Award" winner, John Sorenson of the Bronx, New York City, wrote us a very glowing letter, praising the beautiful appearance of his silver trophy. We are very glad to present this picture of Mr. Sorenson with his SHORT WAVE SCOUT "Trophy" presented for his prize-winning list of short-wave stations, duly verified, which list was published on page 733 of the April issue. It is interesting to note that Mr. Sorenson used a National short-wave "Converter" in conjunction with an 11-tube Philco "Broadcast" receiver.

Editor, SHORT WAVE SCOUT AWARD:

● I'M enclosing two photographs of the SHORT WAVE SCOUT trophy which was awarded to me. In one photo the R.C.A. loudspeaker appears behind me; the National S-W 45 receiver is along side the speaker, as the other photo shows. A map of the world hangs above the receiver; the countries colored dark are the countries heard here; total is 55 countries. The wire at the left of the National is my lead-in of the 30-foot antenna. The calibration chart of my coils is on the table in front of my set. Behind the speaker I have my short-wave coils in a box. They are arranged by pairs, for quick change-over from one wavelength to another. I have the verification from TI4NRH; I also have the certificate of the "Heard-All-Continents Club", of the International Short Wave Club, which hangs above the map of the world.

The receiver I used in obtaining the stations which helped me win the third SHORT WAVE SCOUT TROPHY is the National S-W 45 A.C. The receiver has no special parts; it has a stage of TRF using a 235 tube, a 235 detector which in turn feeds into a 227 first audio, feeding into two 245's push-pull amplifier. The antenna used is a 30-foot single wire. *No ground connections are used.*

I again thank you for the wonderful trophy that you have awarded me.

CHARLES GUADAGNINO,
15226 Mack Avenue,
Detroit, Mich.

The two photos above show the short-wave receiving set used by Charles Guadagnino of Detroit, Michigan, together with a picture of the proud owner who won the "third" SHORT WAVE SCOUT Trophy for his prize list of short-wave stations heard, the list appearing on page 23 of the May issue.

Report From Heinie Johnson's "Official Listening Post"

● The winners of the SHORT WAVE SCOUT Trophies each month are being appointed as official "listening posts" for Short Wave Craft. This means that our list of "Short Wave Stations of the World" will be strictly up-to-the-minute at all times, as not only will it be checked with the latest reports received from "foreign" and "domestic" short-wave stations, but the actual "logs" and reports sent in by the operators of our official "listening posts" will be scanned closely for new short-wave transmitters. Below we present the first report from the "listening post" maintained by Heinie Johnson at Big Spring, Texas.

* * *

"Listening In With Heinie Johnson", Trophy Winner No. 1, Big Spring, Tex.

On an average of every other morning over a period of the past three weeks some mighty fine oriental music has been heard at this listening post on the 50-meter band.

Turning our dials to about 52 meters we have been listening to a Chinese signal of unusual strength. The call number is announced quite often during the program but we just are not Chinese enough to understand it. This station has been heard as early as 4 A.M. and as late as 8:20 A.M., Central Standard Time.

In fact, Central States listeners will be surprised to find the signal gaining in strength up until about 7:30. East coast listeners should be able to hear the signal but can't expect to equal the reception we get out here. This is due to the fact that the only day light the signal has to travel through up until 8 A.M., E.S.T., is the small stretch between this location and a possible 100 miles out in Pacific Ocean. Fifty meters being a poor day traveler naturally weakens the signal a lot between this post and the east coast. To further illustrate the "bang" China reaches us with, I'll explain as follows: Listening over a National FB7A Super, with two stages of T.R.F. ahead, fed by transposed lead-in from a 50 foot high doublet, the signal registers R.9 on the super settings, with full room volume; and kicks a speaker nicely when listened to over a three-tube 2-volt battery job. Now that is a "wallop!" and especially from China!

The editors have arranged with SHORT WAVE SCOUTS located in different parts of the world to send us reports on the latest short-wave listening conditions as found at their stations. We are glad to present herewith a very interesting report received from Mr. Heinie Johnson, winner of the first SHORT WAVE SCOUT "Trophy Cup", whose prize winning set is described on page 663 of the March issue.

Then by dialing around 55 meters, we find an active China "phone" station working at the same hours. So far we have not been able to locate the other end of this station to station conversation.

On two mornings at about 5 A.M., C.S.T., we have heard a Japanese signal around 56 to 58 meters. This station is broadcasting quite a few of our familiar song hits along with a good Japanese program. It comes in about as well as does JYR on 38 meters and is "good listening", but not anywhere near the equal of the Chinese signal.

There are some two or three "smaller fry" trying to break through on 49 meters, at same hours, but the signal-to-noise level is, to all appearances, not as good. Of the whole lot a Dutch amateur station reaches this post best to date.

A careful seige of dialing over the 49 to 60 meter coil range for a week straight will reward the listener with plenty of action before breakfast.

On the morning of Friday, April 20th, we had the pleasure of listening to the 38-meter Japanese signal for over an hour, without losing any of the transmission whatsoever, *using a one-tube "Twinplex" receiver with phones.*

We often locate the more distant signals with our National set-up, then heterodyne them in over the smaller sets and after locating them on the dials of the smaller sets, work them up carefully and thereby ascertain to our own satisfaction the fact that one-to-three-tube jobs will bring in "THE OTHER SIDE OF THE WORLD".

Some of the "local" short-wave "fans" are watching with interest the reception conditions of KNRA programs, as they move along on their world tour.

This is a good move for any "fan" to make, as it will show him what to expect from the different places at various seasons.

Nineteen meters is getting better at this post and 49 meters is getting to the place where distant signals carry a fairly high noise-level in the evenings. But watch that 25 to 31 meter band! To all appearances this band is *improving fastest* for central states listeners. Signals showing up where they have been absent for some time.

For instance I2RO is now reaching this post around 1:30 P.M. with better strength than at any time over past year.

HEINIE JOHNSON,
Big Spring, Texas.

Official Listening Post for SHORT WAVE CRAFT.

SHORT WAVE SCOUTS

Fifth "Trophy Cup" Winner—Harold W. Hansen, South Omaha, Nebraska

● HATS OFF to SHORT WAVE SCOUT, Harold W. Hansen, who hails from South Omaha, Nebraska, and who submitted the longest list of short-wave stations, together with the required qualification of at least 50% verifications, up to the closing date for this issue, May 1.

Mr. Hansen adds another medal to the rapidly growing list of achievements by our SHORT WAVE SCOUTS who use National receivers in picking up the calls of stations all over the world, in compiling their list of entries for the "Trophy Cup" Contest. Mr. Hansen uses the National model SW-45 receiver, which is a very popular one it seems among the more serious-minded short-wave fans. Mr. Hansen receives our heartiest congratulations on his finely prepared list of 74 stations, 50% of which are verified.

The editors are greatly pleased at the increased activity among their SHORT WAVE SCOUTS and during the month of April more entries were received than in any previous month. Everyone who has visited our offices in New York City and who have seen the magnificent silver trophy which is illustrated on this page have nothing but words of highest praise for its beautiful appearance, and they have without exception voiced their great desire to be the proud owner of this really beautiful trophy.

Quite a number of readers have written the editors asking if the entries for a given 30-day period had to be submitted for any given month; the answer to this question is that it does not matter which 30-day period you select. It can be the 10th or 15th of one month to the 10th or 15th of the next month, or run through an even calendar month, whichever you prefer. One important thing we wish to impress upon all would-be entrants for the "Trophy Cup", however, is that they keep their list of stations in their possession until they have received at least the required 50% verification cards, and then send the list, together with the "veris", *complete in one package* and address it to SHORT WAVE SCOUT AWARD, 99-101 Hudson Street, New York City. From the foregoing it will be seen that anyone desiring to enter the "Trophy Cup" Contest will have plenty of time to write for and receive verification cards from "foreign" stations.

FIFTH "TROPHY CUP" WINNER

Presented to
SHORT WAVE SCOUT
Harold W. Hansen
South Omaha, Nebraska
For his contribution toward the advancement of the art of Radio
by
SHORT WAVE CRAFT
Magazine

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

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

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

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

"HONORABLE MENTION AWARDS"

J. F. Legg, Jr., 1733 Belvedere Ave., Charlotte, N. C. 72S; 40V.
Virgil C. Slentz, 1433 Wooster Ave., Dover, Ohio. 67S; 34V.
Florian Poeschl, 0702 Charlevoix St., Montreal, P. Q., Can. 63S; 34V.
R. D. Reifsnyder, 310 Park Ave., Lebanon, Pa. 33S; 19V.
W. Schmacher, 113 Lincoln St., Ellis, Kans. 32S; 16V.
Walter Stead, 211 Maple Ave., Hamilton, Ont., Can. 12S; 6V.
Charles Horvath, Box 107, Kings Park, L. I., N. Y. 4S; 3V.

A WORD FROM MR. HANSEN—THE APRIL "TROPHY CUP" WINNER

Editor, SHORT WAVE CRAFT:

Omaha, Nebraska, April 26th, 1934.

Enclosed please find my list of stations for the SHORT WAVE SCOUT award contest closing May 1st, 1934. Verifications are enclosed for all of the stations on the sheet marked Stations—Verified.

I am using a *National SW45* receiver with a single wire antenna 70 feet long. I use an Atwater Kent loud speaker. Member Short Wave League.

HAROLD W. HANSEN,
South Omaha, Nebraska,
Route 5, Box. 169.

HAROLD HANSEN'S "TROPHY" WINNING LIST

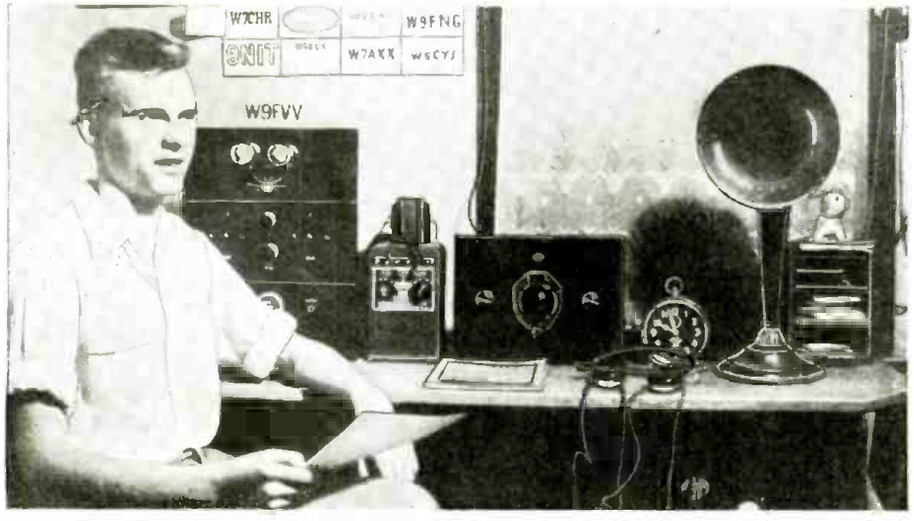
Stations—Verified

GSA—49.5 M. Daventry, England. Heard best here, 6 to 7 P.M.
GSB—31.5 M. Daventry, England. Heard best here, 2 to 6 P.M.
GSC—31.2 M. Daventry, England. Heard best here, 6 to 7 P.M.
GSD—25.5 M. Daventry, England. Heard best here, 2 to 6 P.M.
GSE—25.2 M. Daventry, England. Heard best here, 8 to 10 A.M.
GSF—19.8 M. Daventry, England. Heard best here, 9 to 10 A.M.
GSG—16.8 M. Daventry, England. Heard best here, 6 to 7 A.M.
PHI—25.5 M. Huizen, Holland. 7 to 9 A.M.
DJB—19.7 M. Zeezen, Germany. 8 to 10 A.M.
DJC—49.8 M. Zeesen, Germany. 8:30 to 10 P.M.
CT1AA—31.2 M. Lisbon, Portugal. Tue. and Fri., 4 to 6 P.M.
PSK or PRA3—36.65 M. Radio Club of Brazil. 6 to 7 P.M.
PRADO—45.3 M. Riobamba, Ecuador. Thursdays, 8 to 10 P.M.
COC—49.9 M. Havana, Cuba. 3 to 5 P.M.
HC2RL—45 M. Quayquil, Ecuador. Tue., 8:15 to 10:15 P.M.
YV3BC—48.7 M. Caracas, Venezuela. 7 to 9 P.M.
VE9GW—49.2 M. Bowmanville, Ontario, Canada. See card.
FYA—19.6 M. Pontoise, France. 7 to 10 A.M.
FYA—25.2 M. Pontoise, France. 10 A.M. to Noon. Sent one letter reporting both of these stations.
EAQ—30 M. Madrid, Spain. 4 to 7 P.M. Verification received from Station and also from IBC.
W1XAZ—31.3 M. Boston, Mass. See card.
W3XAU—31.1 M. Philadelphia, Pa. See card.
W2XAF—31.4 M. Schenectady, N. Y. 6 to 10 P.M.
W2XE—49.02 M. New York City, N. Y. See letter.
W3XAL—16.8 M. Bound Brook, New Jersey. 10 A.M. to 4 P.M.
W9XAA—49.3 M. Chicago, Ill. Sundays, 10:30 A.M. to 8 P.M.
W3XL—46.7 M. Bound Brook, N. J. Fri., 4:30 to 12 Midnight.
W3XAU—49.5 M. Philadelphia, Pa. See card.
W2XE—19.6 M. New York City, N. Y. See letter.
W2XAD—19.5 M. Schenectady, N. Y. Sundays, 1 to 3 P.M.

(Continued on page 186)

SHORT WAVES and

W9FVV Has Interesting Station!



Here is the owner and operator of the amateur transmitting and receiving station, W9FVV, Einar Johnson.

Einar Johnson's transmitter panel used at station W9FVV.

Editor, SHORT WAVE CRAFT:

● HERE are two photos of the layout of W9FVV. The transmitter consists of a 47 xtal oscillator, a 46 buffer-doubler, a 10 intermediate amplifier, and a 203-A in the final stage with 150 watts input. The "rig" works on 7.050 kc. and is coupled to a voltage-fed Hertz antenna.

The picture of the operating table shows from left to right: A low-power phone rig with 01-A's in the final, the receiver power supply, the receiver and file case. The receiver employs a 58 detector and a pair of 56's in the audio stages.

The station first went on the air with a 10 Harrley, which was soon junked and an M. O.P.A. outfit built. TPTG was then tried and the present rig was finally constructed in an effort to obtain steadier "sigs".

I think that your magazine is one of the best of its kind that I have had the pleasure of reading; just keep up the "swell dope"

EINAR JOHNSON, W9FVV.
1004 Birch Avenue, Harvey, N. Dak.

(*Mighty nice layout, Einar, and it looks like "real business".—Editor.*)

Victor 2-Tube Superhet A Surprise

Editor, SHORT WAVE CRAFT:

● I AM SO well pleased with the "Victor 2-Tube Superheterodyne Receiver" which I built, following the appearance of the article by Leonard Victor and Harold Mitchell in the December issue of SHORT WAVE CRAFT, that I am sending you pictures of my little wonder set.

The statement in the December issue of stations brought in by tests in your laboratory is no exaggeration of what can be accomplished with the hook-up. The set shown in the pictures has not been in operation long enough to give an attractive list of foreign stations. Stations, however, all over the United States from the Atlantic seaboard to lower California, as well as stations in Canada, Mexico, and Colombia, South America, have come in clear and strong. On two days recently EAQ, Madrid, came through with fine quality and when hooked up with a '24 and '47 amplifier gave enough volume to be heard by the folks downstairs.

It is built on a 2"x7"x10" black enameled No. 20 gauge steel chassis and housed in a walnut cabinet on which considerable time was spent to give it a beautiful finish. The panel is No. 16 gauge steel, finished with a jet black crackle enamel; the cabinet on the inside is shielded with No. 24 gauge galvanized sheet metal. A common ground strip is placed under sub-panel. Only the shield cans and shielded power leads are grounded through the chassis.

The aerial is a single No. 12 gauge enameled wire 60 feet long; the lead-in is 10 feet from one end. The ground wire runs from a second story window to a ¾" perforated copper pipe driven four feet into the ground. The ground wire is coiled around the pipe and soldered. Occasionally I pour water into the pipe to make contact with the earth effective.

All parts used in the set are of the best quality of nationally advertised products that appear in SHORT WAVE CRAFT. It is operated by old-time A and B eliminators of high grade. There is no hum whatsoever.

Only one change was made in the specifications advised by Messrs. Victor and Mitchell. A 100,000 ohm resistor was inserted in place of the 150,000 ohm recommended in the screen-grid lead of the second detector. It increased the volume and continued to give fine quality when operating on 250 volts.

I wish to congratulate the authors on having given to us "fans" the clever design of this remarkable little 2-tube Superheterodyne.

(*Glad you had such fine results with the Victor 2-Tube Superhet Receiver. We have received many other letters praising this receiver and one of its good points is its low cost.—Editor.*)

Here is the dandy job which Harry Shepherd made of the "Victor 2-Tube Superhet" receiver, described in our December issue.

THE "ACE HIGH" BAND-SPREADER PLEASES JACK

Editor, SHORT WAVE CRAFT:

● THIS is the best short-wave magazine I have ever found. I have built nine receivers from your magazine and all were O.K. I am now using the "Ace High" band-spread receiver described on page 152 of the July, 1933, issue, and want to say it sure brings them in. I have heard police and amateur stations from all states and when I say *all states*, I mean also *airport* stations, and also many *foreign* stations.

Up until the first of the year I was hearing YV2AM of Maracaibo, S. A., at about 2:00 A.M. on Saturday mornings, CST on 75 meters talking to New York, but he must have changed his wavelength from 75 meters, for I have not heard him lately. I know it is not the receiver, because every night I hear many other foreign stations, too many to list. I have been watching your SHORT WAVE CRAFT every month to find a better receiver to build, but this "Ace High" Band-Spread works so good I am afraid to rebuild it. Of course, I know that sooner or later I will run across one, then of course, I will get my soldering iron "hot", and go to work; until then, I will say 73 to you and SHORT WAVE CRAFT.

JACK WOLMER,
1801 Ruckle St.,
Indianapolis, Ind.

(*We always thought the "Ace High" set was a little out of the ordinary; glad to hear of your fine results with it.—Editor.*)

LONG RAVES . . . OUR READERS' FORUM

William Ferguson Has Fine Canadian Station

Editor, SHORT WAVE CRAFT:

● I BECAME interested in radio in November, 1929, and like a lot of people purchased a crystal set and got a thrill when I heard the local station coming in on the earphones.

Not being satisfied then with being able to hear a "local" station only, I purchased a one tube battery set in January, 1930, and was then able to hear lots of stations in Canada and U. S. A.

After that I bought a General Electric seven-tube electric radio in December, 1930, which I found of course much more enjoyable, being able to hear on the loud-speaker rather than sit for hours at a stretch with earphones on.

Very soon I was not satisfied with sitting and listening but wanted to know what made "the wheels go round," as the saying is, so I bought a book on radio and tried to learn what made the set work. This proved very interesting and at different times I added various books on radio to my library and with each book I always learned something more.

After finding out a little about how sets were made I decided I would like to experiment myself along those lines and see if I could build something that would work.

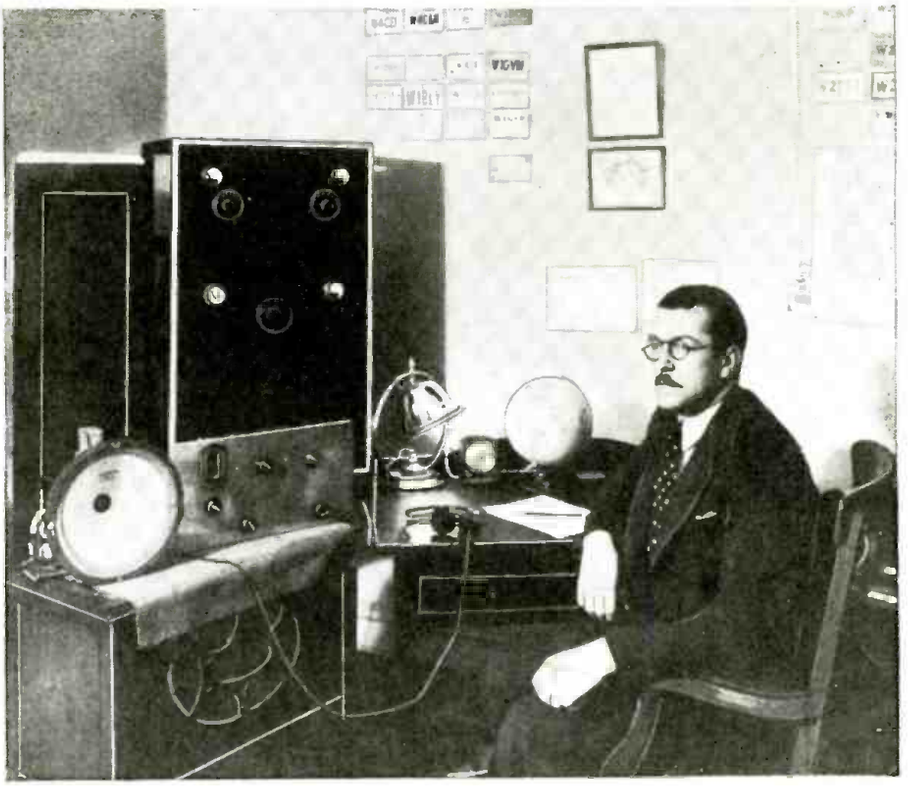
About this time I also became interested in *Short Waves* and decided I would build a Short-Wave Converter to find out what I could get on the Short Waves. Therefore I did build a converter in January, 1932, and hooked it up to the *broadcast* set and heard some amateurs talking and, of course, got lots of code. I did not care much for the Converter so decided to build a real short wave set and as I had been getting SHORT WAVE CRAFT, I saw quite a lot of articles about the *Doerle* receiver, so decided that was the one I would build for a start.

I did build it during November, 1932, and had it ready to hook up to the batteries at the beginning of December, 1932, and you can guess I was delighted to hear lots of amateurs talking on the 80 meter band a few minutes after I turned on the power. I built it with two tubes and in a few weeks added another tube to it and can get lots of stations on the loud speaker with the three tubes when conditions are favorable. The farthest away I have heard so far is Germany and that comes in quite clearly.

The photos show my receiver and a little description about it might be in order. The left-hand vernier controls the tuning condenser. The right hand vernier controls the regeneration condenser. The knob on the top controls the antenna series condenser. The knob on the bottom is for the rheostat. You will also notice on the left hand side of the cabinet another condenser at the top controlled by the long vertical shaft and knob at the bottom, this condenser

(*Continued on page* 182)

Mr. Weinhoeppel's Efficient Station



Carl Weinhoeppel, call W2FTQ, of the Bronx, New York, has laid out a particularly neat and efficient "Ham" station: Note the "globe" used in tracking down those "DX" stations.

Editor, SHORT WAVE CRAFT:

● Needless to say every short-wave enthusiast is looking forward with much interest from one edition of SHORT WAVE CRAFT to another—and I am no exception. In one of your last editions you requested photos of short-wave stations—here is mine.

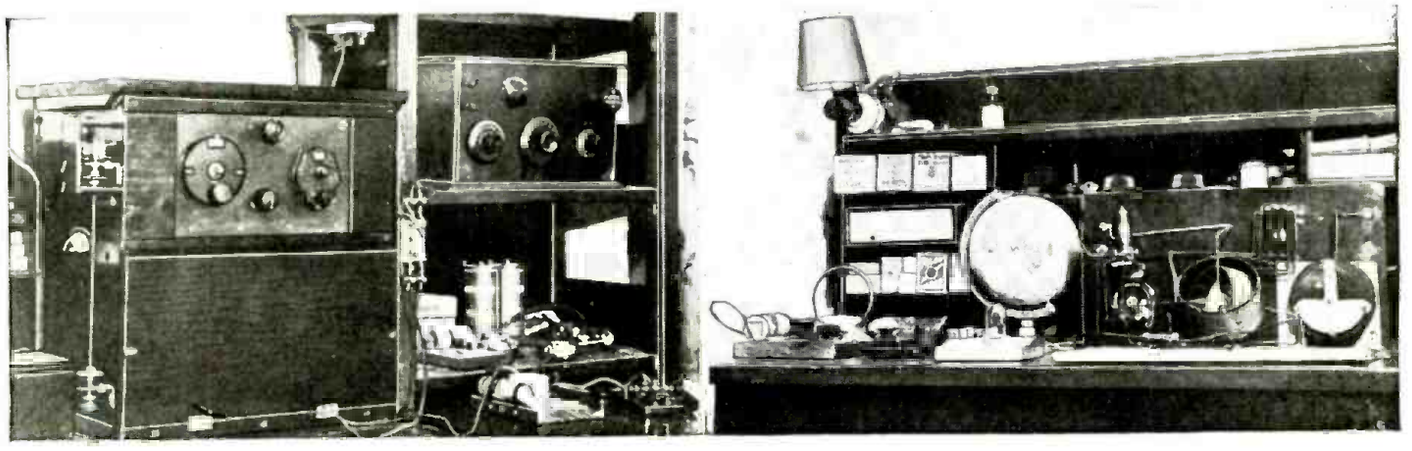
Next to the operating table is the so-called "rig"—it consists of a 47 crystal oscillator, 46 "doubler", followed by a 210 final stage. On the shelf to the left are the "power-packs" for the three stages. In front is the receiving outfit—a TRF 58-58 detector and a 56 audio stage for "loud-speaker" operation on foreign phone and code broadcasts. I use an additional 59 for more "kick".

At present the station is operating on 7 mc.; nearly all districts in the U. S. have been "worked" and a few "heard" cards of European stations are on file.

With best wishes for every success of SHORT WAVE CRAFT.

KARL L. WEINHOEPPEL,
W2FTQ.
2061 Davidson Ave.,
Bronx, N. Y.

(Fine business, Karl, and we ask other readers to note the excellent photo; it's worth a study for arrangement of apparatus and operator all in one photo.—Editor.)



William Ferguson of Ottawa, Ont., Can., operates a typical short-wave "fan" station. Before long he expects to go on the air with a transmitter that he is now building.

A Real 110 Vt.

By GEORGE W. SHUART, W2AMN

This is one of the most compact and efficient All-Wave portables we have seen—and it works on 110 volts A.C. or D.C.; or with a 6-volt filament battery and two 45-volt "B" batteries.

● TO THE short-wave "fan" no summer is complete without a portable receiver of some kind. Portable receivers should be light and compact in order that they can be easily transported. Some portables we have seen have been portable right enough, but portable with a *truck*. The receiver shown in the photographs is really a compact job and can be put into a suitcase along with other vacationing equippage. That is, if our vacation is taking us where there is 110 volts A.C. or D.C. If there is no power available of course batteries will be necessary. However most of us spend our vacations in places where power is available. This set while designed for A.C.-D.C. operation, can be readily used in conjunction with batteries. The car battery or four 1½ volt dry cells can be used to furnish the 6 volt filament voltage and two "B" batteries for the plate voltage (90 volts).

The most important item in designing a portable set is the selection of tubes to be used. Here we have to get the most with the least number commensurate with good performance. The famous "Twinplex" circuit recently developed by Mr. Worcester provides the optimum in performance. For this the 79 tube was selected; the 79 is a twin-triode with a 6.3 volt heater cathode, drawing .6 ampere. This tube provides a very sensitive regenerative detector with one stage of audio all in one tube, which means that we have saved the space required by an extra tube and still have performance equal to a "two-tube" receiver. The rectifier tube can now take the place of the extra tube and we have a complete all-electric receiver using only two tubes.

The rectifier tube seemed at first quite a problem because we had to have the filaments in series. The 79 requiring .6 ampere meant that we had to have a filament in the rectifier that would pass .6 amp. A 25Z5 was chosen and, in order to have it pass the required current, the filament was shunted with an 83 ohm resistor. This makes a total of 41.5 ohms for the 25Z5 and 10 ohms for the 79 or, 51.5 ohms in all when the two are in series. By dividing our 110 volts line voltage by the .6 ampere that is required for the heaters, we find that the total resistance of the circuit should be 183-1/3 ohms. Subtracting the resistance of the heaters, which is 51.5 ohms, we immediately see that our line dropping resistor should be approximately 132 ohms. Procure a line cord with a resistor incorporated in it that has a resistance near that value. By simple mathamatics, calculate the resistance per inch and cut off enough to bring it to the proper value. Make sure the cord is a good one, because it will be carrying .6 ampere; they are usually designed for .3 ampere; a good one will become very hot but no danger will result.

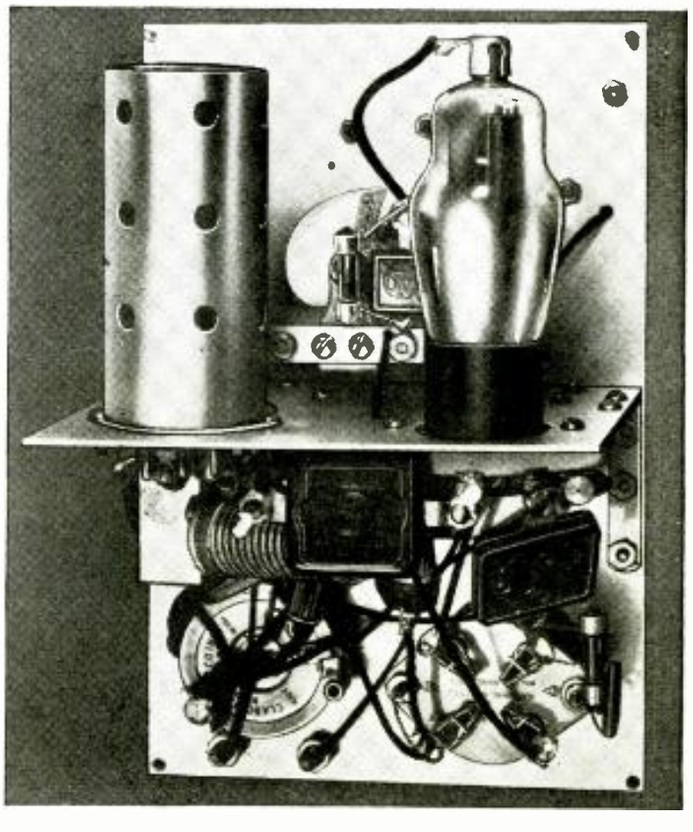
79 Acts As Detector and Amplifier

Getting back to the main portion of the set we find that the circuit is straight-forward in design and there are no tricks in it. One section of the 79 is used for *detection* and the other for the audio amplification. Resistance coupling is used because it takes up much less space than transformer coupling. The most important part of the whole circuit is the .004 mf. bypass condenser in the plate circuit of the audio section of the tube. This is absolutely necessary in order to keep the R.F. (radio frequency) out of the plate circuit of the amplifier. Without that condenser there is a teriffic howling in the phones, which renders the set inoperable. The rest of the circuit is not critical although the specified values of the parts should be adhered to for best results.

The 25Z5 rectifier is connected in a half-wave rectifier circuit, which means that unless we are careful with the wiring and use *plenty of filter*, there is going to be far too much hum present in the earphones. The filter consists of a 30 henry choke (iron core), together with a 1,000 ohm resistor in a double-section filter, with two 4 mf. and one 8 mf. electrolytic condensers. The resistor replaces the usual choke in one of the filter sections and with the very low milliampere drain, provides just as much filtering action and takes up far less room than is required by the choke. While it is just about impossible to remove all the hum from a half-wave power supply on the shorter waves, in this set it was at such a low level that it could hardly be noticed and did not interfere in the least with the reception of the weakest foreign station. Shielding the rectifier tube was also found helpful in reducing the hum.

Regeneration is controlled by a potentiometer connected in series with a fixed resistor across the high-voltage terminals and bringing the plate "B" lead of the detector tube to the rotating arm. This provides a very smooth control.

The chassis consists of a 5⅝ by 8⅝ inch panel, with a shelf 5½ by 4½ inches. Looking at the front of the set, we have the antenna trimmer condenser in the upper left-hand corner, the main tuning dial in the upper central part of the panel, with the regeneration control potentiometer in the lower right-hand corner, and the hole through which the coils are inserted in the socket, in the lower left-hand corner. The phone terminals are right under the potentiometer and the line cord comes through the panel along side of it. The shelf is mounted four inches from the top of the panel and supports the tubes, filter choke and filter condensers. Different layouts will no doubt suggest themselves



Rear view of the chassis for the 110-volt A.C.-D.C. Portable.

A.C.-D.C. Portable

How many times have you said to yourself—"Gee, but I wish I had a small portable about the size of a camera, which I could carry with me on vacation or week-end trips." Here's just the portable you have been looking for—it's light and compact and can be plugged into any 110 volt A.C. or D.C. lamp socket. With a pair of good phones you can hear practically everything going on the SHORT, as well as the BROADCAST waves—this includes those entertaining musical programs from "foreign" countries.

● ● ●

to the builder, especially where a different size carrying case is used. The coil just had to be plugged in through the front panel because if mounted on the panel it would be where the hand capacity would be unbearable.

The size of the particular case used is 9½ inches long, 6 inches wide by 4¾ inches deep, not counting the 1½ inch deep hinged cover. The coils and featherweight headphones are carried in this cover. The set of coils used cover the complete range of from 15 to 500 meters, in order that the regular broadcast stations could be heard when conditions were not so good on the shorter waves. No portable is complete without broadcast band coils.

Remember this is a *portable* and it is likely to be subjected to some rough usage, so mount every part securely and solder all connections firmly. As for results with this little set—all the "foreign" stations can be heard with very comfortable earphone volume, with an antenna only about 15 feet long laid on the floor of the room.

Na-Ald 4-Pin Plug-in Coil Data

Meters Wavelength	Grid coil turns	Tickler turns	Distance between 2 coils
350-500	131 T. No. 32 dsc bank wound 2 layers	32 T. No. 36 dsc (CW)	1/8"
200-350	68 T. No. 28 dsc (CW)	28 T. No. 36 dsc (CW)	1/8"
200-80	52 T. No. 28 En. Wound 32 T. per inch	19 T. No. 30 En. Close wound (CW)	1/8"
80-40	23 T. No. 28 En. Wound 16 T. per inch	11 T. No. 30 En. C. W.	1/8"
40-20	11 T. No. 28 En. 3-32" between turns	9 T. No. 30 En. C. W.	1/8"
20-10	5 T. No. 28 En. 3-16" between turns	7 T. No. 30 En. C. W.	1/8"

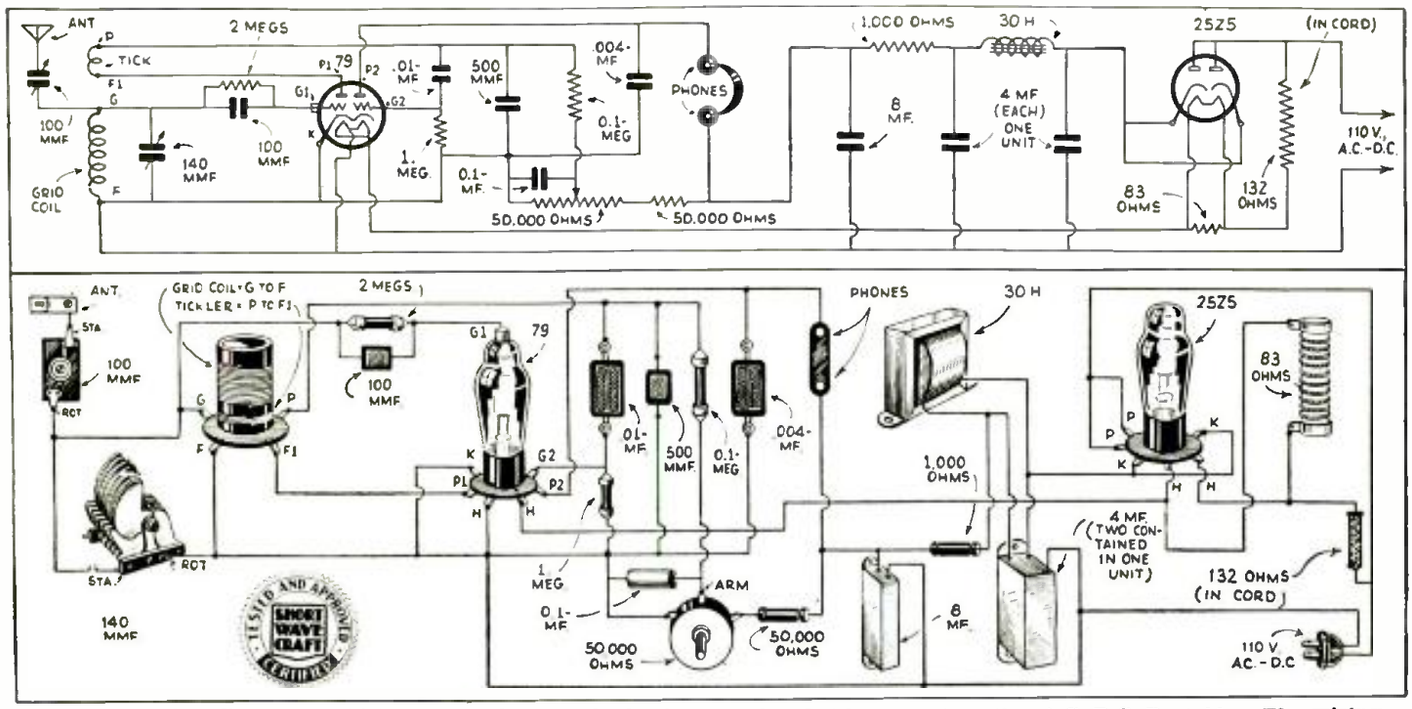
Coilform—2⅛" long by 1¼" dia. 4-pin base.

This photo shows the small size of the portable receiver here described by Mr. Shuart; far different from some of the "portables" which need a 5-ton Mack truck to transport them!

Part List—Shuart Portable

1 Aluminum Chassis (see text). Blan.
1 Carrying Case (see text). Blan.
1 4-prong Isolantite Coil Socket. Hammarlund.
2 6-prong Wafer Sockets. Na-Ald.
1 .0001 mf. Mica Condenser. Polymet.
1 .0005 mf. Mica Condenser. Polymet.
1 .01 mf. By-Pass Condenser. Polymet.
1 .1 mf. By-Pass Condenser. Polymet.
1 .004 mf. Mica Condenser. Polymet.
1 8 mf. 175 volt Electrolytic Filter Condenser. Polymet.
1 2 section, 4 mf. each, 175 volt Electrolytic Condensers. Polymet.
1 .00014 mf. Tuning Condenser. National (Hammarlund).
1 .0001 mf. Antenna Trimming Condenser.
1 2 meg. Grid-Leak. Lynch (½ watt).
1 1 meg. Grid-Leak. Lynch (½ watt).
1 100,000 ohm Resistor. Lynch (½ watt).
1 50,000 ohm Resistor. Lynch (1 watt).
1 1,000 ohm Resistor. Lynch (1 watt).
1 50,000 ohm potentiometer.

(Continued on page 185)



Complete wiring diagrams, which will enable even the beginner to build this very attractive A.C.-D.C. Portable. The wiring is extremely simple and the cost of the parts very nominal.

The young lady finds no difficulty in tuning in "DX" stations 3,000 miles away, on this particularly efficient and well-designed 3-tube battery portable.

Screen-Grid PORTABLE-3

Leonard Victor and Ernest Kahlert

Here's an attractive portable, 3-tube receiver using all screen-grid tubes. It was designed to provide a low current drain on the batteries, which are contained in the cabinet. A test brought in European stations, which gives a good idea of what this set can do.

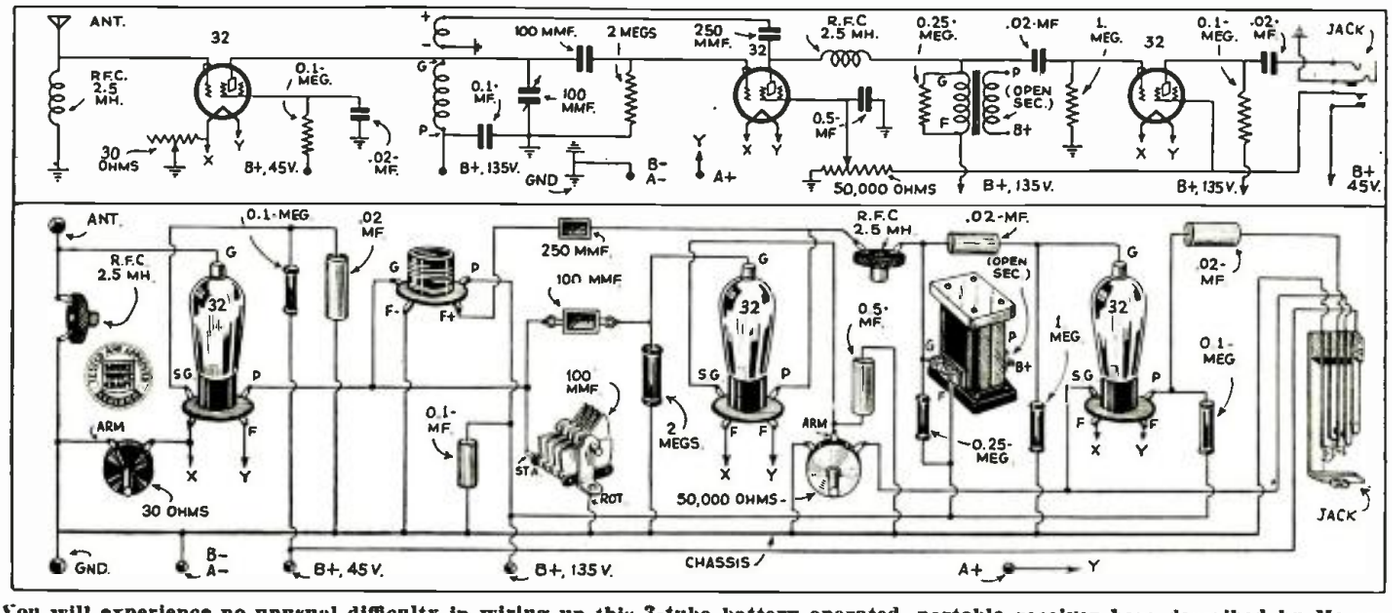
● THE set described in this article is a dressed-up version of a "junk-box" portable that was slapped together last summer so as to have some touch with radio while on a trip. The original set was mounted on a wooden board and bolted into a tin cracker box. Yet the set operated so dependably and lived up so well to the requirements made of it, that it was decided to build a better copy of it for the coming summer's ramblings. Incidentally, this set has many uses around the "home base". On several occasions it has operated admirably as a *monitor*, since it is fully shielded. Likewise it has as good sensitivity and selectivity as most R.F. detector and one-stage audio sets that we have heard. Frequently it has been pressed into service to hear certain stations when the "home receiver" was in process of dismantlement or rebuilding, and as yet has never failed to come through with the goods.

A constructor desiring to build a set like this one does not necessarily have to invest in a metal box and chassis, but has many opportunities for exercising his ingenuity in designing some very sturdy form of container. The essential point to be remembered is that the set must be strong enough to stand the banging it will surely get on an auto or train trip. If the box for the set is made of wood, the inside should be pasted with tin-foil, such as comes in packages of cigarettes, to provide shielding. The foil on the walls, top and bottom of the set should be soldered together, so as to get a perfect electrical shield and prevent annoying crackling noises. We almost ripped a set apart once because it was very noisy, and only after several weeks of annoyance did it dawn on us that the trouble was caused by the tin-foil shielding inside the cabinet in which the set had been placed!

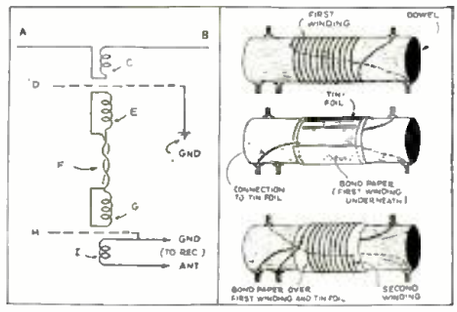
Take a look at the neat layout of the screen-grid portable 3. You will be as pleased with its performance as you are with its appearance.

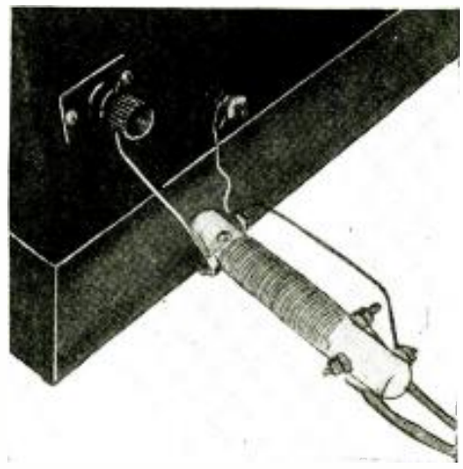
The Circuit

Quite a bit of cogitation went into the choice of the circuit that was used in the set. The question of R.F. or no R.F. was decided immediately. Decidedly yes! Besides the undeniable gain of an R.F. stage, it (*Continued on page* 179)



You will experience no unusual difficulty in wiring up this 3-tube battery-operated, portable receiver here described by Messrs. Victor and Kahlert. The authors are to be congratulated on the happy choice of tubes which they have selected, as the set works out very nicely indeed, both from the viewpoints of economy, as well as reception results.





Left—The weather-proofed antenna coupler. Above—Fig. 1, connection of antenna and couplers to feeder line; Fig. 2, details of couplers. Right—The coupler used at the receiving set.

Interference-Reducing Antenna

By Louis R. Huber

● INTERFERENCE generated by vacuum-cleaners, motors, X-ray machines, heating pads, and other household and industrial devices, is responsible for most of the noise which mars short-wave reception and often makes a short-wave receiving set worthless in some locations. A coupling device for use with the "doublet" antenna eliminates a good share of this interference by the simple expedient of putting the receiving antenna in a spot which is largely free from the interference and running a "feed line" from the antenna to the receiving set—the feed line, of course, being non-sensitive to radio waves.

The most important factor being the location of the antenna, one should select a place as remote as possible from all sources of interference. Height is generally the most successful factor, since the "belt of interference" lies at a height of from 10 to 25 feet above ground, and an antenna situated above this "layer," with a non-sensitive lead-in or feed-line, will not be affected greatly by the interference.

The type of antenna herewith described—the "doublet"—is suitable for use at only one wavelength or frequency, but by building several antennas of this type, the listener is equipped for all wavelengths on which reception is desired. A schematic diagram in Fig. 1 shows the method of connecting to the antenna. The system ACB comprises the antenna proper and the primary coil of the antenna coupler, the antenna proper consisting of two equal lengths of wire separated by a strain insulator, at which point the antenna coupler is connected.

The system CDE is the antenna coupler, consisting of two coils with an electrostatic shield between them. The feed line F may consist of lamp cord or weatherproofed twisted pair such as telephone linemen use for house leads, or—*better yet—of number* 14 *B. & S. gauge enameled copper wires transposed every two feet on transposition insulators.*

The system GHI is the receiver coupler, exactly like the antenna coupler except for the connections. It will be noticed that the electrostatic shield of the antenna coupler is led off to a ground in the vicinity of the antenna. This connection is not absolutely necessary but is desirable. The electrostatic shield of the receiver coupler, on the other hand, is connected to the ground post of the receiver, which may or may not be grounded; trial should be made to determine if the receiver functions better or worse with a ground.

Construction of Couplers

Four sets of couplers will provide the short-wave listener with an efficient short-wave antenna system that will cover nearly all the territory on which

(*Continued on page* 176)

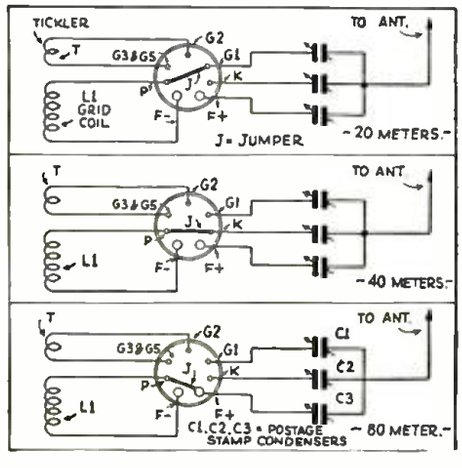
WE WANT REPORTS!

Mr. Huber gives all the details for the construction of the new type of transmission line for coupling a short-wave antenna to the receiving set, so as to minimize the pick-up of the noise-creating currents. We are anxious to know how this antenna coupling scheme works out in different localities, and the editors will appreciate receiving brief reports from our readers after they have tried out Mr. Huber's design of interference-reducing antenna. Address your letters to the Editor.

Automatic Antenna-Coupling Kink

● EVERY short wave set owner knows the inconvenience of having to make a separate adjustment of the antenna-series condenser for each band used. The arrangement illustrated in Fig. 1 automatically changes over to the proper amount of coupling necessary for best reception on any of the three popular bands.

The plug-in coils are wound on 7 prong forms, which may be either manufactured forms or tube bases, the leads being brought out to the pins as shown. The small variable condensers are of the "postage stamp" variety, and are connected to the terminals of the 7 prong socket as shown. "Jumper" wires (J) are used inside the coil forms to connect a separate condenser to the coil for each band used. All of the rotors are connected to the antenna as shown. (A large 7-prong form can be made from a piece of bakelite tubing slipped over a 7-prong tube base.)



By using a 7-prong socket and a 7-prong form, automatic compensation for antenna absorption with different coils is easily arranged for.

The coils are placed in the socket and the condenser which connects to that particular one is adjusted for best reception. The next coil is placed in the socket and the process is repeated with the next coupling condenser, and so on, until each coil has its condenser adjusted.

Now the coils can be plugged-in without any adjustment of the coupling condensers whatever and still have perfect coupling, no matter whether the coil is for 20 meters or for 80 meters.—H. D. HOOTON, W8UPX.

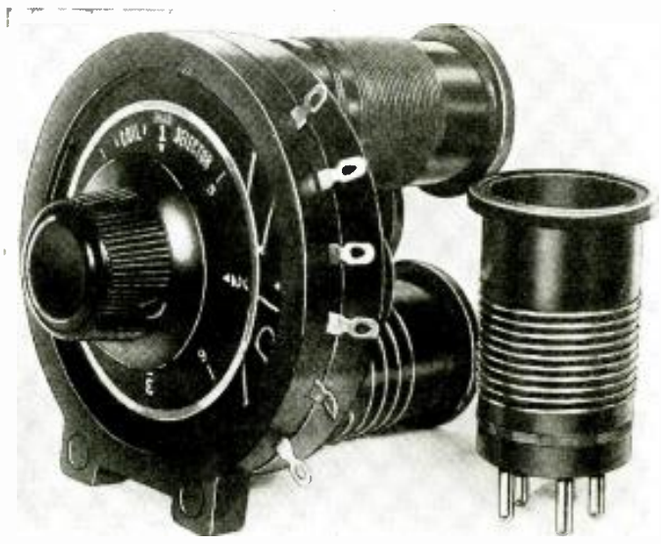
(*This idea can also be used to obtain band-spread on either the "Amateur" or Short-Wave "Broadcast" bands. Instead of using a regular* 140 *mmf. tuning condenser, employ a* 35 *mmf. with separate padding condensers so connected that when a coil is plugged in, it automatically connects the padding condenser, which has previously been properly adjusted, in parallel with the small tuning condenser.—Editor.*)

WHAT'S NEW In Short-Wave Apparatus

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

A Clever Coil Switching Arrangement

● FOR THOSE who have tired somewhat of changing coils each time another short-wave channel is explored, the Alden Manufacturing Company are introducing a new band-selecting device which can be operated from the front of your panel with a mere twist of the wrist. As shown in the photograph, the switching arrangement consists of four universal sockets attached to a moulded selector switch. Either 4, 5 or 6-prong coils can be plugged into these sockets. In other words whether you have a receiver using two or three winding coils, or even band-spread coils, you can plug this complete set of coils into this switch base, which can be mounted on the front panel of your set. Many short-wave experts have registered approval and disapproval of coil-switching arrangements. However, there is no question but that coil-switching arrangements are here to stay. One nice feature about this switching arrangement is that the coils can be changed without altering any circuit connections. In other words, if you wish to listen in on one or two of the short-wave channels, together with the regular broadcast band, you can insert two short-wave plug-in coils and the two broadcast coils in the switch and you have truly an *all-wave* receiver. The switch being universal in design will serve the experimenter well, for when he wishes to change circuits all he has to do is select the proper terminals from the base of the switch and insert any coil which he may desire to use. This switching arrangement can be used in conjunction with any of the popular receivers described in SHORT WAVE CRAFT, even to the *3-tube "Electrified" Doerle Set*, where two sets of different type coils are used, one set of 4-prong coils and 1 set of 6-prong coils. When used in a set of this type, which has a tuned R.F. stage, two switches are ganged together, a set of 4-prong coils being used in one and the 6-prong coils in the other. It is a single-hole mounting affair furnished with a very neat escutcheon, clearly marked to indicate the coil which is being used. The switch requires 3½" of space behind the panel and is 4" in diameter, a really small instrument for the big job it does.



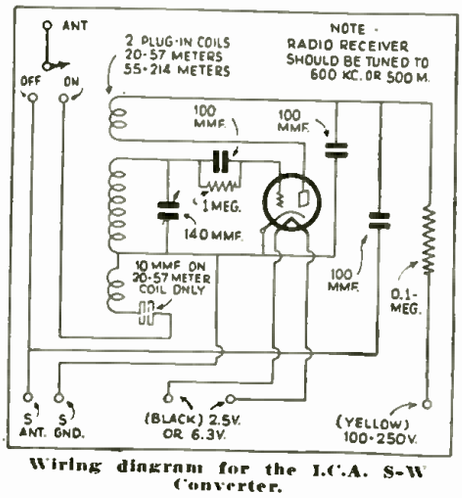
Here's the new Na-Ald Short-Wave Coil Switch; regular plug-in coils fit into the receptacles moulded on the back of the switch. (175)

This Converter Tunes in S. W. on Your B. C. Set

The newest member of the short-wave converter family—the I. C. A. Converter—which enables you to hear "short-wave" stations on your "broadcast" receiver. (176.)

● HERE is a novel short-wave *converter*—it will make any fairly sensitive broadcast receiver a short-wave superheterodyne with which you can enjoy thrills of speech and music emanating from many of the foreign broadcast stations. It is housed in a very neat modernistic cabinet, very similar to those used in modern electric clocks. It uses a 56 or 37 tube, depending upon the type of receiver it is to be used with. Two plug-in coils cover the various short-wave broadcast channels from 80 to 114 meters. This converter is designed to receive its power (plate and filament voltages) directly from the broadcast set; this is accomplished by inserting three small clips over the prongs of one of the power amplifier tubes. The broadcast set should be tuned to approximately 600 kc. (500 meters) for best results. When once attached to the broadcast receiver it is only necessary to flip a switch mounted on the front panel. It is unnecessary to disconnect the converter when changing from short to long waves. The accompanying diagram and photograph clearly shows the general appearance and circuit of this ingenious little converter.

The volume, of course, is controlled with the regular volume control incorporated in the broadcast set. Tuning is usually done with the converter dial; however, in short-wave bands it is quite possible to set the converter in the center of this band and tune the stations in or out with the broadcast receiver tuning control. This means that you can actually tune in or out short-wave stations with the same ease that broadcast stations are tuned in with the regular set, making the adjustments on the short-wave stations far less critical. In many cases interference can be overcome by adjustment of the broadcast receiver.



Wiring diagram for the I.C.A. S-W Converter.

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

This 2-tube short-wave receiver is really the equivalent of a 3-tube set, a 6F7 "dual-purpose" tube acting as detector and A.F. amplifier. (No. 181.)

The "All-Electric 3" Uses Dual-Purpose Tube

By L. J. MILES*

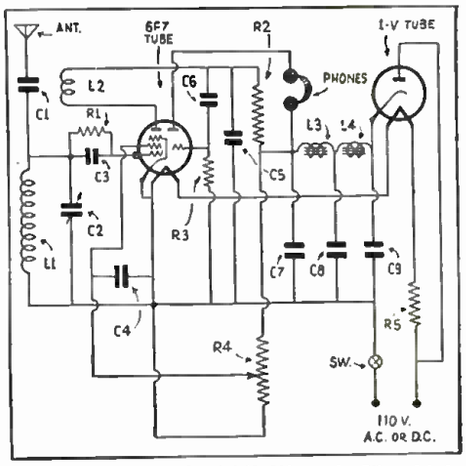
● THE short-wave receiver here described should be of considerable interest to the home set constructor who wishes a simple, inexpensive, sensitive and compact receiver. When used properly, it is capable of producing excellent head-phone volume on "foreign" as well as American broadcast stations.

Due to the application of the new 6F7 high-gain "dual-purpose" tube, this receiver is in reality the equivalent of a 3-tube short-wave receiver. In it are combined the advantages of high sensitivity, operation directly from the 110-volt house lighting circuit, and freedom from all traces of hum.

The electrical circuit diagram is seen to consist of a screen-grid regenerative detector, utilizing the R.F. pentode section of the 6F7, one stage of audio frequency amplification employing the triode section of the same tube, and a rectifier and complete built-in power supply utilizing the 1V type of tube.

The antenna is coupled to the receiver by means of the series capacity C1, having a range of approximately 7-80 mmf. This instrument allows some control over the signal input to the receiver, as well as to remove so-called dead spots from the tuning dial. Grid leak and condenser detection is employed, resulting in a high level of sensitivity. Regeneration is controlled by means of the potentiometer R4 which varies the screen-grid voltage. This method of control results in an unusually smooth and noiseless detection system. Resistance coupling to the audio frequency amplifier is used and results in excellent tonal quality. Grid leak bias is also employed for the audio amplifier. Due to the relatively low plate impedance of the 6F7 triode section, the headphones may be connected directly in its plate circuit with excellent results.

The filaments of this receiver are lighted directly from the 110-volt house lighting circuit, the current being limited to the proper value by the series resistor R5. Plate voltage is furnished by the half wave rectifier and two section filter, and is free from all traces of hum. No ground connection is necessary with this receiver as such connection is automatically obtained through the house lighting circuit.



The circuit for the "All-Electric 3", which uses a 6F7 and a type 1V tube as a rectifier.

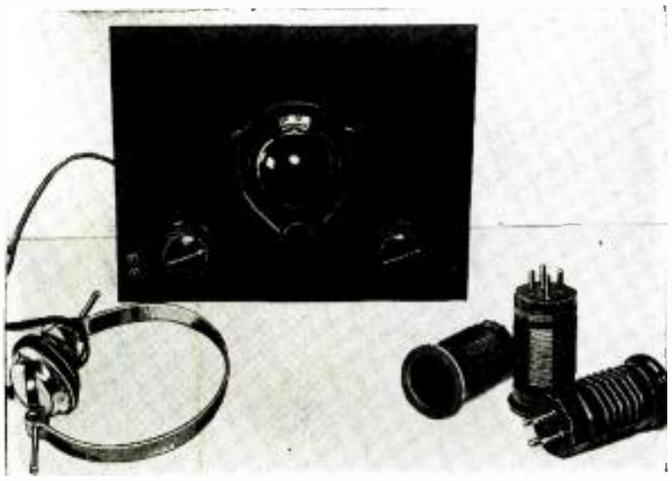
The complete receiver is mounted upon a heavy, black, crackle finished metal chassis

(*Continued on page* 166)

* Ellen Radio Laboratories.

The 2-Tube Short Wave "DX-ER"

By W. F. MARSH*



One of the newest 2-tube short-wave receivers to make its bow is the one here shown. It uses two 30-type 2-volt tubes. (No. 182.)

● THE 2-Tube "DX-ER", here illustrated, answers the need for a battery-operated short-wave set of simple and proved design. There is nothing elaborate or complicated about it. It is frankly conventional, easy to build, and unusually dependable for short-wave results. For those who want to start exploring the busy short-wave channels, the "DX-ER" is a very logical and straight-forward type of set to construct.

As will be seen from the schematic diagram the circuit is the old familiar "stand-by" single-circuit regenerative type, with tickler feed-back. The placement of the parts is extremely important for effective results. One of the line drawings illustrates the most practical layout for maximum efficiency. It is also important to use good quality parts. Shoddy equipment thrown together carelessly will not bring the desired results.

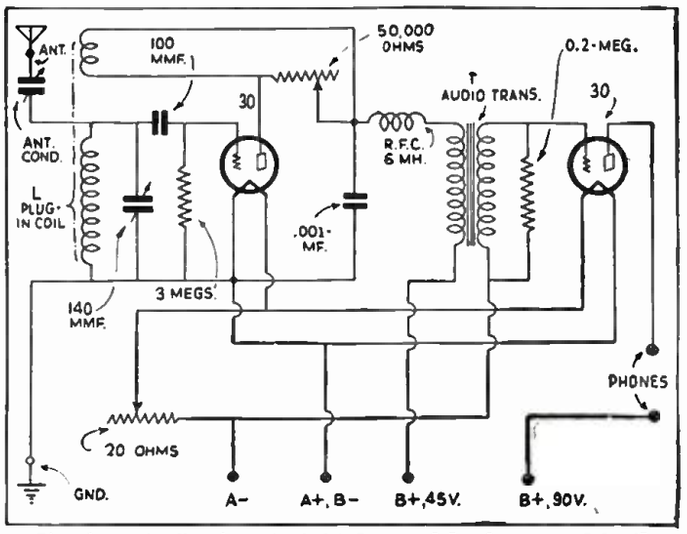
For economical operation, two type 30 low-drain two-volt tubes are used. The first serves as a regenerative detector; the second is used as an audio amplifier. The tuning range of the receiver is 15 to 200 meters, covered by a set of four improved plug-in coils. Regular broadcast reception is optional, by adding a set of two plug-in coils to cover 200-500 meters.

All of the parts are mounted on a wooden base-board measuring only 8x9 inches. The front panel is of hard rubber, 7x9 inches, and holds a vernier tuning dial, a regeneration control, and a filament control rheostat. All of the parts required are available in "kit" form, and the entire design and layout has been carefully planned so that the "DX-ER" may easily be assembled by anyone.

It is important to point out again that the plan layout of the apparatus shown be carefully adhered to. It is particularly desirable to keep the plug-in coil as far away from the other parts and the front panel as possible. Careful wiring will insure proper results.

Regeneration in the "DX-ER" is controlled by a 50,000 ohm variable resistor connected across the tickler leads. The output of the detector is transformer-coupled to the audio tube by a shielded transformer having a ratio of 1 to 5. A load resistor of 200,000 ohms is connected across the secondary of the audio transformer to eliminate any possibility of

(*Continued on page* 175)



Simple and effective straight-forward hook-up used in the 2-tube short-wave "DX-ER"; two 2-volt tubes are used.

* Chief Engineer, Allied Radio Corporation.

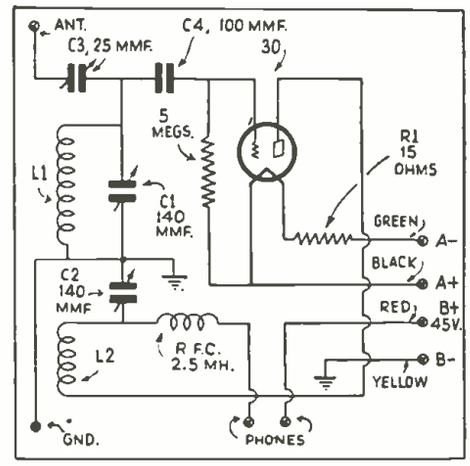
The All-Wave Master

The All-Wave Master Receiver is designed in three units for the "Beginner," so that he can add an R.F. and an A.F. unit as he desires to the central regenerative detector unit. (No. 177.)

● THE All-Wave Master represents something quite different from the usual design of short-wave receivers. Of particular interest is the more or less modernistic layout. The chassis has three side, back, top and a slanting front on which are mounted the two *tuning controls*. The top portion serves as a mounting base for the tube and plug-in coil as can be seen in the photograph. The chassis is one piece of metal bent in this manner in order that the wiring could be concealed underneath with the various sides serving to mount the parts. It is especially constructed so that the beginner can add two additional stages, without materially affecting the basic one-tube unit. These two stages are, an *untuned R.F.* stage which can be attached to the left of the chassis, and a *pentode audio amplifier stage* which can be attached to the right. The diagram only shows the wiring of the detector or single tube unit, which forms the basis of this "Add-A-Unit" receiver. The circuit is straight-forward in design and uses the well-known plate feed-back method of obtaining regeneration and oscillation. Regeneration is controlled by a variable condenser connected between the B plus side of the tickler and the B negative.

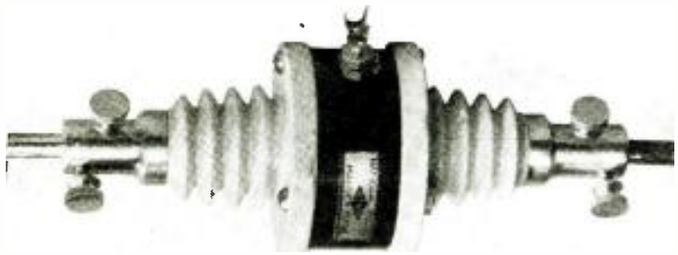
Standard plug-in coils are used, four being necessary to cover the complete range from 15 to 200 meters with a 140 mmf. variable tuning condenser. Antenna coupling is accomplished by the miniature variable condenser connected between it and the grid side of the tuning inductance. This set should be of particular interest to the "beginner", inasmuch as he can start off by building up the 1-tube portion and after he has become thoroughly familiar with the operation and handling of receivers designed to operate the short-wave bands, he can add the pentode audio stage which consists of a small section of chassis, bent the same as the basic unit and designed to fasten directly to it, giving the appearance of a complete one-piece chassis. This, of course, would require the addition of extra "B" battery as it is only necessary to use one 45-volt battery on the detector unit, but in order to attain the highest percentage of efficiency from the pentode amplifier, which is a

(*Continued on page* 166)



Wiring diagram of the All-Wave Master S-W Receiver.

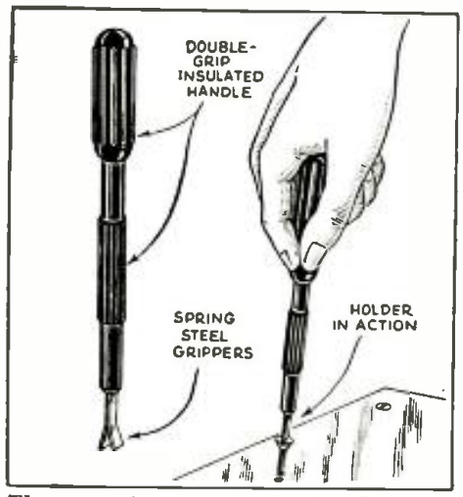
New 5-Meter Coupler



● FOR THE fellows interested in 5-meter transmission the National Company of Malden, Mass., have designed a very efficient coupling system to be used in coupling the output of the transmitter to the antenna proper. A glance at the photograph will reveal that this coupling transformer is designed to be part of the antenna. Two antenna rods, which should be approximately 43 inches each in length, are inserted in each end of the coupling transformer. It is designed so that it can be easily adapted for portable use in conjunction with the transceivers which have recently come into their own among the 5-meter fans. Each end of the coupler is fitted with knurled thumb-screws in order that the entire antenna system may be dismantled at a minute's notice. Not only is this an efficient transmitting antenna system, but it will serve excellently on 5-meter receivers, inasmuch as a 5-meter fundamental antenna can easily be erected and which will provide much better results than the ordinary short piece of wire, which most of the 5-meter boys have been using. (No. 179.)

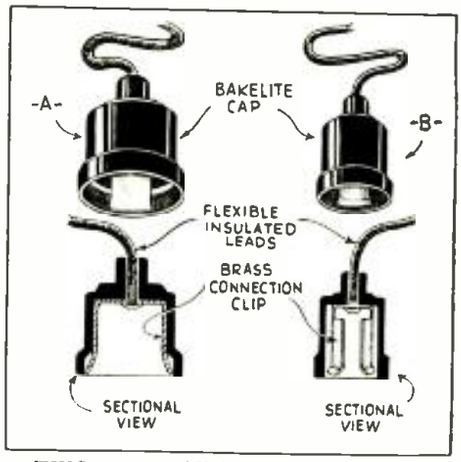
A "Sure-Grip" Screw-Driver

● HERE is a very handy screw "gripping" screw-driver which should go far to aid the experimenter in retaining his patience when working in very tight quarters. The spring grippers on the end of the screw-driver are designed to hold a screw firmly. A slight press on the handle will disengage the clutch which holds the screw-driver. This is very handy and should be of especial interest to the serviceman and experimenter.

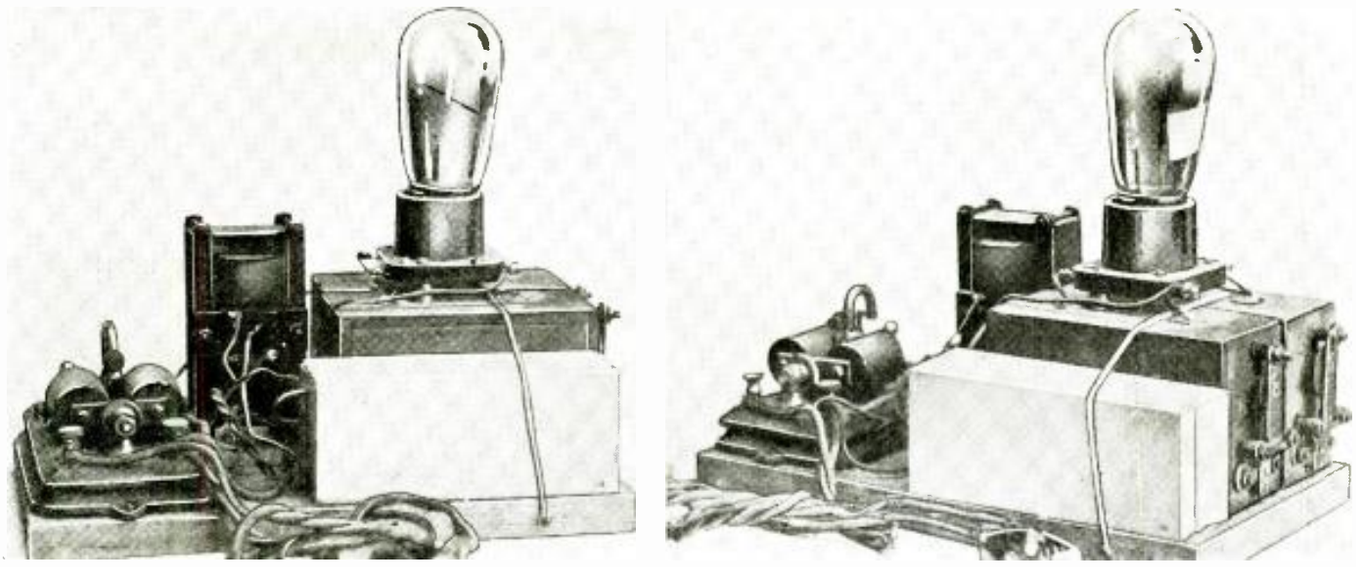


The newest sure-grip insulated screw-driver for radio set-builders and servicemen. (No. 178.)

Insulated Grid Clip



● TWO recent additions to the well-known Na-Ald line are insulated screen-grid clips. One is the regular size unit to be used in conjunction with regular receiving type tubes having a grid terminal on top of the bulb, and the other is a large clip designed to be used in conjunction with the 866 rectifier tubes. They are constructed of molded bakelite which houses the metal spring clip and are furnished with extra long leads insulated with varnished cambric. It is a very neat piece of apparatus and should go far to prevent the experimenter from getting burned in case the hand should come in contact with the top of the 866 tubes when the plate voltage is on. (No. 180.)



The photographs clearly show how the various parts of the power supply are mounted.

Power Supply from Ford Coils

By C. V. CRANE, Ex. W9ARQ

For the boys in the Rural districts, this power supply provides a very efficient source of plate voltage. It would also serve very nicely in camps, where temporary transmitters are used to communicate with the folks "back home."

● MANY "Hams" have expressed deep interest in this novel power supply, especially those living in rural communities, or communities not supplied with A.C. line current, for whom this article is especially written.

No doubt some may look upon it with disfavor, in fact I did until I had given it a trial. In its original form some trouble was experienced, but by many experiments the final circuit was developed, which far exceeded all expectations.

Some may say that the vibrator points will give no end of trouble, others may say that it will be impossible to secure a good P.D.C. note, and steady frequency. All I can say to the skeptical is "try it" and convince yourselves as I did.

In experimental tests covering a period of 4 or 5 days on the 85 and 160 meter bands with not over 2 hours of operation time per day, some 40 to 50 stations were contacted and *worked*. All reported absolutely steady frequency, some D.C. reports were received, but the majority were P.D.C. with audibility reports from QSA 3-5 and R 5-8. This is not so bad considering that a pair of 201-a tubes were used in the conventional Hartley oscillator circuit.

Not much time was spent on the 85 meter band or in trying to work DX. But to give an idea as to what can be done with this power supply in the low power field, from central Kansas stations were worked as far east as Ohio. As far north as the Canadian line. As far south as Port Arthur, Texas, and as far west as Livingston, Montana. And at no time was any trouble experienced with the vibrator points. Although the secret of the whole supply lies in the adjustment of the contact points and relays.

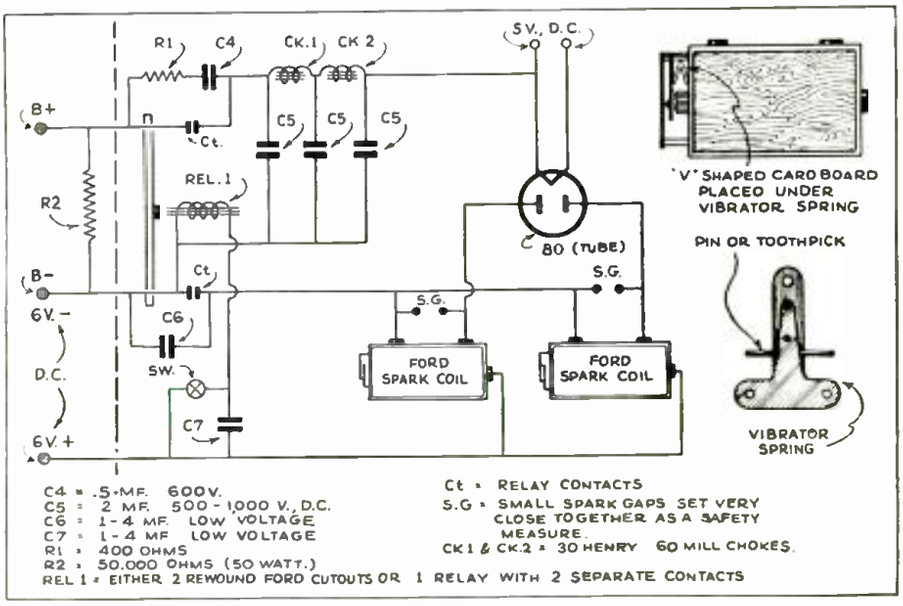
Now for the adjustment of the vibrator points. Be sure they are good, new ones preferred. Cut a small piece of *stiff* cardboard about 2" long and ½" wide; bend it into a "V" and place it under the vibrating reed as shown.

Next place a pin or toothpick between the upper reed and its mounting as shown in the drawing.

Now with the oscillator on and the power supply connected, adjust the vibrator points until the milliammeter in the plate lead to the oscillator reads maximum *steady* current. You are now ready to tune your oscillator and go on the air.

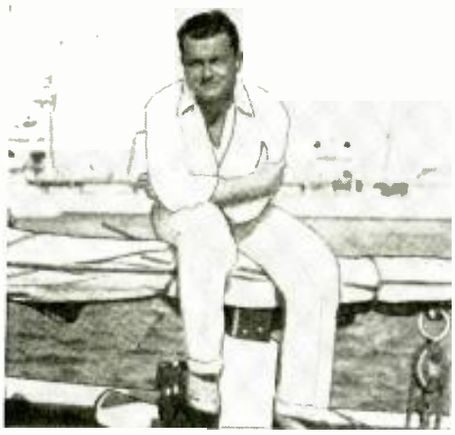
One thing to keep in mind is that in using the 280 type rectifier a separate storage battery is required, while by using the Raytheon type rectifier no such battery is needed. If sparking appears in the rectifier tube reverse the

(*Continued on page* 178)



The above diagram shows how the Ford spark coils are connected in this novel power supply.

A 6-Volt Transmitter



The author aboard the good ship "Buccaneer."

● EARLY in January of this year the two masted schooner-yacht *"Buccaneer"* sailed from New Orleans, bound for a seven months' cruise to various ports in Central and South America, and the host of islands which line the lower Caribbean Sea. This tour was conceived and launched by Irving Buck, director of Boy's World Cruises of New Orleans. There are ten young men aboard who are representative of American boyhood and who together with the five leaders will have an interesting trip.

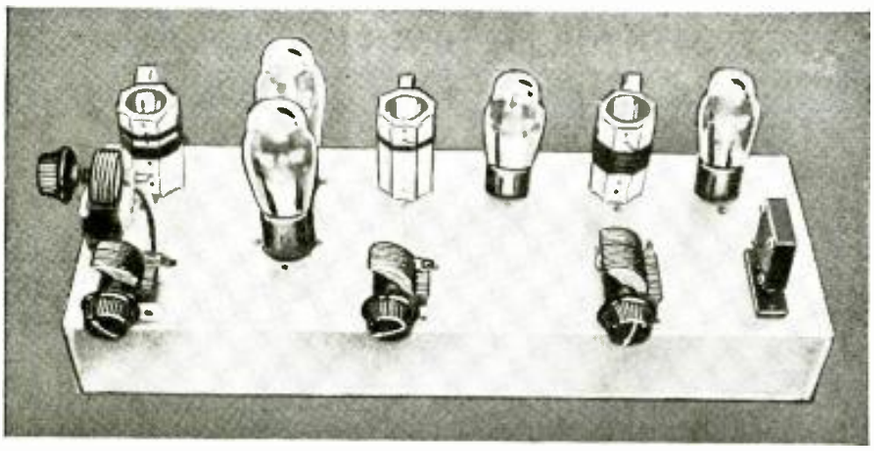
The necessity that reliable means of communication with the States be kept at all times left no alternative; only a properly designed and operated short-wave radio station would do the trick. Regular 600 meter equipment would not be satisfactory in operation because of distance limitations. The final design must be compact, self-contained, low-powered and yet allow reliable long-distance communication at all times.

The answer has been found in a *battery operated,* crystal-controlled rig, using 6-volt heater type tubes and a National SW-3 receiver. Such a transmitter is a comparative oddity in radio circles and the building of the equipment was somewhat different from the usual amateur job.

Information from reliable sources indicated that one set of heavy duty "B" batteries could be expected to deliver 100 ma. (milliamperes) over a period of several months when used intermittently. About 50 watts input to the transmitter on high frequencies should be available, and at 100 ma. we would need 500 volts or about eleven blocks of the 45 volt size. The "A" batteries are charged by a small gasoline generator. A dynamotor for high voltage was considered but later discarded because of the high first cost and the poorer voltage regulation to be expected from such a device. Steadiness in the emitted signal was of prime importance and there should be no changes in the plate voltage during the process of "keying".

The combination of battery supply and a crystal-controlled oscillator will give probably the best note which can be obtained from any CW transmitter. Its piercing sound can penetrate the perpetual static of the tropical sea-coast like no other. Incidentally the transmitter which was finally evolved has held almost perfect contact with the states for several months, working on 6,170, 6,210 and 8,290 kilocycles.

The complete transmitting and receiving equipment installed aboard the "Buccaneer." The receiver was a National SW3.

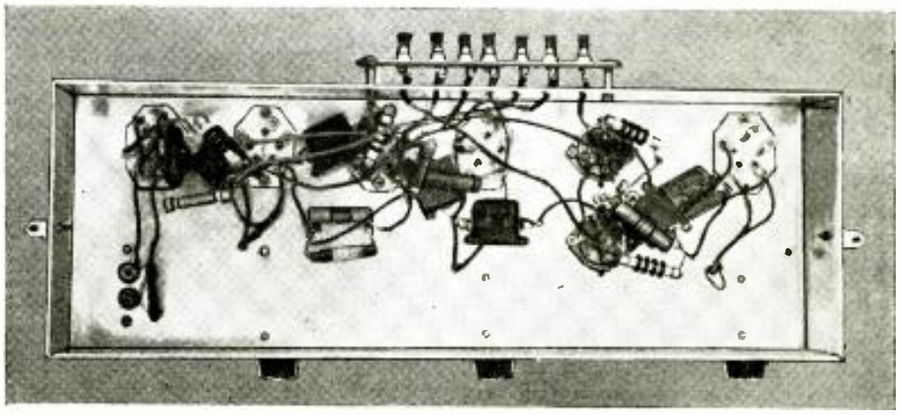


Perspective view of the 6-volt transmitter, which sported "crystal control."

In the event that some of the readers of SHORT WAVE CRAFT should find application of this transmitter as a portable outfit or for permanent use where no city power is available, the constructional details are herewith presented. Such an arrangement would be excellent for use in out-of-the-way summer camps and lodges or as a permanent installation in rural districts.

The transmitter was built up on an aluminum base in three electrically distinct units; the oscillator, frequency-doubler stage, and the final stage. The aluminum base was laid off on 3/16 inch stock, cut, drilled and bent into shape. The dimensions are 3 inches high, 6 inches wide, and 20 inches long. Isolantite sockets and plug-in coil forms

* Chemical Engineer.

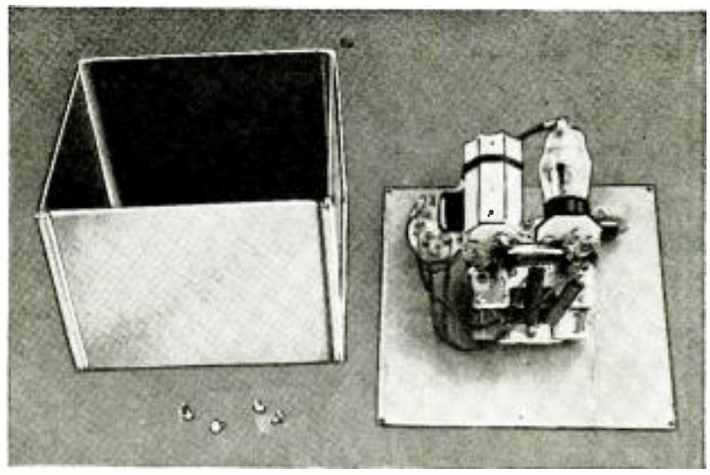


Bottom view of the 6-volt transmitter.

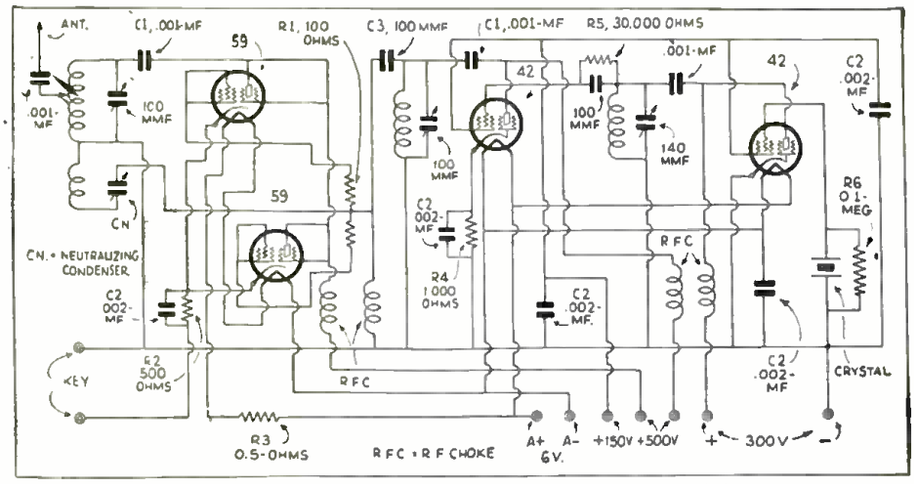
That Went to Sea

By A. D. MAYO, Jr.*

An unusual type of battery-operated transmitter, carried on a recent cruise made by a group of young men aboard the two masted schooner yacht "Buccaneer." The transmitter here described employed "crystal-control" and 6 volt heater type tubes. It was operated from a 6 volt storage battery, the plate current being supplied by a bank of 45-volt dry "B" batteries. The transmitter gave excellent satisfaction and pierced the tropical static in surprising fashion.



Appearance of the "frequency meter" and metal shield box.



Wiring diagram of the 6-volt transmitter used very successfully aboard the "Buccaneer."

wound with No. 18 and 20 wire were used for the inductances. The coils were tuned by midget receiver type condensers.

Referring to the top view of the transmitter close-up, right to left, we see first the plug-in crystal holder, and behind it the 42 pentode crystal oscillator tube. Next are the midget tuning condenser and the coil for this stage. Note that a 140 mmf. condenser is used in this stage, whereas the following ones are 100 mmf. The high capacity in the tank tends to give better stability by making the frequency less sensitive to changes which take place in "keying". A spring pressure type crystal holder is necessary in

(Continued on page 170)

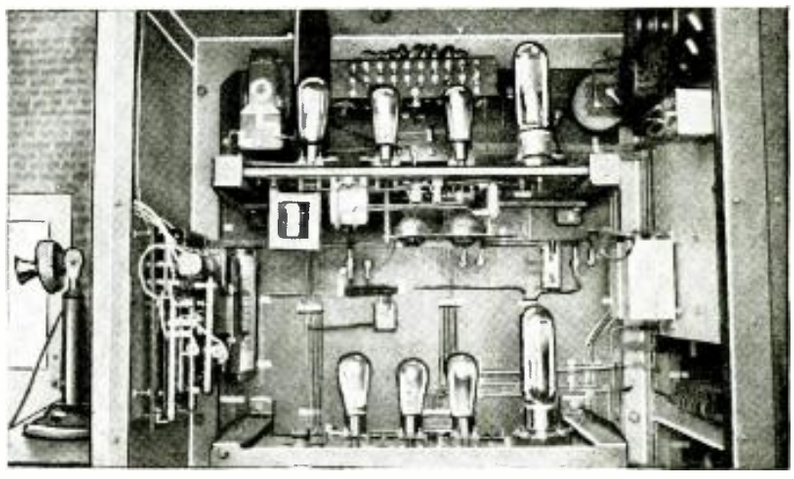
Oscillator Control-Tube Permits Voice to Operate 'Phone Transmitters

By CHAS. W. CARTER

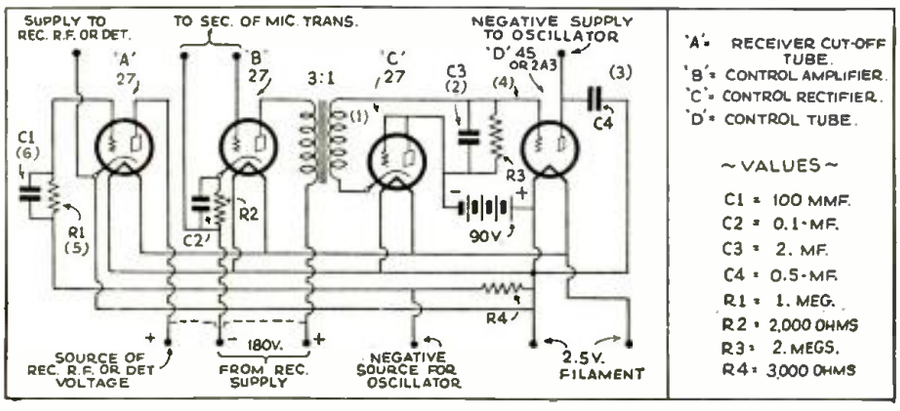
● LAST YEAR I investigated the possibilities of using a control tube for keying the transmitter, the advantages of which were the elimination of key-clicks, thumps and removal of high voltage and sparking from the key contacts.

After considerable thought in regard to its practicability and advantage in amateur use, this article has been prepared on *control tube* operation of the 'phone transmitter.

The resulting effect from the use of this system is that the transmitter oscillates only when a word is spoken. As applied to an individual station, this would mean that interference caused to other stations would be greatly reduced. Its greatest usefulness will be found in *duplex telephony*, in which both stations can use the same frequency. Rather than duplex, I might say multiple telephony, for as many as six stations could operate



The system here shown permits multiple telephone operations on any of the amateur phone bands with a minimum of QRM (interference). This surely would relieve the congestion on the 80 meter "phone" channel. The sound entering the mike causes the transmitter carrier to go on the air, due to the simple addition of another 27 tube; the receiver can be cut off at the same time.



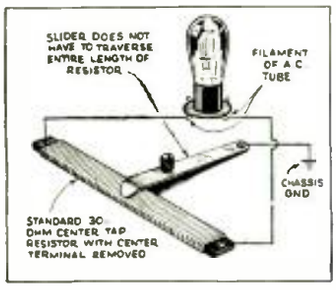
on the same frequency in group QSO parties. The infrequent use of duplex is no doubt due to the difficulty of preventing interference in the receiver from the transmitter, except in the rare case where the transmitter can be located some distance from the receiver and operated by remote control. Even then, the interference caused to other stations

(Continued on page 169)

$5.00 PRIZE

BALANCING OUT HUM

A good method for balancing out hum in A.C. sets is given below: As shown in the diagram, the ends of the resistance are connected across the filament of the tube, and the sliding contact is connected to



common ground and adjusted for the least hum; mount the resistance near tube.—Jos. Galan.

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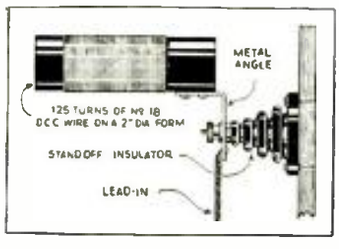
SHORT-WAVE KINK

Short-Wave fans who find it difficult to erect a receiving antenna, due to lack of space, would do well to try this kink. 125 turns of No. 18 D.C.C. wire are wound on a 2-inch diameter form, leaving enough space at one end to affix a small metal angle. Holes are drilled at each end of the angle to accomodate machine screws for attaching it to coil form and porcelain stand-off insulator.

The arrangement may be mounted outside, over a window, or wherever it may be convenient. This type of antenna is used at W7ZZAK, and pulls in "DX" on both long and short waves in a most satisfactory manner.—Milton F. Peterson.



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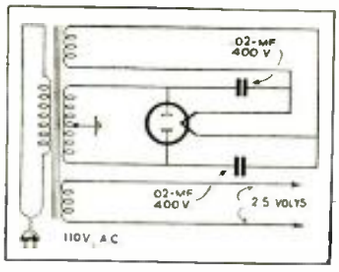
REMOVING "TUNABLE HUM"

Here is a kink for taking the "tunable hum" out of a short-wave power pack. I use two .02 m.f. condensers of 400 volts rating.—Theodore H. Buschick.



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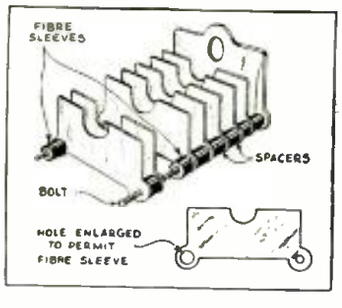
2-SECTION CONDENSER

Here is a suggestion for a two-section tuning condenser. To make the condenser a 23-plate midget was used. The stator plates are removed and a hole in each plate is enlarged to permit fibre sleeves to pass through, and fit over the bolts; condenser is then assembled as shown in accompanying sketch. With this type of condenser a wide range of frequencies may be covered with fairly good bandspread, using a single coil.—J. Walaitis.



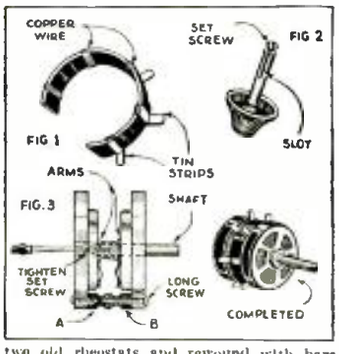
$5.00 FOR BEST SHORT WAVE KINK

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.

SIMPLE "GANG-SWITCH"

In building the 2-tube "Oscillodyne described in the May 1933 SHORT WAVE CRAFT, I discovered an excellent arrangement for making a "gang-switch."

The resistance wire was removed from



two old rheostats and rewound with bare copper wire in ⅛" section for the contacts as shown in FIG. 1. Strips of tin of the same width were soldered against the contacts for making convenient connections. The rheostats used were equipped with slotted shafts shown in FIG. 2. In FIG. 3 one shaft holds the two arms together and the old binding-posts serve to hold the entire assembly.

The threads are drilled out of the binding posts at (B) to allow long screws, which are the only extra parts used, to pass through and into binding posts (A). —J. W. Barnes.

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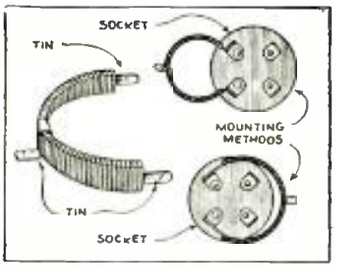
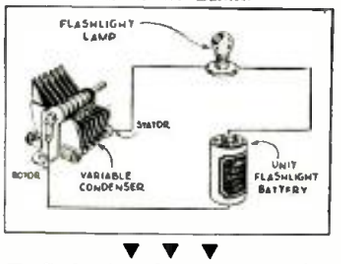


EMERGENCY CENTER-TAPPED RESISTOR

For the "ham" who does not have a 20-ohm center-tapped resistor handy, here is one way to solve the problem.

Secure an old 20-ohm rheostat from the junk box and remove the resistance strip. Cut three strips of tin and with a little soldering paste, solder them to the ends and center of the strip as shown in the illustration. The curved form of the resistor may suggest several excellent ways for mounting.—J. W. Barnes.



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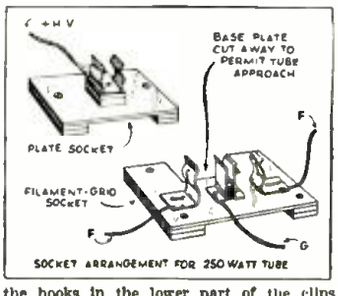
TESTING TUNING COND.

If the lamp lights while turning around the tuning condenser, you know that the plates touch at that point, and that the plates need to be straightened out at that point, so as they do not touch each other. Then test it over again in the same way until the lamp does not light. Then you know that your tuning condenser is working properly.—Ignas Zwigaitis, Jr.

SOCKET FOR 250 WATT TUBE

Required: Two large Fahnestock clips; a terminal clip for the standard 60-100 ampere cartridge fuse; the receiver contact for a ½ inch wide, knife switch-blade; bakelite and assorted flat-head and button-head screws and bolts. For the plate socket the fuse clip will usually not have to be altered, having a threaded hole to which a bolt, holding the bakelite base plate and bakelite shims, may be fastened. Further, the base plate may be "shimmed up" with bakelite so that the tube can clear the baseboard of the set, with plenty of air space. A lug projects from the fuse clip to which connections may be soldered or bolted. For the other socket, the knife switch receiver contact, without alteration, is mounted centrally on the base plate. The Fahnestock clips are bent out so as to take the shape shown;



the hooks in the lower part of the clips are flattened and bent over so as to leave a space large enough for a small bolt to pass through. The clips are fastened with two bolts each, to the base plate and can be bent in or out so that they will make a firm biting contact with the filament terminals of the tube. The curve in the upper part of the clips will hold the tube down in place. The base plate is cut away as shown, to make way for the tube. —Albert J. Mandelbaum.

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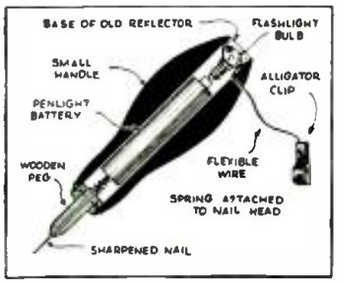
CONTINUITY TESTER

In making this convenient tester, a handle from a small hand-drill is drilled to the size of the "pen-light" battery. A wooden plug is placed in one end and



through this plug is placed a sharpened nail. A small spring is soldered to the head of the nail so that it makes contact with the battery. An ordinary 2-volt flashlight bulb is used. A small alligator clip is attached to the flexible wire, which is soldered to the reflector.—Victor Camp.

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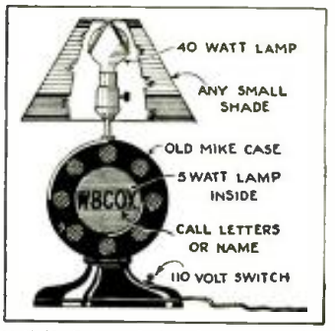
RADIO LAMP

Here is my "radio lamp" which was evolved from an old "mike" case and other odds and ends. The finished product resides atop our broadcast receiver in the living room. A circular piece of transparent white paper, with station call letters printed on it, is fastened inside the wire mesh face of the "mike" case. A 5 watt, 110 volt bulb is located directly behind this screen, while a 40 watt lamp is fastened on top of the case. A shade was procured from the five and ten cent store. Both bulbs are in parallel and are turned on by way of a small switch mounted in the base. An interesting effect is obtained by lighting only the enclosed 5

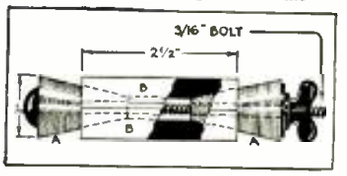


watt lamp in a darkened room, especially so if red or green bulbs are used.—Ralph C. Folkman.

▲ ▲ ▲

COIL WINDING HINTS

I devised the attachment shown to keep the forms tight so that the coils could be wound with perfect ease. First, the forms are cut out from blocks of wood, four in all. The dimensions are 2½ inches long, 5/16 inch thick, and 11/16 inch wide. Both ends are marked off ¾ inch to the center and are cut to slope to a ⅛-inch thickness and they are grooved in the cen-



ter so that the round chuck could fit nicely. The top of the forms is rounded to suit the coils. The chucks are cut out from the thread spools one inch in diameter at one end and ⅝ inch at the smaller. A ¼ inch hole is cut in the middle to receive a bolt. The parts or forms are kept in place by a rubber band. The forms and chucks may be made bigger if needed to suit the larger coil, and also the attachment can be used with only two forms and work as well. When the screw is tightening the chucks are drawn apart, causing the forms to spread and thus tightening the coil form. This can be placed in the chuck of a hand drill which is held in a vise and the wire can be wound tightly on the form.—Francis Salwiea.

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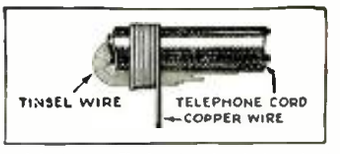
SOLDERING PHONE CORDS

Trying to solder the tinsel wire in phone cords has caused much gray hair. After vainly trying several ways, I finally happened on this method which I find quite



satisfactory. Push the insulation back from about ¾ inch and double back the exposed wire along the insulated portion of the cord. Wrap fine copper wire around the doubled portion, tin, and solder in the usual manner. Any strain placed on the cord is then exerted against the cloth covering rather than against the comparatively weak tinsel wire and connections made in this way last more or less indefinitely.—Lewis Neville.

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COIL-WINDING MADE EASY

To avoid the difficulty of threading the end of the winding through the correct prong, push a guide wire through the right prong from the bottom, twist or temporarily solder the two wires together and then pull through the prong. Cut off the surplus length of lead wire and solder it to the prong.—Dennis Delaney.

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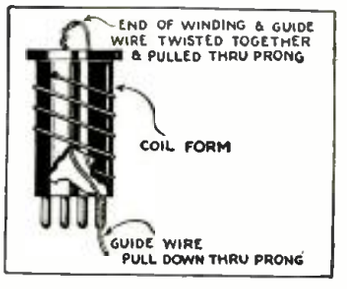

SHORT WAVE STATIONS OF THE WORLD

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

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

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

DON'T FORGET TO VOTE!

● PLEASE note that we have set up the list of short-wave stations and their call letters this month in a brand new style, with the stations arranged in alphabetical order by call letters. It is up to you as to which style you prefer, the one we used last month, or the present one. Please mail us a post-card and simply state thereon—"I prefer No. 1 (June style), or No. 2 (July style) for S-W Station List." Address your cards to the Editor.

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

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

Around-the-Clock Listening Guide

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

From daybreak to 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 Nine P.M. until shortly after daybreak. After dark, results above 35 meters are usually much better than during daylight. These general rules hold for any location.

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

ALPHABETICALLY BY STATIONS

Call Letters			Kilocycles
CFA	(C)	Drummondville, Canada (43.80)	6840
CGA	(C)	Drummondville, Canada (32.15)	9330
CJRX	(B)	Winnipeg, Canada (25.47)	11780
CNR★	(B)	Rabat, Morocco (37.33)	8036
CNR★	(B,C)	Rabat, Morocco Director General Telegraph & Telephone Stations (23.39)	12825
COC	(B)	P. O. Box 98, Havana, Cuba (49.92)	6010
CP5	(B)	Lapaz, Bolivia (49.34)	6080
CT1AA★	(B)	Lisbon, Portugal (31.25)	9600
CT3AQ	(B)	Funchal, Maderia (26.83)	11181
DAN	(C)	Nordeich, Germany (26.44)	11340
DJA★	(B)	Zeesen, Germany (31.38)	9560
DJB★	(B)	Zeesen, Germany (19.73)	15200
DJC★	(B)	Zeesen, Germany (49.83)	6020
DJD★	(B)	Zeesen, Germany (25.50)	11760
EAJ25	(B)	Barcelona, Spain Barcelona Radio Club (50)	6000
EAQ★	(B)	Madrid, Spain P. O. Box 951 (30.43)	9860
EAR110	(B)	Madrid, Spain (43)	6977
	(B)	Madagascar Radio Tananarive (50)	6000
FRO,FRE	(C)	St. Assise, France (16.44)	18240
FTK	(C)	St. Assise, France (18.90)	15880
FTM	(C)	St. Assise, France (15.50)	19355
FTN	(C)	St. Assise (Paris) France (24.47)	12260
FYA★	(B)	Paris, France "Radio Colonial" (25.63)	11705
FYA★	(B)	Paris, France "Radio Colonial" (25.25)	11880
FYA★	(B)	Paris, France "Radio Colonial" (19.68)	15243
		Service de la Radiodiffusion, 103 Rue de Grenelle, Paris	
FZR	(C)	Saigon, Indo-China (18.48)	16233
FZS	(C)	Saigon, Indo-China (16.35)	18345
GAA	(C)	Rugby, England (14.72)	20380
GAB	(C)	Rugby, England (16.63)	18040
GAP	(C)	Rugby, England (15.66)	19160
GAQ	(C)	Rugby, England (15.81)	18970
GAS	(C)	Rugby, England (16.38)	18310
GAU	(C)	Rugby, England (16.11)	18620
GAW	(C)	Rugby, England (16.48)	18200
GAX	(X)	Rugby, England (16.06)	18680
GBA	(C)	Rugby, England (21.44)	13990
GBB	(C)	Rugby, England (22.08)	13585
GBC	(C)	Rugby, England (60.30)	4975
GBC	(C)	Rugby, England (34.56)	8680
GBC	(C)	Rugby, England (23.47)	12780
GBC	(C)	Rugby, England (17.56)	17080
GBP	(C)	Rugby, England (27.85)	10770
GBS	(C)	Rugby, England (24.69)	12150
GBU	(C)	Rugby, England (24.41)	12290
GBW	(C)	Rugby, England (20.78)	14440
GBX	(X)	Rugby, England (28.49)	10530
GCA	(C)	Rugby, England (30.89)	9710
GCB	(C)	Rugby, England (32.33)	9280
GCS	(C)	Rugby, England (32.26)	9020
GCU	(C)	Rugby, England (30.15)	9950
GCW	(C)	Rugby, England (30.64)	9790
GCX	(X)	Rugyb, England (33.63)	8920
GDB	(C)	Rugby, England (69.44)	4320
GDS	(C)	Rugby, England (43.95)	6905
GDW	(C)	Rugby, England (62.24)	4820
CFA	(C)	Drummondville, Canada (43.80)	6840
CGA	(C)	Drummondville, Canada (32.15)	9330
GSB★	(B)	Daventry, England British Broad. Corp. (31.55)	9510
GSC★	(B)	Daventry, England British Broad. Cast. (31.29)	9585
GSD★	(B)	Daventry, England British Broad. Corp. (25.28)	11750
GSE★	(B)	Daventry, England British Broad. Corp. (19.81)	11865
GSF★	(B)	Daventry, England British Broad. Corp. (16.86)	15140

(Figures in parenthesis indicate wavelength in meters.)

Call Letters		Kilocycles
GSG★	(B) Daventry, England British Broad. Corp. (25.53)	17790
GSH	(B) Daventry, England British Broad. Corp. (13.97)	21470
HBL★	(B) Geneva, Switzerland League of Nations (31.27)	9595
HBP★	(B) Geneva Switzerland League of Nations (38.47)	7799
HC1DR	(B) Quito, Ecuador (47.00)	6383
HC2RL	(B) P.O. Box 795, Guayaquil, Ecuador, S. A. (45.00)	6666
HCJB	(B) Quito, Ecuador (73)	4109
HCK	(B) Quito, Ecuador, S. A. (52.5)	5714
HI1A	(B) Dominican Rep. (47.8)	6276
HIX	(B) Santo Domingo, Dominican Republic (49.46)	6065
HIZ	(B) Santo Domingo, Dominican Republic (47.5)	6316
HJ1ABB★	(B) Barranquilla Col., S. A. (46.53)	6447
HJ3ABF	(B) Bogota, Colombia (47.81)	6275
HJ4ABB	(B) Manizales, Colombia (41.6)	7150
HJ4ABE	(B) Medellin, Colombia (50.6)	5930
HVJ	(B) Vatican City (Rome) (50.26)	5970
HVJ★	(B) Rome, Italy Vatican City (19.83)	15120
I2RO★	(B) Rome, Italy (25.4)	11810
IAC	(C) Piza, Italy (45.1)	6650
IAC	(C) Piza, Italy (35.8)	8380
IAC	(C) Piza, Italy (23.45)	12800
IAC	(C) Piza, Italy (16.89)	17760
JYK	(C) Kemakawa-Cho, Chiba-Ken, Japan (22.04)	13610
JYR	(C) Kemikawa-Cho, Chiba-Ken, Japan (38.07)	7880
JYS	(X) Kemikawa-Cho, Chiba-Ken, Japan (30.49)	9840
JYT	(X) Kemikawa-Cho, Chiba-Ken, Japan (19.04)	15760
KAY	(C) Manila, P. I. (20.03)	14980
KEL	(C) Bolinas, Calif. (43.70)	6860
KES	(X) Bolinas, Calif. (28.80)	10410
KIO	(C) Kahuku, Hawaii (25.68)	11680
KKQ	(X) Bolinas, Calif. (25.10)	11950
LCL	(B) Jeloy, Norway (42.92)	6990
LSF	(C) Buenos Aires, Argentina (15.31)	19600
LSG	(C) Buenos Aires, Argentina (15.08)	19900
LSI	(C) Buenos Aires, Argentina (30.61)	9800
LSK	(C) Buenos Aires, Argentina (29.27)	10250
LSL	(C) Buenos Aires, Argentina (37.97)	7901
LSL	(C) Buenos Aires, Argentina (29.13)	10300
LSL	(C) Buenos Aires, Argentina (18.98)	15810
LSL	(C) Buenos Aires, Argentina (14.18)	21160
LSM2	(C) Buenos Aires, Argentina (20.69)	14500
LSM	(C) Buenos Aires, Argentina (16.56)	18115
LSM	(C) Buenos Aires, Argentina (15.67)	19140
LSM	(C) Buenos Aires, Argentina (14.27)	21020
LSM	(C) Buenos Aires, Argentina (14.1)	21280
LSN	(C) Buenos Aires, Argentina (30.33)	9890
LSN	(C) Buenos Aires, Argentina (24.61)	12190
LSN	(C) Buenos Aires, Argentina (20.65)	14530
LSN	(C) Buenos Aires, Argentina (16.84)	17820
LSN	(C) Buenos Aires, Argentina (15.27)	19650
LSX★	(X) Buenos Aires, Argentina (28.98)	10350
LSY	(C) Buenos Aires, Argentina (14.49)	20700
OER2	(X) Vienna, Austria (49.41)	6072
OKIMPT	(X) Prague, Czechoslovakia (58.31)	5145
ORK	(C) Ruysselede, Belgium (29.04)	10330
OXY	(B) Skamleboaek, Denmark (49.5)	6060
PCK	(C) Kootwijk, Holland (38.60)	7770
PCV	(C) Kootwijk, Holland (16.84)	17810
PDK	(C) Kootwijk, Holland (28.80)	10410
PDV	(C) Kootwijk, Holland (38.30)	7830
PHI★	(B) Huizen, Holland (16.88)	17775
PK1WK	(B) Bandoeng, Java (49.5)	6060
PLE	(C) Bandoeng, Java (15.93)	18830
PMC	(C) Bandoeng, Java (16.33)	18370
PMY	(C) Bandoeng, Java (58.00)	5170
PSH	(C) Rio de Janiero, Brazil (29.35)	10220
PSK★	(C) Rio de Janiero, Brazil (36.65)	8185
RNE	(B) Moscow, U. S. S. R. (25)	12000
RW15	(B) Khabarovsk, Siberia, U. S. S. R. (70.20)	4273
RW59	(B) Moscow, U. S. S. R. (50)	6000
RW72	(B) Moscow, U. S. S. R. (45.38)	6611
TI4NRH	(B) Heredia, Costa Rica (31)	9675
TGX	(C) Guatemala City, C. A. (33.50)	8928
VE9BJ	(B) Saint John, N. B., Can. (49.26)	6090
VE9CS	(B) Vancouver, B. C., Canada (49.42)	6070
VE9DN	(B) Drummondville, Quebec Canadian Marconi Co.	6005
VE9GW★	(B) Bowmanville, Ont., Canada (49.22)	6095
VE9HX★	(B) Halifax, Nova Scotia (49.10)	6110
VK2ME★	(B) 47 York St., Sydney, Aus. Amalgamated Wireless. Ltd. (31.28)	9590
VK3LR	(B) Melbourne, Australia (31.31)	9580
VK3ME★	(B) G.P.O. Box 1272L, Melbourne, Aus. Amalgamated Wire., Ltd. (31.55)	9510
VLK	(C) Sydney, Australia (28.51)	10520
VQ7LO	(B) Nairobi, Kenya, Africa Imperial and International Communications, Ltd. (49.50)	6060
VUC	(B) Calcutta, India (49.1)	6110
W1XAL	(B) Boston, Mass. (25.45)	11790
W1XAL	(B) Boston, Mass. (19.67)	15250
W1XAZ★	(B) Springfield, Mass. Westinghouse E. & Mfg. Co. (31.35)	9570
W2XAD★	(B) Schenectady, N. Y. Gen. Electric Co. (19.57)	15330
W2XAF★	(B) Schnectady, N. Y. General Elec. Co. (31.48)	9530
W2XE★	(B) 485 Madison Ave., N.Y.C. Atlantic Broad. Corp. (49.02)	6120
W2XE★	(B) 485 Madison Ave., N.Y.C. Atlantic Broad. Corp. (25.36)	11830
W2XE★	(B) Atlantic Broadcasting Corp. (19.65)	15270
W3XAL★	(B) Bound Brook, N. J. Relays WJZ (49.18) National Broadcasting Co.	6100
W3XAL★	(B) Bound Brook, N. J. National Brd. Co. (16.87)	17780
W3XAU	(B) Newtown Square, Pa. (49.50)	6060
W3XAU★	(B) Newtown Square, Pa. (31.28)	9590
W3XL★	(X) Bound Brook, N. J. National Broad. Co. (46.70)	6425
W3XL★	(X) Bound Brook, N. J. National Broad. Co. (17.33)	17310
W4XB	(B) Miami, Florida (49.67)	6040
W8XAL★	(B) Cincinnati, Ohio Crosley Rad. Corp. (49.50)	6060
W8XK	(B) Pittsburgh, Pa. Westinghouse E.&M.Co. (13.93)	21540
W8XK★	(B) Pittsburgh, Pa. Westinghouse Elec. & Mfg. Co. Relays KDKA (48.86)	6140
W8XK★	(B) Pittsburgh, Pa. Westinghouse Elec. Co. (25.26)	11870
W8XK★	(B) Pittsburgh, Pa. Westinghouse Electric & Mfg. Co. (19.72)	15210
W9XAA★	(B) Chicago, Ill. Chicago Fed. of L. (49.34)	6080
W9XF★	(B) Downers Grove, Ill. (49.18)	6100
WCN	(C) Lawrenceville, N. J. (59.08)	5077
WKF	(C) Lawrenceville, N. J. (15.60)	19220
WKK	(C) Lawrenceville, N. J. A. T. & T. Co. (14.01)	21420
WKN	(C) Lawrenceville, N. J. (15.14)	19820
WLA	(C) Lawrenceville, N. J. (16.36)	18340
WLK	(C) Lawrenceville, N. J. (18.44)	16270

Call Letters		Kilocycles
WMA	(C) Lawrenceville, N. J. (22.40)	13390
WMF	(C) Lawrenceville, N. J. (20.73)	14470
WMN	(C) Lawrenceville, N. J. (20.56)	14590
WNA	(C) Lawrenceville, N. J. (32.72)	9170
WNB	(C) Lawrenceville, N. J. (28.1)	10675
WNC	(C) Hialeah, Floirda (19.92)	15055
WND	(C) Hialeah, Florida (73.21)	4098
WOA	(C) Lawrenceville, N. J. (44.41)	6755
WOB	(C) Lawrenceville, N. J. (50.25)	5853
WOF	(C) Lawrenceville, N. J. (30.77)	9750
WOG	(C) Ocean Gate, N. J. (18.44)	16270
WOK	(C) Lawrenceville, N. J. (28.44)	10550
WON	(C) Lawrenceville, N. J. (30.4)	9870
WOO	(C) Ocean Gate, N. J. (70.22)	4272
WOO	(C) Ocean Gate, N. J. (63.1)	4752
WOO	(C) Ocean Gate, N. J. (35.05)	8560
WOO	(C) Ocean Gate, N. J. (23.36)	12840
WOO	(C) Ocean Gate, N. J. (22.71)	13210
WOO	(C) Ocean Gate, N. J. A. T. & T. Co. (17.52)	17120
WOP	(C) Ocean Gate, N. J. (15.48)	19380
WOY	(C) Lawrenceville, N. J. (70.22)	4272
WOY	(C) Lawrenceville, N. J. (63.1)	4752
WOY	(C) Lawrenceville, N. J. (35.05)	8560
WOY	(C) Lawrenceville, N. J. (23.36)	12840
WOY	(C) Lawrenceville, N. J. (17.52)	17120
XETE	(B) Mexico City, Mexico (31.25)	9600
YV1BC ★	(B) Caracas, Venezuela (49.08)	6112
YV3BC ★	(B) Caracas, Venezuela (48.78)	6150
YV3BC	(B) Caracas, Venezuela (31.55)	9510
YV5BMO ★	(B) Maracaibo, Ven. (49.42)	6070
YV5BMO	(B) Maracaibo, Venezuela (31.25)	9600
ZFA	(C) Hamilton, Bermuda (59.7)	5025
ZFB	(C) Hamilton, Bermuda (29.84)	10055
ZGE	(B) Kuala Lumpur, Fed. Malay States (48.94)	6130
ZHI	(B) 20 Orchard Rd., Singapore, Malaya Radio Service Co. (49.9)	6012
ZTJ	(B) Johannesburg, South Africa (49)	6122

POLICE RADIO ALARM STATIONS

KGHG	Las Vegas, Nev.	2474 kc.
KGHK	Palo Alto, Cal.	1674 kc.
KGHO	Des Moines, Iowa	1682 kc.
KGHZ	Little Rock, Ark	2406 kc.
KGJX	Pasadena, Cal.	1712 kc.
KGLX	Albuquerque, N. M.	2414 kc.
KGOZ	Cedar Rapids, Iowa	2466 kc.
KGPA	Seattle, Wash.	2414 kc.
KGPB	Minneapolis, Minn.	2430 kc.
KGPC	St. Louis, Mo.	1706 kc.
KGPD	San Francisco, Cal.	1674 kc.
KGPE	Kansas City, Mo.	2422 kc.
KGPG	Vallejo, Cal.	2422 kc.
KGPH	Oklahoma City, Okla.	2450 kc.
KGPI	Omaha, Neb.	2466 kc.
KGPJ	Beaumont, Tex.	1712 kc.
KGPK	Sioux City, Iowa	2466 kc.
KGPL	Los Angeles, Cal.	1712 kc.
KGPM	San Jose, Cal.	1674 kc.
KGPN	Davenport, Iowa	2466 kc.
KGPO	Tulsa, Okla.	2450 kc.
KGPP	Portland, Ore.	2442 kc.
KGPQ	Honolulu, T. H.	2450 kc.
KGPS	Bakersfield, Cal.	2414 kc.
KGPW	Salt Lake City, Utah	2406 kc.
KGPX	Denver, Colo.	2442 kc.
KGPY	Baton Rouge, La.	1574 kc.
KGPZ	Wichita, Kans.	2450 kc.
KGZA	Fresno, Calif.	2414 kc.
KGZB	Houston, Tex.	1712 kc.
KGZC	Topeka, Kans.	2422 kc.
KGZD	San Diego, Cal.	2490 kc.
KGZE	San Antonio, Tex.	1658 kc.
KGZF	Chanute, Kans.	2450 kc.
KGZG	Des Moines, Iowa	2466 kc.
KGZH	Klamath Falls, Ore.	2382 kc.
KGZI	Wichita Falls, Tex.	2458 kc.
KGZJ	Phoenix, Ariz.	2430 kc.
KGZL	Shreveport, La.	1712 kc.
KGZM	El Paso, Tex.	2414 kc.
KGZN	Tacoma, Wash.	2414 kc.
KGZO	Santa Barbara, Cal.	2414 kc.
KGZP	Coffeyville, Kans.	2450 kc.
KGZQ	Waco, Tex.	1712 kc.
KGZR	Salem, Ore.	2442 kc.
KGZS	McAlester, Okla.	2458 kc.
KGZT	Santa Cruz, Cal.	1674 kc.
KGZU	Lincoln, Neb.	2490 kc.
KGZW	Lubbock, Tex.	2458 kc.
KGZX	Albuquerque, N. Mex.	2414 kc.
KSW	Berkeley, Cal.	1658 kc.
KVP	Dallas, Tex.	1712 kc.
UYR	Montreal, Can.	1712 kc.
WCK	Belle Island, Mich.	2414 kc.
WEY	Boston, Mass.	1558 kc.
WKDT	Detroit, Mich.	1558 kc.
WKDU	Cincinnati, Ohio	1706 kc.
WMDZ	Indianapolis, Ind.	2442 kc.
WMJ	Buffalo, N. Y.	2422 kc.
WMO	Highland Park, Mich.	2414 kc.
WMP	Tulare, Cal.	2414 kc.
WPDA	Framingham, Mass.	1666 kc.
WPDB	Chicago, Ill.	1712 kc.
WPDC	Chicago, Ill.	1712 kc.
WPDD	Chicago, Ill.	1712 kc.
WPDE	Louisville, Ky.	2442 kc.
WPDF	Flint, Mich.	2466 kc.
WPDG	Youngstown, Ohio	2458 kc.
WPDH	Richmond, Ind.	2442 kc.
WPDI	Columbus, Ohio	2430 kc.
WPDK	Milwaukee, Wis.	2450 kc.
WPDL	Lansing. Mich.	2442 kc.
WPDM	Dayton, Ohio	2430 kc.
WPDN	Auburn, N. Y.	2382 kc.
WPDO	Akron, Ohio	2458 kc.
WPDP	Philadelphia, Pa.	2474 kc.
WPDR	Rochester, N. Y.	2382 kc.
WPDS	St. Paul, Minn.	2430 kc.
WPDT	Kokomo, Ind.	2490 kc.
WPDU	Pittsburgh, Pa.	1712 kc.
WPDV	Charlotte, N. C.	2458 kc.
WPDW	Washington, D. C.	2422 kc.
WPDX	Detroit, Mich.	2414 kc.
WPDY	Atlanta, Ga.	2414 kc.
WPDZ	Fort Wayne, Ind.	2490 kc.
WPEA	Syracuse, N. Y.	2382 kc.
WPEB	Grand Rapids, Mich.	2442 kc.
WPEC	Memphis, Tenn.	2466 kc.
WPED	Arlington, Mass.	1712 kc.
WPEE	New York, N. Y.	2450 kc.
WPEF	New York, N. Y.	2450 kc.
WPEG	New York, N. Y.	2450 kc.
WPEH	Somerville, Mass.	1712 kc.
WPEI	E. Providence, R. I.	1712 kc.
WPEK	New Orleans, La.	2430 kc.
WPEL	Middleboro, Mass.	1666 kc.
WPEM	Woonsocket, R. I.	2466 kc.
WPEP	Arlington, Mass.	1712 kc.
WPES	Saginaw, Mich.	2442 kc.
WPET	Lexington, Ky.	1706 kc.
WPEW	Northampton. Mass.	1666 kc.
WPFA	Newton, Mass.	1712 kc.
WPFC	Muskegon, Mich.	2442 kc.
WPFD	Highland Park, Ill.	2430 kc.
WPFE	Reading, Pa.	2442 kc.
WPFG	Jacksonville, Fla.	2442 kc.
WPFH	Baltimore, Md.	2414 kc.
WPFI	Columbus, Ga.	2414 kc.
WPFJ	Hammond, Ind.	1712 kc.
WPFK	Hackensack, N. J.	2430 kc.
WPFL	Gary, Ind.	2470 kc.
WPFM	Birmingham, Ala.	2382 kc.
YPFN	Fairhaven, Mass.	1712 kc.
WPFO	Knoxville, Tenn.	2474 kc.
WPFP	Clarksburgh, W. Va.	2490 kc.
WPFQ	Swathmore, Pa.	2474 kc.
WPFR	Johnson City, Tenn.	2470 kc.
WPFU	Portland, Me.	2422 kc.
WPFV	Pawtucket, R. I.	2466 kc.
WPFX	Palm Beach, Fla.	2442 kc.
WPFZ	Miami, Fla.	2442 kc.
WPGA	Bay City, Mich.	2466 kc.
WPGB	Port Huron, Mich.	2466 kc.
WPGC	S. Schenectady, N. Y.	1658 kc.
WPGD	Rockford, Ill.	2458 kc.
WPGF	Providence, R. I.	1712 kc.
WPGG	Findlay, Ohio	1682 kc.
WPGH	Albany, N. Y.	2414 kc.
WPGI	Portsmouth, Ohio	2430 kc.
WPGJ	Utica, N. Y.	2414 kc.
WPGK	Cranston, R. I.	2466 kc.
WPGL	Binghampton, N. Y.	2442 kc.
WPGN	South Bend, Ind.	2490 kc.
WPGO	Huntington, N. Y.	2490 kc.
WPGS	Mineola, N. Y.	2490 kc.
WRDH	Cleveland, Ohio	2458 kc.
WRDR	Grosse Pt. Village, Mich.	2414 kc.
WRDQ	Toledo, Ohio	2474 kc.
WRDS	E. Lansing, Mich.	1666 kc.

(*Continued on page* 166)

SHORT WAVE LEAGUE

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Readers Opinions on "No Code" Test Below 5 Meters

Why the Code Test?

Editor, SHORT WAVE CRAFT:

● IT is interesting and amusing to read the many letters in your SHORT WAVE LEAGUE section. Most of the arguments put forth by the various correspondents in regards to abolishing the *code test* below six meters comes in the latter class.

My suggestion is that they sit down and consider the question before they start writing, instead of writing first and thinking about it later on—if they find the time.

It is purely fantastic to think that because one can sit down and pound brass at the rate of 20 w.p.m. (words per minute) or upwards that he is a radio expert, and being such should be given all privileges that are due to the omnipotent. Of course my adversaries will immediately cry out that there is also a technical (so called) examination required, before one may secure a license. In order to get the necessary knowledge to pass the examination one procures an Amateur's Hand Book (ARRL) or some other similar text-book, obtains a list of questions and answers on how to pass the government license and with a few hours work is ready to pass the examination.

After passing this highly "technical" exam. and passing out in code at 10 w.p.m. or above the person is a real amateur and ready to operate his station.

I am not saying that all amateurs do no more work than this, and that some of them are not very efficient and conscientious station operators; however the "real good" ones are the exception, rather than the rule. No one can be perfect and we all must learn more or less by experience: Experience is only obtained by building a station and operating one.

The British Signalling Corp. have for the past years and are still doing more and experimenting with "phone" transmission and although not entirely perfected at the present time they still realize its possibilities. Most all their sets built in the past few years have been phone sets. They also use phone from plane to ground, as does also the Commercial Airways in both Canada and the United States.

If by learning code one is more capable to operate a phone set, then I wish some one would explain how. The cry goes up that the 5-meter band will be jammed with punk operators and that they will not have the real amateur's spirit. In most cases I fail to see the true amateur's spirit of cooperation. In regards to codeless license below 5 meters some of them show that fine spirit, of which one hears so much about. Pick up any issue of ham publications and hear the complaints against "mushy" signals and "off frequency" signals, and the number of operators who realize that they are operating stations in the above class. Looking over the facts you will at once realize that the line amateur spirit is lacking in a good many cases and that real knowledge of how to cure the above defects and similar other ones *is also lacking.*

One has no difficulty in realizing that the number of licenses in the 5-meter band would rapidly increase under the codeless clause and that undoubtedly a good many punks would be in evidence, but probably not a higher number than are in evidence today when code is necessary.

A narrow-minded class of operators can't seem to realize that code learning isn't possible to every one and that some people can't learn, no matter how hard they try. This statement is not guesswork; government figures support it and I have seen some real intelligent fellow in other lines fail completely when it came to code. By the way, I learned my operating with the Royal Canadian Corp of Signals, and although I do not operate a station, code and the technical exam. does not prevent me from doing so. Why should those really interested in phone reception be forced to learn code, and in those cases where it is impossible to do so, why haven't they a right to experiment in phone work? The answer is that they shouldn't have to learn code and that they have a perfect right to experiment, just as much right as their brother the key pounder.

In any radio book on the theory and practice of radio, I never ran across a section that linked code with the underlying principles of radio or "wireless," as you choose, and if any one has I would be delighted if they would kindly forward the name of the author to me. Perhaps some of my amateur friends whose letters I have read in the SHORT WAVE CRAFT will write me some day.

Did Hertz, Faraday and other pioneer workers in the field of radio all specify learning the *code* as a symbol for interest in radio work?

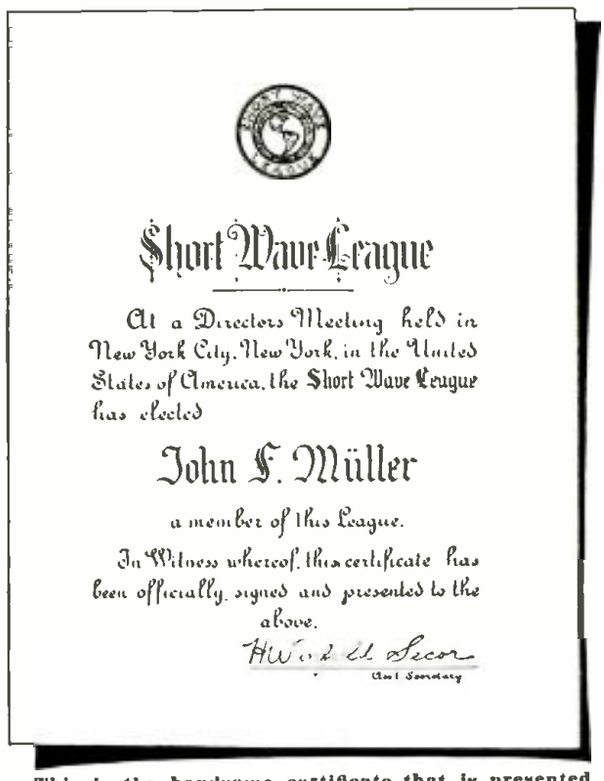
It is ridiculous to say that if one is really interested in short wave work that he will buckle down and learn the code. You can't move the ocean no matter how serious about it you may be.

My solution to the whole matter is that a much "stiffer" *technical examination* be required for any type of a license, whether phone or C.W., in which case those who have only a passing interest may be discouraged long before they come to the point of writing the exam.

I am very glad to note that the LEAGUE is sponsoring a codeless license and I hope that other bodies will fall in line as time goes on; nothing worth while is accomplished without work and plenty of it.

Yours for continued Service,
J. H. FULTON,
St. Stephen, N. B., Canada.

(*Continued on page* 177)



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

See page 187 how to obtain certificate.

Get Your Button

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

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

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

SHORT WAVE QUESTION BOX

EDITED BY

GEORGE W. SHUART, W2AMN

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

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

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

MODULATED OSCILLATORS

Phil. F. Pitlock. Jersey City, N. J.

(Q) Will you please be kind enough to publish a diagram in your next issue of SHORT WAVE CRAFT of a microphone hook-up to a Hartley Circuit Transmitter?

(A) Under the present Federal Regulations the modulated oscillators are absolutely prohibited. We advise that you construct a crystal controlled master-oscillator amplifier system if you intend to use phone.

POWER SUPPLY FOR 201-A'S

W. J. Closson, Troy, N. Y.

(Q) In the April issue of 1933 you describe a 250-volt power supply. Will you please tell me if this "pack" could be used for 201-A type tubes, providing an "A" battery was used on the filament?

(A) This power supply could be used providing the proper voltages were selected for the battery type tubes and an "A" battery was used for the filaments.

USING CHARGER AS A SUPPLY

Frank Wallace, Cleveland, Ohio.

(Q) Is it possible to use a 6-volt, 5-amp. tungar charger as a battery eliminator, by having a special choke and condenser?

(A) We do not advise that you attempt to use a battery charger as an "A" eliminator. One of the dangers is that the chargers use an auto transformer and if a ground were attached a fuse could easily be blown and the tubes probably ruined.

WHAT SIZE WIRE?

E. Kolakowski, Schenectady, N. Y.

(Q) What size of wire is used for the grid and tickler coil on page 591 in the February issue of 1933. The receiver is the "Short Wave Receiver in a Cigar Box".

(A) On most short-wave receivers the size of the wire for winding the coils is between 26 and 28 B&S gauge. This size wire will serve for any of the coil specifications given in SHORT WAVE CRAFT.

(Q) Will a 201-A tube work as well as a '99?

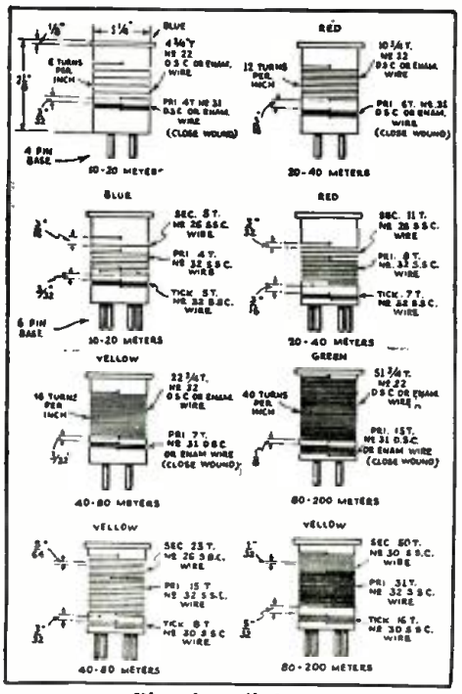
(A) 201-A tubes can be used in place of the 199's, providing proper filament voltage is supplied. The 201-A is superior, inasmuch as it is less microphonic.

BEAT OSCILLATOR

Francis MacArthur, Rochester, N. Y.

(Q) Will you please publish a diagram of a "CW" *beat oscillator* for code reception for a 6-tube superheterodyne. This incidentally, is a Pilot "dragon" set.

(A) We are very pleased to print your diagram showing the connections for a *beat oscillator*. The coil should consist of 130 turns of No. 34 enameled wire close wound on a one-inch tube tapped at approximately the thirtieth turn from the ground end. With the condensers shown this will take in the 465 kc. range. Condenser, C, should consist of a very low capacity condenser approximately 5 mmf. This can be constructed by merely twisting the two wires together. The length of the twist should be about ½ inch.



Plug-in coil data.

COIL DATA

Gordon Williamson, Old Sayhook, Conn.

(Q) Would you please give the dimensions of the coil and the size of the wire used in the short-wave adapter mentioned in the Question Box in the October, 1933, issue of SHORT WAVE CRAFT.

(A) We have literally thousands of requests for coil data. Above you will find a complete list of specifications for short-wave plug-in coils of the 2 and 3 winding variety. We trust that our readers will keep this information on tap as these coils will tune with a .00014 mf. condenser in any short-wave hook-up.

A.C. ON BATTERY TUBES

George Breney, Jr., 659 S. Park St., Elizabeth, N. J.

(Q) I have a 6-volt filament transformer which I would like to use with a 6-tube battery set. I do not want to rewire the set. Could you suggest a way that I could use the filament transformer on the battery tubes?

(A) If the tubes in your set are the type intended to be used from a storage battery and have directly-heated filaments the transformer will give you considerable hum. However, if the set uses 6.3 volt heater type cathode tubes, the 6-volt transformer will serve excellently.

ADDING A 33 TO THE DOERLE

J. A. Mustonen, Box 55, Amboy, Calif.

(Q) I have a battery type Doerle short-wave receiver, using two 230 tubes, but I wish to add another tube to it. Sometime ago I saw an item in your magazine giving the diagram and specifications, how to add another tube to same, which I believe was the 34 type tube, so I can operate a loud speaker.

(A) It is advisable to add a type 33 pentode audio amplifier to your set in order to work a loudspeaker. The 34 would not make a very good output audio amplifier because of its high plate impedance.

GANGING CONDENSERS

Sterling E. Smith, Jacksonville, Fla.

(Q) I have been reading with considerable interest all the excellent results obtained on the three-tube Doerle and I am writing for your opinion of using a gang condenser instead of the two single condensers as shown in the hook-up. Would this work as well as the "singles"? Since your article in the August issue states the dials on the Doerle run together, it would seem that it should work out all right. However, I await your advice before proceeding.

(A) The two tuning condensers used in the 3-tube Doerle receiver could be very easily ganged making a single control set. It is necessary to provide ample shielding between the two condensers in order to reduce the coupling between the R.F. and detector stage, which might result in self-oscillation of the R.F. stage. When two condensers are ganged it is necessary to provide a 50 mmf. trimming condenser in the antenna R.F. stage, connected in parallel with the 140 mmf. condenser in order to compensate for slight difference in tuning the two circuits.

UNTUNED R.F. STAGE

Jack Piring, Cleveland, Ohio.

(Q) Please print a diagram of an untuned R.F. amplifier to be added to Mr. Ingram's short-wave receiver.

(A) You will find the diagram of an untuned R.F. stage on this page.

(Q) Do the coils shown in the article describing this set cover the ham bands?

(A) All the ham bands can be covered with the coil data given.

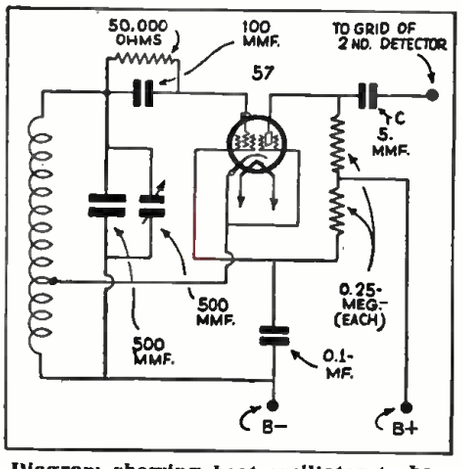
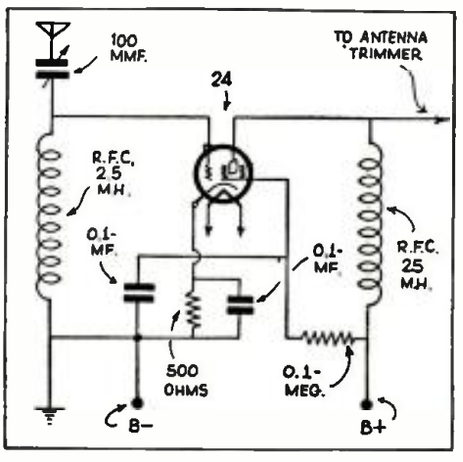


Diagram showing heat-oscillator to be used with any superheterodyne.



This R.F. stage can be added to any S-W receiver.

Short Wave Stations of the World

AIRPORT RADIO Stations

AERONAUTICAL (AIRPORT) FREQUENCIES

	(Red Chain)	
3,147.5	3,322.5	5,582.5
3,162.5	5,122.5	5,592.5
3,172.5	5,572.5	5,662.5
3,182.5		
	(Blue Chain)	
2,906	4,937.5	4,952.5
3,072.5	4,967.5	5,672.5
3,088		5,692.5
2,720	6,510: Day only	
2,732	6,520: Day only	
4,110	6,530: Day only	
	8,015: Day only	
	(Brown Chain)	
3,127.5	4,917.5	3,005
3,222.5	5,602.5	2,854
3,232.5	5,612.5	5,377.5
3,257.5	5,632.5	
3,447.5		
3,457.5		
3,467.5		
3,485		
2,640	4,740	6,540
2,644		6,550
2,612		6,560
2,636		8,015
3,467.5		
	(Green Chain)	
2,922	4,122.5	

(*Continued from page* 163)

2,946	5,652.5	
2,986		
2,748	6,590	
4,745	6,600	
	(Orange Chain)	
2,870	5,375	8,220
3,082.5	5,405	12,330
	5,692.5	16,440
2,648	6,570	
3,082.5	6,580	
5,375	8,015	
	16,240	

The various transport companies are assigned frequencies for their use and each transport company's network is given a certain code color.

TELEVISION Stations

1600-1700 kc. 176.5-187.5 m.
W2XR—Long Island City, N. Y.
W8XAN—Jackson, Mich.
2000-2100 kc. 142.9-150 m.
W9XAO—Chicago, Ill.
W6XAH—Bakersville, Cal.
W9XK—Iowa City, Iowa
2100-2200 kc. 136.4-142.9 m.
W2XBS—New York, N. Y.
W6XS—Los Angeles, Calif.
W9XAP—Chicago, Ill.
W9XAK—Manhattan, Kans.
2200-2300 kc. 130.4-136.4 m.
W9XAL—Kansas City, Mo.
2750-2850 kc. 105.3-109.1 m.
W9XG—W. Lafayette, Ind.
43,000-46,000 kc. 6.52-5.98 m.
48,500-50,300 kc. 6.00-6.20 m.
60,000-80,000 kc. 3.75-5.00 m.
W9XD—Milwaukee, Wis.
W9XE—Marion, Ind.
W8XF—Pontiac, Mich.
W3XAD—Camden, N. J.
W2XR—Long Island City, N. Y.
W9XAT—Portable
W2XF—New York, N. Y.
W6XAO—Los Angeles, Calif.
W3XE—Philadelphia, Pa.
W2XAK—New York, N. Y.
W10XX—Portable and Mobile
W8XAN—Jackson, Mich.
W8XL—Cuyahoga, Heights, Ohio

The "All-Electric-3" Uses Dual-Purpose Tube

and panel, and presents a very pleasing as well as compact appearance. By the use of 4 plug-in coils the entire short-wave range of 15 to 200 meters may be covered. Two additional coils are also available for the broadcast band.

A single wire antenna having an overall length of 55 to 140 feet will produce good results with this set. The original model when on test readily picked up such well-known foreign stations as GSB of Daventry, England; EAQ of Madrid, Spain; DJA of Zeesen, Germany; as well as numerous American stations.

A list of parts required for construction of this receiver follows:

C1 7-80 mmf. Trimmer Condenser.
C2 0.00014 mf. Hammarlund Midget Variable Condenser.
C3 0.00010 mf. Aerovox Mica Condenser.
C4 0.5 mf. Cartridge Condenser, 200 V. rating.
C5 0.00010 mf. Aerovox Mica Condenser.
C6 0.01 mf. Cartridge Condenser, 200 V. rating.
C7, C8, C9 8 mf. 300 peak volt Electrolytic Condensers.
R1 5 megohm Grid-Leak.
R2 100,000 Resistor, ½ watt.
R3 3 megohm Resistor, ½ watt.
R4 50,000 ohm Potentiometer.
R5 325 ohm, 30 watt Resistor.
SW Rotary Switch, 3 ampere, 250 V. rating.
L1, L2 Plug-in Coils, 4 prong (Eilen).
L3, L4 10 henry, 30 ma. Filter Chokes.
1 Special Crackle Lacquer Metal Chassis and Panel (Eilen).
1 7-prong Tube Socket.
2 4-prong Tube Socket.
1 Large Vernier Dial.
2 Bakelite Knobs.
1 Tube Shield.
1 Antenna Post.
1 Phone Terminal Strip.
1 6F7 Tube.

(*Continued from page* 155)

1 1V Tube.
1 Pair Headphones.

Coil Data Wound on 1¼ Inch Forms

Length of Prl. Wind. Coil.	Wave Band.	Prim. Turns.	Sec.
1 inches	15 to 28 M	4¾	6¾
1 inches	27 to 45 M	10¾	8¾
1⅝ inches	43 to 80 M	21¾	9¾
1⅝ inches	75 to 200 M	43¾	19¾
	L1	L1	L2

Primary wound with No. 28 wire, secondary wound with No. 30 wire, spaced ⅛ inch from primary winding.

The All-Wave Master

(*Continued from page* 156)

type 33 tube, 135 volts should be used on this plate. Later an identical unit, only using a 34 R.F. tube instead of the audio tube can be added to constitute a complete 3-tube receiver using an untuned I.F. stage, regenerative detector and pentode audio amplifier capable of producing really strong signals on any of the "foreign" stations.

OPERATING SIMPLE S-W CONVERTER FOR A SUPER-HET

● THE following describes how to tune in a station on 1,900 kc. with the S-W Converter illustrated on page 610, February issue. This frequency is chosen for an example because it is in the 160 meter amateur phone band. These instructions apply only if the receiver used is a Super-Het with 175 kc. intermediate. Receivers with other intermediate frequencies will tune different but the tuning can be figured out the same way.

Be sure that the antenna is connected to a converter instead of the receiver. Be sure that the output of the converter is connected to the GRID OF THE FIRST DETECTOR (the connection coming to the cap on top of the tube, and the regular connection removed.

Since the intermediate frequency is 175 kc., to tune in a signal on 1,900 kc. the oscillator must be tuned to 1,900 plus or minus 175. We will use the higher frequency or 2,075 kc. To get this frequency we will use a second harmonic of the oscillator. Then the fundamental would be 1,037.5 kc. To set the oscillator on 1,037.5 kc. the receiver dial must be set at 1,037.5 minus 175 or 862.5 kc. (Slightly above the 860 kc. channel.) Now start with condenser C1 all in and decrease capacity until the FIRST resonance point is reached. (Indicated by an increase in background noise.) This will be 1,900 kc. and should occur with the condenser about three-fourths in. Now signals in the neighborhood of 1,900 kc. can be tuned by using the receiver dial only, and C1 adjusted for the best signal strength.

Be sure that it is the first resonance point that you have. With the receiver dial set at 862.5 kc. there can be five or may be six resonance points hit with C1. As follows: 1,900 and 2,250 kc. from the second harmonic of the oscillator, 2,937.5 and 3,287.5 kc. from the third harmonic, and 3,975 and 4,325 kc. from the fourth harmonic.

The fifth point or the one at 3,975 kc. is in the 80 meter amateur phone band, so you can listen there with the receiver dial at the same setting (862.5 kc.). This resonance point should be reached with the condenser C1 almost all the way out.—*Harry D. Pickett.*

Can We Transmit Power by Radio?

(*Continued from page* 137)

It would seem much more likely that what is being done in the Santa Fe Railway secret test is the radio transmission of control signals, which possibly switch on power from a storage or other battery carried on the car, to the motor propelling the car. If this is the case, then nothing particularly new has been demonstrated, as the U. S. Navy radio experts successfully demonstrated quite a good many years ago that they could accurately control the movements of a crew-less battleship! In some of the tests the transmitters radiating the radio control signals were even out of sight of the ship. The radio transmission of control signals presents practically no problem at all to any radio expert today, as the strength of the signals required at the receiving antenna in order to trip a relay is practically no greater than the strength of signal received on the average broadcast set in your home. When the control signal acts on the electro-magnetic relay mechanism, it causes its armature to close a heavy set of contacts which may in turn open or close the circuit of another still heavier relay, and in this fashion hundreds, or even thousands of H.P., can be switched "on" or "off" at will.

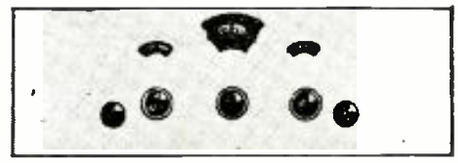
No discussion on the radio transmission of power would be complete without mentioning the tremendous amount of mathematical research carried out on this problem by one of the world's greatest electrical experts, Dr. Nikola Tesla. For nearly half a century, Dr. Tesla has preached the doctrine of the "radio transmission of power" —but up to the present time our engineers and physicists have not been able to put this learned scientist's theory to work.

Simply explained, Dr. Tesla's theory of power transmission by radio is based upon the proposition that if we erect a tremendously powerful radio oscillator at a given point on the globe, as shown in one of the accompanying diagrams, at no matter what point on the globe we erect a receiving station, with a suitably tuned capactiy or antenna, etc., then we will set up at such receiving stations sufficiently powerful oscillations for use in operating motors, lamps, etc. As one of the diagrams shows a simple hydraulic analogy would be if we had a ball filled with a liquid and used a pump at a given point to create an increase in pressure in the liquid, then this fact would be noted at all points on the sphere, if you had a suitable number of pressure gauges connected to it. It is highly interesting to note at this point that Dr. Tesla does not believe that the *space* or so called *sky wave* radiated from the transmitting antenna plays any important part in the transmission of a phone or code signal, or in the transmission of power. He is strongly of the opinion that the *ground* wave is the one that does the work and this forms a basic part of all of the mathematical and other work he has done on radio power transmission.

As one of the accompanying diagrams shows graphically, if a signal at ¼ mile distance from the transmitter has a strength designated as "A," then at a distance of ½ mile the signal strength would be ¼ that at "A"; at ¾ of a mile the signal strength, C, would be only 1/9 of that at "A," while at one mile distance, the signal strength would be only 1/16 of that at "A." This doesn't sound so bad, but it is the problem of getting the strong signal or quota of electrical energy to the receiving aparatus at the ¼ mile point that counts. At present we will do very well it would seem, according to eminent engineers, if we can place a practical and usable quantity of electrical energy at a distance of 500 feet from the transmitter! The writer had an idea that possibly one of the secrets up Mr. Gregory's sleeve was that he placed the transmitting antenna close to the metal rails or tracks and that these in turn act on the order of "wired radio" to guide the waves along

toward the moving car. Dr. Goldsmith did not think that this helped matters much at all, particularly in consideration of steel rails and he said that we might, as a beautiful scientific example, consider running the car on a pair of copper or silver-plated copper rails, highly insulated and placed at a good distance above the ground to avoid undue losses; but if we were going to go so far as this, we might as well lay down an ordinary "third-rail" and forget about the whole thing, so far as the radio transmission of power is concerned.

The Ensall Eight-Nine Short-Wave Receiver



● THE receiver illustrated is of superheterodyne design for use on short waves, having twin-control, tuning over a wide range in wavelengths and also with bandspread on every frequency. This new receiver, designed by the Ensall Radio Laboratory, is equipped with a new feature in superheterodyne receivers—the *automatic mixer control circuit* which assures smooth tuning on every frequency and having the oscillator tube automatically control the transfer of the oscillator signal to the detector circuit to make the beat frequency for the intermediate frequency there is a more stable control on all frequency, resulting in a receiver in which there are no "points", where the receiver does not work, on the entire tuning range of the receiver. It is designed for use on a range from 10 to 200 meters. It is AC design. It has been designed for "home construction" and blue-prints showing the general construction from the chassis to completed receiver are now available at nominal cost.

Oscillator Control-Tube Permits Voice to Operate 'Phone Transmitters

(*Continued from page* 159)

is severe, as one or the other transmitter is not handling modulation during one side of the QSO, but is needlessly heterodyning other stations. Think of the times you have talked for 5 to 10 minutes only to hear the other fellow come back with "sorry QRM got most of that". Duplex telephony with the use of the control tube system would solve these difficulties to a great extent.

The circuit herein described is applied to a Colpitts Master Oscillator. With slight modifications it can be applied to a crystal oscillator. In this connection note that the crystal would be carrying a load only as each word is spoken.

Operation: The current induced in the secondary (1) of the control amplifier output transformer is rectified by the control rectifier so that the current produces a charge in capacitor (2) which makes the grid side of the capacitor positive with respect to the bias side. The control tube is normally biased to cut-off (i.e., biased so that it draws no plate current), but the voltage produced across capacitor (2) by the rectified voice currents causes the resultant grid bias to become sufficiently positive so that the control tube draws plate current through the master oscillator tube, causing it to produce radio-frequency oscillations and excite the power amplifier. Capacitor (3) smoothes out irregularities in the master oscillator plate current, thus preventing the transmitted carrier wave from being modulated by these irregularities. When the operator stops speaking, the charge leaks out of capacitor (2) through resistor (4), causing the grid of the control tube to become negative with respect to the filament, cutting off the plate current and thus stopping the transmission of the carrier wave.

The tubes used may be of any cathode type, although other tubes could be used if desired. Type 2A3 tubes would be especially suitable for the control tube because of their lower plate resistance. The system is thoroughly reliable and functions perfectly when properly adjusted. It has long been in use in commercial work where operation of two or more transmitters is desired on a single frequency.

Obviously, some type of automatic volume control for the receiver will be necessary for duplex operation.

Operation of receiver control: A cathode type tube is connected in series with the plate supply of either the R.F. amplifier or the detector tube. The function of this tube is to cut off or greatly reduce the voltage of the tube connected in series with it. Normally, this tube has no bias and the plate resistance is low. When the oscillator draws current a voltage drop develops in resistor R4 from which negative bias is added to the receiver control tube, thus increasing its resistance, lowering the receiver voltage and making it inoperative. The grid leak (5) and the condenser (6) are merely to stabilize the grid circuit and the values may vary for different conditions.

Recently some experiments were made in cutting off the receiver supply by means of a 150 ohm pony relay connected in the plate supply of the master oscillator. These experiments were successful, but some trouble was experienced in devising a suitable "key click filter."

Since the receiver control will function to decrease the sensitivity of the receiver when the transmitter oscillates, certain precautions are necessary. First, there must not be more than normal room noise. Second, you must not breathe against, or into the microphone. Third, do not speak until the second party has completed enunciation. Failure to observe these precautions will cause the incoming signal to chop up, since any slight sound reaching the microphone will cause the transmitter to oscillate, which in turn causes the sensitivity of the receiver to decrease, or apparently "cut off".

A 6-Volt Transmitter That Went to Sea

(*Continued from page* 159)

this application because the mounting is in an upright position. It was made this way to facilitate the quick changing of frequencies by plugging in the appropriate crystal for a given frequency. The coil is cut to have an inductance value which will give the frequency of the lowest crystal frequency to be worked on any one coil with the plates of the condenser practically all of the way in.

The first tank circuit feeds into the grid of the doubler stage, which is a similar unit located more to the center of the base, through capacitative coupling. As in the crystal set-up the tube here is also a 42 pentode. Bias on this tube is a combination of grid-leak and self-bias. High bias is desirable since this permits the use of the full plate supply voltage without excessive plate current.

The tubes used in the next and final unit are type 59 pentodes having 2.5 volt heaters. They are connected in series, with a ½ ohm resistor furnishing the one volt drop in the 6 volt "A" lead. The two inner grids on each tube are tied together and the two pairs are joined by a 100 ohm center-tapped resistor. This grid resistor lowers the tendency to parasitic oscillation in the neutralized amplifier. The outer grid is connected to the plate. This connection on the elements of the 59 is the same as the manufacturers recommend for class "B" audio operation where no bias is supplied to the tube. About 50 volts more bias is needed to cause the tubes to work efficiently. This is obtained easily by the use of a 500 ohm cathode, self-biasing resistor. Another 45 volt section must then be added to the plate supply to keep the available plate voltage at 500 volts. Neutralization of this pair of tubes is likely to be incomplete, unless a rather high capacity is used in the neutralizing condenser. Since all leads come through the base of the tube, there is a great capacity effect in the leads between plate and grid circuits.

Two antennas are employed on the good ship "Buccaneer", one cut for 6,170 kc. and the other for 8,290 kc. A switching arrangement makes provision for connecting either one or both antennas to either the receiver or transmitter. In ordinary use the antenna not in use for transmitting is connected to the receiver.

These two antennas are of the end fed (voltage fed), fundamental or half wave type. Each one simply begins at the transmitter switch and runs up a mast, terminating near the top, one up the foremast and the other up the mainmast.

With this particular type of antenna, which is just clipped onto the tank of the final tubes at the point which gives the desired input, there is no current at the junction to the transmitter. In order to get a check on the antenna current there is a switch at the base of each mast which can be opened to throw a small flashlight bulb in series with the antenna lead. The highest current in these antennas would be at their centers, but the positions mentioned are near enough to give comparative readings while tuning.

The "Buccaneer" is 80 feet long overall, with a 40 foot cabin. The radio equipment is located in the after part of the cabin. Between the table and bunks there is a chart table which lifts up and discloses a 50 hp. auxiliary marine engine.

This cruise was not entirely without excitement. At one time, a severe gulf storm beached the "*Buccaneer*" on the coast of Mexico and the members had a month's vacation while repairs were being made to the ship. The "*Buccaneer*" drifted for five days in the Gulf of Mexico, unable to take bearings because of the stormy weather and the sun not making its appearance. Radio direction finding, however, informed the party that they were near Tampico, Mexico. This, of course, proves that a short-wave radio set is an indispensable part of every ship's equipment, whether the ship is large or small.

A Ham at Sea

(*Continued from page* 138)

"Not so sure about that." Mr. Arnold replied as he swept the horizon with his very best mariner's glance. "It looks all right now, but I believe I can smell a fog."

"You old fraud," his son shouted gleefully. "Don't come that 'old salt' stuff on me. I read that weather report myself."

"I seem to remember that the paper did say something about fog, but, of course, you realize that didn't influence my forecast in the slightest. We Arnold's have been forecasting the weather for nigh on to twenty years now, and we never let any upstart of a weather bureau tell us what's what. However, if it proves that I and the bureau are both right this once, it will not affect our fishing. They bite just as well when it is cloudy as when it is clear."

"Shall I drive out to the usual spot?"

"Yes, we will anchor there until noon, and if our luck is no good by that time, we can move on down the coast a bit."

They followed this plan, but by the time that noon rolled around they had no thougbt of shifting their position. For once they were catching fish. As often as Jack hauled one in over one side of the boat, his father reciprocated with one from the other. Neither could honestly claim to have the better of the fishing, so both were very loud in asserting that very claim. At one o'clock, Jack turned to his father.

"Say, Dad, what say we declare an armistice while we stow away some of those sandwiches?"

"My endurance is rewarded," Mr. Arnold sighed happily as he reeled in his line. "I made up my mind that if you didn't make that suggestion in another ten minutes, I was going to throw my dignity to the winds and suggest it myself. You get out the lunch while I see what I can pick up on the radio."

The launch was equipped with a small battery radio that furnished entertainment when the fishing was slow. Within a few minutes the two were contentedly eating their lunch and listening to a baseball game. After they had eaten practically the entire stock of sandwiches, they fell to disparaging each other's fishing ability in a good-natured spirit. Suddenly Mr. Arnold broke off.

A Surprise

"By George!" he exclaimed. "Look at that fog that has come up. I was so busy that I never noticed it, but you can't even see the shore. Well, I was right."

"You *and* the weather bureau," Jack added with a grin.

"All right, all right!" Mr. Arnold said with an answering grin. "Have it your own way. Shall we resume our piscatorial pursuit?"

In a few moments their lines were again in the water, and for two solid hours they tried every trick of fishing that they knew without bringing a single fish in over the side. Finally Mr. Arnold reeled in.

"I am persuaded," he said resignedly. "There is not a single fish within two miles of this boat. Let's raise the anchor and let the boat drift while we fish. Maybe we shall run into another school, and if we do, we can drop the hook."

In a short space, the gentle off-shore breeze was driving them steadily seaward through the increasing fog. Occasional strikes kept their attention on their lines without rewarding their concentration with any tangible results. Finally both hooked a fish at the same time. When they were landed, the fish proved to be larger than any that had been taken before, so Mr. Arnold hastily let go of the anchor. The rope quickly ran out to its entire length and hung taut.

"Hello!" he said. "We must have drifted out a good ways."

"Better start the motor and get back to where the anchor will touch bottom," Jack suggested. "This fog is getting thicker every minute."

Mr. Arnold started the motor and swung the boat in a wide arc until his compass told him that he was headed for the coast.

Suddenly there was a loud clanking from the motor, and the next moment it stopped dead.

The Motor Gives Out

"Well, now what?" Mr. Arnold asked as he lifted the cover of the motor compartment. "Great cow!" he shouted. "Look here! We have thrown a rod, and it has gone through the crank-case. Oil is all over the place."

"Meaning?" Jack inquired.

"Meaning that we are out a motor, the anchor will not hold, and the wind is blowing us to sea, and a sail would only speed up the process."

"What do we do now?"

"Well, about all we can do is to keep our eyes and ears open for a boat and ask them to row us to shore," Mr. Arnold said as he wiped his hands on a piece of waste. He said this in a calm unconcerned fashion, but Jack noticed that he looked anxiously at the wall of fog about them and at the waves which were being kicked up by the increasing puffs of the off-shore breeze. The sea, instead of presenting the smooth surface that had met their eyes all day was now beginning to rise and fall in long swells. When the boat presented its side to these waves, it developed a roll that was very disconcerting to the stomach. As the waves rose higher, an occasional one would send a dash of water over the side.

"We have to get the bow of the boat into the wind, or these waves are going to swamp us," Mr. Arnold shouted to Jack. "Cut the anchor rope into four thirty-foot lengths while I get that piece of canvas from the locker."

He took the ropes from Jack and tied one to each corner of the ten foot square of canvas. The other ends of the ropes were attached to a ring in the prow of the boat and the canvas was thrown over the side. As it spread out in a parachute, it decreased their speed considerably, and, what was more important, it brought the head of the boat into the wind and stopped the waves from coming over the side.

"That was a pretty close thing," Mr. Arnold said. "Another ten minutes broadside to those waves would have swamped us."

"Yes, and if we continue to back across the ocean at this speed, the stern is going to bump Europe in an hour or so," Jack replied. "What do we do now?"

"All we can do is keep our eyes and ears open for a boat. They will be blowing their fog-horns, so we shall probably hear them long before we can see them. There are a lot of steamers that run up and down along the coast, and we are almost certain to be seen by one."

"Well," Jack said skeptically, "they are going to have to come very near if they see us in this fog. Furthermore, if we continue at the rate we are going, we shall be outside the coasting steamer lanes within an hour or so."

"That's true enough, but we shall just have to hope for the best. Keep your ears open for the horns."

The next two hours were spent in gazing anxiously at the wall of fog that enclosed them and in straining their ears for the sound of fog-horns. Twice during the first hour they heard the faint "wh-o-o-o, wh-o-o-o" of distant steamers, but none came close enough to be seen. Nothing was heard during the second hour, except the splashing of the waves. These were running higher than ever, and in spite of the sea anchor, an occasional crest sent a dash of spray into the boat.

Son Has a Brilliant Idea

"Well, Son," Mr. Arnold finally said, "it seems to me that we might as well take stock of our situation. We must be thirty or forty miles out to sea by now, and there is little hope that we shall be picked up before morning. We have three shopworn sandwiches and a bottle of olives for food, a quart of water in the way of drink, a flashlight with extra bulb and batteries for signals, and a radio for entertainment."

"Sa-a-a-y!" Jack interrupted.

"Say what?"

"The radio! Maybe we can use it to call for help."

"What do you mean? I don't understand."

"Why, maybe I can build a transmitter out of the parts of that receiver and use it to send out an SOS. Give me a screw driver from the locker and we shall see what the receiver contains."

"First," Jack went on as he busily plied the screw driver, "the two-volt air-cell battery and the three B-batteries will furnish us with filament and plate supplies. Ah, here we have four '30's and a '31, three tuning condensers that are belt-driven and can be operated separately, three tuning coils, a wire-wound volume control, and five sockets. That is all of the stuff that we shall need."

"You mean to tell me that you can build a transmitter out of those receiver parts?"

"Well, I hope I can. If I can't, it seems to me that we are going to do some deep sea diving without the benefit of helmets."

In a few minutes the boy had the receiver reduced to its original components. Then he took one of the short seat-boards from the prow of the boat and mounted two of the sockets upon it.

"I am going to build a push-pull TNT rig," he explained to his uncomprehending father. "It is as easy to build as a single-tube transmitter, and it has about three times the power. Say, Dad, you take some of the heavy wire from one of these large forms and rewind twenty turns on one of the large forms. Twist a little loop at the center so that we can make a connection to it."

As Mr. Arnold obediently started winding the tank inductance, the boy began to prepare the grid coil.

"Let me see," he said more to himself than to his father, "we shall build the rig for 80 meters, for there is less skip than on 40, and the early evening QRM is not so bad. My old push-pull rig had sixty turns on a coil of just this diameter, so if I use the same number of turns, the dip should be very close to the band."

When the coils were completed, the boy placed them and one of the variable condensers on the board. He made the necessary connections with wire from the coils, and used the volume control as a variable grid-leak. When the A-battery was connected, the tubes lighted. The flashlight was dismantled and the bulb was placed in the B-plus lead. After a final check, the boy connected the B-battery. The flashlight bulb burned brightly for a second, but as Jack quickly rotated the condenser it dropped to a dull red color and finally went out.

"Hurrah!" the boy shouted, "it's oscillating!"

Next he cut down the resistance of the grid leak until the bulb again glowed and then adjusted the tank until it went out. He repeated this point until he found the point at which the tank condenser had to set to draw the least current.

"Well, we have the transmitter ready to go now," he said. "The next problem is the antenna."

"We'll try the one you use with the broadcast set with a ground for a Marconi antenna. You wind about ten turns on one of those coil-forms, and I will mount another condenser on the board."

In ten minutes they had the coil, a condenser, a flashlight bulb, the antenna, and the ground all in series. The coil was placed near the oscillating transmitter, and the condenser was slowly rotated. At one point the bulb lighted brilliantly.

"That's surely a break," Jack exclaimed. "I was afraid we should have to rig up a new antenna or at least use loading coils. Well, we're all ready; what shall I say?"

"Let me see," Mr. Arnold said. "As near as I can tell by this compass, we have been drifting straight out to sea, so if we travel at the rate of eight miles an hour, that would put us about thirty or thirty-five miles due east of Garver Point. Yes, say that we are thirty-five miles due east of Garver Point."

SOS!

Using the B-Plus wire as a key and sending very deliberately, Jack began:

SOS SOS SOS WE ARE ADRIFT IN LAUNCH WITH DEAD MOTOR ABOUT THIRTY-FIVE MILES EAST OF GARVER POINT MASS SOS SOS SOS

For ten minutes he repeated this over and over. Then he changed his frequency a trifle and repeated the call for help. During the ensuing two hours he sent almost continuously, only stopping to change his frequency slightly.

Darkness settled over the water while he was sending, and the flashlight bulb which was in the antenna blinked brightly at the wall of fog. Suddenly Mr. Arnold sprang to his feet.

"Listen!" he said as he held up a warning hand.

From some place outside the fog-wall there came a faint sound of a fog horn.

"To-o-o to-o-o to-o-o; to to-o-o to; to to-o-o; to to to-o-o to-o-o to to" it bellowed.

"Say," Jack exclaimed excitedly, "he is sending QRA? That means, 'What is your location?'"

"Quick!" Mr. Arnold commanded. "Give me that flashlight bulb."

In a couple of minutes the flashlight was sending a bright finger of light up through the fog. As if in answer a broad shaft of light swung across the western fog-bank.

"They see us," Jack shouted excitedly. "Keep swinging the flashlight."

Safe

Thirty minutes later they were seated in the cabin of a const guard cutter headed for home. The captain was speaking:

"About six o'clock we got a phone call from an amateur in Boston giving us your location. We instantly prepared to get under way, and were putting out to sea in fifteen minutes, but in that short time, we received three more calls. Then, just as we started out, this fellow dashed up and asked to go along." He turned to a slender boy who stood near the door.

"I picked you up just outside the band," the boy exclaimed. "I grabbed my portable receiver and dashed down to the station just in time to get on board. We listened to you all the way out, and were able to gauge our approach to you by the increasing strength of your signals. When I began to pick up your key clicks, I started sending QRA? on the fog horn."

"How were my signals?" Jack asked eagerly.

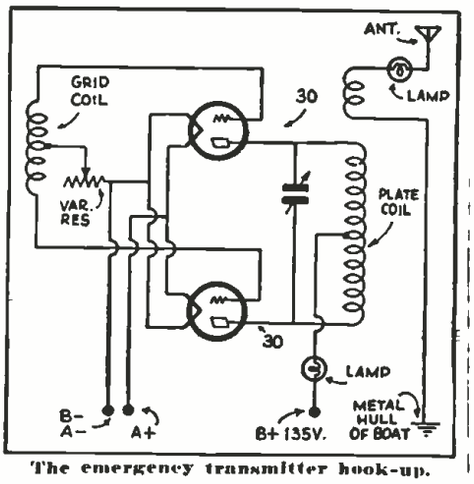
"QSA5 R6 to 7, chirpy PDC."

"That was because of the antenna bulb," Jack mused.

After the captain had gone up on deck, Jacked turned to his father.

"Well, Dad, I can see where you were right about having a little diversification in one's hobbies. If you had not known about that sea-anchor, we should probably be the guests of Davy Jones by now."

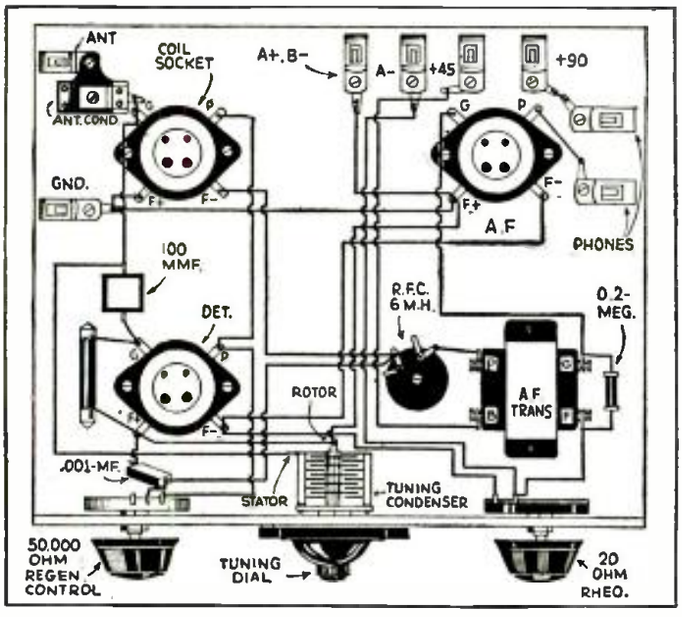
"Hm-m-m, yes," Mr. Arnold said. "I am glad you see my point. And by the way, do you suppose an old codger like me could learn to send and receive code?"



The emergency transmitter hook-up.

The 2-Tube Short-Wave "DX-ER"

(Continued from page 155)



The first of the four plug-in coils is a daylight reception "DX" coil, covering primarily both International "phone" broadcast and Amateur phone and code bands. This coil, as used in the set pictured in Fig. 3 is colored black. The second coil, which is brown in color, covers the International "broadcast" (phone) and Amateur night-time (phone and code) bands. These are the very busy short-wave channels. The third coil is green in color, and covers particularly Amateur C.W. and phone bands as well as commercial stations. The fourth coil which is red, primarily tunes police (phone) broadcasts and Amateur C.W. and phone signals.

Plan view and wiring diagram at left for the S-W "DX-ER". Below—Rear view of the S-W "DX-ER".

"fringe howl". The audio stage is well-designed to give increased volume on all signals for headphone operation.

The antenna is coupled to the tuning coil by a semi-variable "postage-stamp" condenser having a maximum capacity of 80 mmf.

Tuning is accomplished by a 140 mmf. midget variable condenser mounted on the front panel. A smooth vernier type dial is used to insure proper tuning.

In operation, the antenna condenser is adjusted so that the detector tube will oscilliate at all points on the tuning dial. The point of adjustment depends entirely upon the degree of absorption of the antenna circuit from the tuning circuit. It is well-worth mentioning here that a *good* aerial contributes inestimably to efficient short-wave reception, particularly for a set of this type. Both the aerial and lead-in should be well insulated and kept as far away from walls, roofs, etc., as possible.

It should be kept in mind also, that phone signals are loudest just *below* the oscillation point and C.W. signals just *above* the oscillation point. When tuning the "DX-ER" the regeneration control should be set to the point where the detector just starts to oscillate. Then, the tuning dial should be carefully manipulated until a "whistle" is heard. Careful tuning at this point and further adjustment of the regeneration control will bring in the intelligible signal. While there is nothing tricky about the operation of the "DX-ER" it is well to spend some time in learning how to tune it to derive maximum reception.

For maximum enjoyment, a good, *sensitive* pair of headphones should be used. Only two dry cells and two 45 volt "B" batteries are required for complete operation.

Parts List for "2-Tube DX-ER"

1—7x9 Drilled Hard-Rubber Panel.
3—4 prong Sockets.
1—140 mmf. Midget Tuning Condenser.
1—20 ohm Rheostat.
1—50,000 ohm Regeneration Control.
1—1 to 5 ratio Shielded Audio Transformer.
1—Antenna Condenser. 80 mmf. max.
1—Knight R.F. Choke.
1—.0001 mf. Knight Mica Condenser.
1—.001 mf. Knight Mica Condenser.
1—3 megohm Resistor.
1—200,000 ohm Knight Carbon Resistor.
8—Clips.
1—Baseboard.
1—Vernier Dial.
2—Knobs.
1—Kit of Screws, Nuts, Hardware. Wire, etc.
1—4-prong plug-in Coil Kit (4 coils).
2—30 Tubes. R.C.A. Radiotron (Arco.).
2—Dry Cells (1½ volts each).
2—Knight 45 volt "B" batteries.
1—Pair Headphones.

When You Write to Us Please Note the Following

SHORT WAVE CRAFT now has the **largest circulation of any short wave magazine in the world.** Our daily mail has become so heavy that it has swamped our editors.

It is the purpose of this publication to give you the best magazine every month. To do so, the editors must have sufficiet time to do their normal work. With the tremendous influx of mail, the problem is becoming a serious one with us.

Please cooperate with us by writing only when it is necessary, and if you wish to get a personal answer to some technical problem, enclose 25c for stenographic and clerical help. It is impossible for us at the present time to answer every letter for readers who wish information on sets, etc., for which no payment has been made.

You wish to get the best short wave magazine, which we are anxious to do, and for that reason we ask your cooperation and indulgence.—The Editors.

Interference Reducing Antenna

(*Continued from page* 153)

reception is desired, since the antennas are not excessively critical. For reception of a specific frequency, one special antenna may be designed, but it will also serve adjacent frequencies. It is considered most practicable, therefore, to use four systems having a harmonic relation from 160 meters on down through 80, 40 and 20 meters. This will allow reception of police calls around 180 and 120 meters, amateurs on 160 meters, aircraft on 90 and 52 meters, international broadcasting on 49, 30, 25 and 19 meters, and amateur radiophone on 75 meters.

Antenna lengths for the four systems are as follows:

160 meters—90 feet (45 feet on each side)
80 meters—80 feet (40 feet on each side)
40 meters—60 feet (30 feet on each side)
20 meters—30 feet (15 feet on each side)

The couplers for each antenna call for separate specifications. The details of construction are shown in Fig. 2, and specific directions for each antenna system are as follows:

160 meters—Coil form is ⅞" maple dowel 4 inches long. First winding of 100 turns number 30 d.c.c. copper wire. Second winding of 75 turns.

80 meters—Same coil form. First winding of 60 turns number 30 d.c.c. copper wire. Second winding of 45 turns.

40 meters—Coil form of ½" maple dowel 3½" long. First winding of 16 turns number 24 d.c.c. copper wire. Second winding of 14 turns.

20 meters—Same coil form. First winding of 9 turns number 24 d.c.c. copper wire. Second winding of 7 turns.

In all coils the *electrostatic shield* consists of a 1¼ turn winding of tinfoil with a piece of bond writing paper separating the ends so as to keep the tinfoil from forming a one-turn absorption loop. The first winding is wrapped with 3 layers of bond paper, then the electrostatic shield is put on, three more layers of bond paper are wound on, and the second winding is applied.

The five binding posts are brass machine screws countersunk half the way through the coil forms. For the 160- and 80-meter forms, they can be ¾" round-heads size 6-32, and for the 40- and 20-meter forms they can be ½" round-heads size 4-40.

When both windings and the electrostatic shield are finished on each coupler, the entire form and coils are taped over completely with black friction tape, given three or four coats of clear auto finish, and they are weatherproof. It is important to cover everything but the binding posts with the tape, as the clear auto finish will not adhere to smooth surfaces in the action of sun, wind, rain and variable temperatures.

How to Get Verification Cards

First of all, write the letter neatly, typewritten or ink, never in pencil! Give the exact local time of reception, as well as Greenwich meridian time.

Be sure to mention that part of the program which you listen to.

Be sure to thank the station manager for giving you the program ,and how much pleasure you received by listening to his station.

State in the letter that you enclose an *International Postage Reply Coupon*. Never send cash or stamps. The foreign stations cannot use them. The International Postage Reply Coupon costs 9c. You must buy it at your local Post Office.

Most important is the matter of postage. Letters to Europe, Australia, Asia, Africa and most of the foreign islands go at the rate of 5c, if the letter weighs less than an ounce. If it weighs above this, extra postage must be prepaid.

But few stations will answer your requests, unless the International Postage Reply Coupon is used!

$20.00 PRIZE MONTHLY FOR BEST SET USING 1 OR MORE TUBES

● THE Editors are looking for some "brand-new" Receiving Circuits USING BUT ONE TUBE. The tube must be a standard one and any type tube can be used. The new multi-element tubes provide Short-Wave "Fans" with almost limitless opportunities. Send along your set—or a circuit diagram and 200 word description for opinion as to acceptability.

The Editors offer a $20. monthly prize for the best short-wave receiver submitted. If your set does not receive the monthly prize the Editors will pay space rates for any articles accepted and published.

You had better write the "S-W Contest Editor," giving him a short description of the set and 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. Set should not have more than five tubes and 1-tube sets featuring one of the new "twin-element" tubes are in great demand. Let's see "YOUR" idea of an Ultra-Modern 1-Tube Set!

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 (July 1 for the September issue, etc.). In the event of a "tie" an equal prize will be paid to each contestant so tying.

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

Address your entries to:

Editor,
SHORT WAVE CRAFT,
99-101 Hudson St.,
New York City.

Short Wave League

(*Continued from page* 164)

Ouch! Who Said "No Code" Exam!

Editor, SHORT WAVE CRAFT:

I have read in SHORT WAVE CRAFT many letters favoring a codeless examination for amateur operator licenses.

I have been in this greatest of all games since back in the spark days, and code always has been the thing which furnished the greater part of the thrills and interest in amateur radio.

Surely we are not going to ease up now and allow a bunch of *kids*, lacking the interest or ambition to learn the code, to step into our ranks and call themselves amateurs.

It is a proven fact that anyone with knowledge enough to be a radiotelephone experimenter can, with a little bit of spare time and effort, learn the code. Anyone who does not have the time to learn the code most certainly does not have the time to do any radiotelephone experimenting.

This letter will probably cause plenty of comment from those in favor of the *codeless* exam, but it expresses my opinion that in order to obtain an amateur license to operate on *any* amateur frequency, one should first pass a *code test*. I think that every "dyed in the wool" ham will agree with me.

Yours very truly,
73 sincerely,

GEORGE L. MEEK,
WSIB, ex SALG, 3PA, WSZZH, etc.,
Shinnston, W. Va.

* * *

He'd Petition the President for "Codeless" Ticket

Editor, SHORT WAVE CRAFT:

I am enclosing herewith application for membership in the Short Wave League which I understand is a scientific membership organization for the promotion of the short wave art, and which I believe is true.

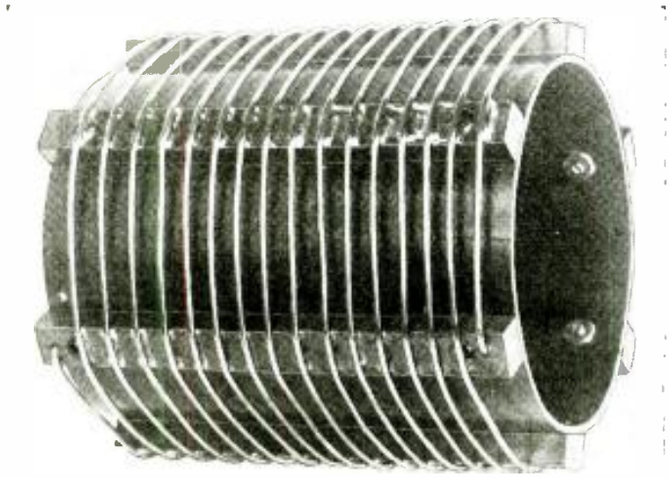
As I am writing this letter, I am reading from a March 1918 issue of the *Electrical Experimenter* which was the leading and practically only radio magazine at that

(*Continued on page* 191)

"Clip-Coil" Eliminates "Plug-Ins"

● THE very latest wrinkle in short-wave tuning coils for receivers is the *Clip-Coil* here illustrated. An improved and very sensitive short-wave receiving circuit utilizing the new *Clip-Coil appears on page* 140.

By means of two spring clips and a fixed center tap, any number of turns, or fractions of a turn, may be connected into the grid and tickler circuits. One-half of the coil is used as the tickler, while the other half of the coil is used as the grid winding. Some of the advantages of the *Clip-Coil* are that due to its large diameter and the use of heavy copper wire, with the turns spaced the proper distance apart, it now becomes possible to cover the whole short-wave spectrum with one coil. This eliminates the use of plug-in coils. Electrical losses occasioned by the use of many of the plug-in coils wound with very fine wire, are eliminated in the *Clip-Coil*, thanks to the use of unusually heavy copper wire. The new *Clip-Coil* measures 3⅜" mean diameter by 4 inches in length. The heavy copper wire winding is supported practically in air, on bakelite strips, with a consequent minimum of electrical leakage.



The newest idea in short-wave receiver tuned coils is the "Clip-Coil" here illustrated. It eliminates the use of plug-in coils and the various bands are tuned in by shifting the clips along the coil. (No. 185.)

The Constant Band-Spread Twinplex

(*Continued from page* 143)

ser is mounted about four inches behind the panel and connected to the dial with an insulated shaft in order to eliminate "hand-capacity" effects.

Due to the close proximity of the two triode units in the 19 tube, it is necessary to employ the condenser, C6, to keep stray R.F. out of the phone cord. Failure to employ this condenser will also result in embarrassing "hand-capacity" effects.

The coil data follows: these coils are wound on 1⅛" dia. Hammarlund Midget coil forms. The two windings are wound in the same direction and separated by about ⅛". In wiring the coil, the two outside leads go to the plate and grid condenser. The disposition of the remaining leads is immediately evident from the wiring diagram.

Coil No.	Frequency Range, MC.	L1 No. Turns	L1 Wire	L2 Tap	L2 No. Turns	L2 No. Wire
1	6-18	10	No.22en	4	12	No.30dsc
2	1.5-6	27	No.22dsc	27	18	No.30dsc

Parts Required

C1—Equalizing condenser — EC-35 (35 mmf.) Hammarlund.
C2—140 mmf. variable condenser, MC-140-M. Hammarlund.
C3, C4—365 mmf. two-gang variable condenser, Trutest.
C5—.0001 mf. mica condenser.
C6. C7—.0005 mf. mica condenser.
C8, C9—.2-.2 mf. dual paper tubular bypass condenser.
L1, L2—Set of two plug-in coils. See text for winding details. Wound on Hammarlund Midget 5-prong Isolantite coil forms. CF-5-M.
L3—8 m.h. isolantite R.F. choke, CH-8, Hammarlund.
L4, L5—Audio transformer, 3:1.
R1—3 meg. grid-leak, Lynch.
R2—500 ohm metallized resistor, Lynch.
R3—50,000 ohm potentiometer.
1—5-prong isolantite socket, Hammarlund.
1—14 ga. aluminum panel, 5"x10", Blan; I.C.A.
1—14 ga. aluminum chassis, 6"x12"x1", Blan; I.C.A.
4 ft.—4-conductor battery cable.
1—Six-prong wafer socket, I.C.A.
1—Twin binding post.
1—Twin speaker jack.
1—3" vernier dial.
1—Flexible coupling, Hammarlund.
4 in.—Hard rubber ¼" dia. extension shaft.
1—R.C.A. "Radiotron" type 19 tube.

Power Supply From Ford Coils

(*Continued from page* 157)

polarity of the storage battery connections to the spark coils.

The relays are made by removing the original coil windings from Ford cut-outs, and winding the bobbin full of No. 28 cotton covered wire, care being taken to insulate the two leads coming off this coil from the contact points on the relay. This arrangement makes very satisfactory relays.

The relay connected in the high voltage lead to the plate of the oscillator should be adjusted until it closes a split second before the relay connected in the primary lead of the spark coil. This eliminates all chirps from the emitted wave. A word may be said as to the bleeder resistance connected to the output of the high voltage relay. Experiments show that if it were connected in the output of the filter system, a very noticeable voltage drop, and voltage lag occurred. While connecting it in the output of the relay no such drop or lag was noticed.

This power supply may be built very economically. By using choke coils designed for broadcast receivers capable of passing at least 60 mills of current, and using the condensers taken from Ford coils, in the filter system, and across points, etc. The filter condensers must be capable of standing at least 500 volts rectified A.C.

Screen-Grid Portable 3

(Continued from page 152)

eliminates the very annoying trouble of having the incoming signal hop around whenever the aerial gave a slight tremor in the breeze, or, if an indoor skywire is used, whenever someone steps on the floor or goes near the aerial. With an R.F. stage ahead of the detector, a 60-mile gale dancing the aerial around will have absolutely no effect on the frequency of the note being received.

Whether the R.F. should be tuned or not came in for quite some debate, the final decision being in favor of an untuned stage. Tuning the R.F. tube would have necessitated an extra set of coils, besides extra shielding on the chassis, another control for a padding condenser, and a two-gang tuning condenser. A simple choke input circuit was chosen and the results obtained with the set have been satisfactory, even though the difference in gain between a tuned and untuned stage was lost.

The tube unanimously chosen for the detector was one of the screen-grid type, because of its supremacy over a triode in the matter of sensitivity. With particular tickler arrangement used, which may perhaps seem queer, very smooth and noiseless control of regeneration is obtained.

Audio

The first thing thought of for audio was a pentode, but consulting the tube chart quickly showed that this kind of tube would draw entirely too much current for the small batteries that would have to be used to keep weight down. Yet a triode would not give us just what we wanted in the way of output, so a rather peculiar choice was made. A screen grid tube is used, and although the audio output in milliwatts is comparatively low, the very high gain obtained makes it an admirable tube for this set. There is a slight "peaking" effect due to the use of a screen-grid tube, but this seems to be an aid rather than a liability. The audio output circuit shown might cause a graduate engineer to shudder in horror at the mismatching of impedances, but the only answer is, it works, gives plenty of audio "hop", and has pretty good quality, so "come up and hear it some time".

The absolute absence of R.F. chokes except in the detector plate and the R.F. grid circuits may cause some builders to wonder. The answer is that chokes were tried and made no noticeable difference. Hence they were left out to keep the cost down as much as possible. As a matter of fact, a five thousand ohm carbon resistance worked just as well as the choke in the plate of the detector, but the choke was left in as a sacrifice to the conventionalities. A tip that you fellows might try when building a receiver and are short of chokes, is to try substituting a carbon resistance. In most cases you'll find it works just as well. Remember, there are exceptions to every rule, so don't take this as an infallible statement, inasmuch as we have no desire to be scalped by irate readers.

Layout

The placement of parts on the chassis is quite conventional, and was chosen with an eye for the shortest possible leads in all circuits. From left to right along the front edge of the chassis, right behind the panel, are: the '32 R.F. tube, the .0001 tuning condenser and the '32 audio tube. On the rear edge of the chassis, from left to right, are: the 32 detector tube, the socket for the plugin coil, and the audio transformer. The secondary of this audio transformer is used as a choke in the plate circuit of the detector tube. The controls on the panel, from left to right, are: filament rheostat, tuning control, and regeneration control.

Coils

The coils are wound on ordinary 4-prong tube bases. Dimensions for the coils, which follow, place the "ham" bands near the center of the coil.

Band	Primary Turns	Tickler Turns	Wire Size
20 m.	4½	6½	No. 26
40 m.	7½	8½	No. 29
80 m.	15½	13½	No. 34
160 m.	34½	15½	No. 34

Unless they are readily available, it is not really necessary to use the different sizes of wire. They are mentioned in the article because the set of manufactured coils that was used had the various sizes of wire on them. Any wire between No. 28 and No. 34 can be used for all the coils. Whichever way the coils are made there will probably have to be the usual slight amount of "cut and try" before the set works perfectly on all bands. After the coils are correct, paint them with a thin coat of collodion or clear duco, so that the turns will stay put and stations will come in on the same spot on the dial every time. In case a little broadcast music should be desired for the good of the soul.

Batteries

Two 1½ volt A cells and three small size portable B batteries are used with the set. Total filament drain is .18 ampere, so the two A cells should last at least a year under normal use. Overall plate current cannot be more than 5 milliamperes, therefore the B batteries should last a long time. Needless to say, only a good, standard make of battery should be purchased, even though an inferior make is slightly lower in cost. Poor batteries will become noisy in a very short time, and even with modern construction methods, will fail to stand up under any heavy jouncing. This statement is the result of personal experience, as a cheap set of batteries were purchased and had to be thrown out after only 7 weeks use!

Construction

The method of building the set will depend to a large extent on whether metal chassis is used, or the old favorite baseboard is re-sandpapered to construct the set on. In either case no difficulty should be encountered, as there are no mechanical tricks to the set. More than normal care should be taken with the soldering if the set is to be subjected to rough handling.

Operation

After the set is wired, and all connections have been checked and re-checked, connect the A battery. If the filaments of the three tubes light when the rheostat is turned, add the B batteries. If the filaments do not light, go over the set again, as there must be some error in wiring. With A and B batteries connected, filaments on so that they show a cherry red color, antenna connected, plug in the 160 meter coil, and turn the regeneration control until a rushing or hissing noise is heard. Tuning should be done very slowly with the main control, and the potentiometer should be kept just at the edge of regeneration for loudest signals.

This set has given very fine results, and we should be glad to hear from those that build it, so as to compare notes on what has been heard with it. Here's hoping we come across some copies of the screen grid portable during our travels this summer.

Parts List—Screen-Grid Portable-3

Cabinet and Chassis—Harrison Radio Co.
2-100,000 ohm ½ watt Carbon Resistors.
30 ohm Rheostat.
2 meg. Carbon Resistor.
50,000 ohm Potentiometer.
250,000 ohm, 1 watt Resistor.
1 meg. Carbon Resistor.
3-.02 mf. Paper (200 vt.) Condenser.
.0001 mf. Mica Condenser.
.00025 mf. Mica Condenser.
.5 mf. Paper Condenser.
.1 mf. Paper Condenser.
.0001 mf. Variable Condenser. Hammarlund.
3/1 Ratio Audio Transformer.

2-2.5 M.H. R.F. Chokes.
4-4-prong Wafer Sockets.
1 Double-Circuit Jack.
3-'32 Tubes, R.C.A., Radiotron (Arco.).
Hardware, Wire, etc.—Harrison Radio Co.
1 set Plug-in Coils. Harrison Radio Co.

Coil Data—Victor Portable "Screen-Grid 3"

16 to 200 Meters

Coil	Grid	Wire	Tickler	Wire
No. 1	7 turns	No. 28	5 turns	No. 28
No. 2	13 turns	No. 30	6 turns	No. 30
No. 3	22 turns	No. 30	8 turns	No. 30
No. 4	38 turns	No. 32	15 turns	No. 32

All coils close-wound on 1⅜" dia. tube bases, with single silk covered wire. Standard manufactured coils, of course, can be used.

Zeesen—Germany's S-W Voice

(*Continued from page* 135)

their energy from underground, a special cable which has been explained previously in this magazine. In consequence of these extraordinarily efficient directive antennas, it is possible for the listener overseas to hear the German programs direct, even on the smallest S-W receivers.

Because some other transmitters are planned, it will be possible to open in a short time the new directional antenna to Australia and to lengthen the time schedules to other parts of the world—at first those for North America. (This will be welcome news to American S-W fans.—Editor.)

Under the present plan, the future developments at Zeesen will result in the most up-to-date and powerful short-wave broadcasting station in the world. Our American friends will thus be able to thoroughly enjoy, far more than now, the many excellent musical and vocal features emanating from Germany.

(*Even now the Zeesen station is laying down a surprisingly powerful signal in the eastern part of the United States. The editors enjoyed some excellent music and talks from Zeesen (on the 49 meter band) during the month of April, just before the "dead-line" for copy for this issue. The "loud-speaker" music was so loud on a 7-tube short-ware superhet, that the volume control had to be turned away down. Even then it could be heard all over the house.—Editor.*)

In further explanation of the "beam zone" map, the shaded section, A and B, indicates the area of maximum signal intensity for the North American beam aerial system. B indicates the central radius signal strength, while A is the edge of the beam with slightly less signal strength. C marks the maximum signal strength on the South American beam on DJA (31.38 meters). It will be noted that this beam C1 also extends over Eastern Asia and appears on the other side of the map. The reason for this is that this beam is reversible and can be used to transmit signals to Eastern Asia on DJA. The shaded portion, E, also shows the area of maximum signal intensity from the Eastern Asia radiation in the vicinity of 19 meters. It should be noted that E and C1 do not exactly coincide, so that the maximum radiation area is different in these regions. The area marked "D" is the region of maximum radiation with the transmissions to South Africa on DJE and DJC. The beam marked F and F1, which is not in use just yet, will also be a reversible beam. F will radiate its maximum intensity over the Australian area, while F1 will radiate maximum strength of signal over Central America and the northern part of South America.

Despite the fact that these directional antennas are used and concentrate at will it is possible to pick up several of the beam transmissions in this country. The transmission to South America on DJA is frequently picked up at very good strength, and also the transmission to South Africa on 25 meters.

"HAM" ADS

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

WANT HAMMARLUND OR NATIONAL SET complete. Must be in A-1 condition and price reasonable. CHARLES F. NEICE, 3725 Sixty-fourth St., Woodside, L. I., N. Y.

PLUG-IN COILS. WOUND ON BAKELITE four-prong forms, 15-210 meters. Set of four 50c. NOEL, 809 Alder, Scranton, Pa.

TEN PRACTICAL AND INEXPENSIVE changes converting Dodge 12-V. Ford T.A., Chevrolet Delco 6-V generators into 100-500 watt capacity A.C. generators, or into 32-110 volt D.C. motor or generator. Dodge is 500-W. self-excited. All in one book illustrated with complete simplified instructions and drawings for only $1. AUTOPOWER, 414 S. Hoyne Ave., Chicago.

INSULATION, WIRE, VARNISHES, SUPPLIES, etc. Send 3c stamp for bulletin. AUTOPOWER, 414 S. Hoyne Ave., Chicago.

203A FIFTY WATTERS WITH CARBON plates. $9.75 each; new, first quality and fully guaranteed; also 211's and 845's. VTE Laboratories, Ridgefield, N. J.

CASH FROM BURNT-OUT TUBES. Details 15c. Radio, 2224 Woodstock, Pittsburgh (18), Pa.

LIMITED NUMBER OF FIVE-METER PHONE blueprints, 25c each (coin). Literature included. RADIO BLUEPRINT SERVICE, South Hanson, Mass.

FIRST MONEY ORDER OF $17 TAKES COMplete Samuel Curtis Radio Course. Consists of Forty Lessons and text book. Good condition. ALBERT FREEMAN, South Hanson, Mass.

SHORT WAVE SETS BUILT TO ORDER. Send plans for quotation. Drawings, ideas, etc., furnished upon request. VIRGIL DARNELL, Emerson, Ga.

THE INTERNATIONAL AMATEUR SHORT Wave Fan Society calling you. Join. Membership 75 cents a year. Read QSO. Secretary, Oliver Amlie, 56th City Line Ave., Philadelphia, Penna.

FOUR PLUG-IN COILS FOR .0001, .00014 CONdensers, 16-200 meters $.50. Not tube bases. Lewis-Smallfield, 27 Avondale St., Valley Stream, New York.

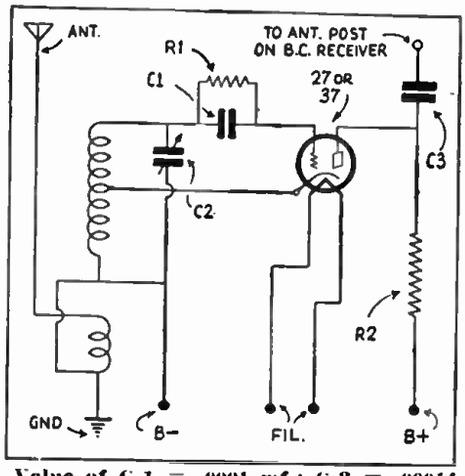
PILOT SUPER WASP—D.C.—BAND SPREADed—coils and tubes complete—how much offered? W2EPE, 338 Hamilton St., Harrison, N. J.

QSL AND SWL CARDS. 200, $1.00. STAMP for Samples. W8ESN, 1827 Cone, Toledo, Ohio.

TUBELESS CRYSTAL SET, SOMETHING NEW. Separates all stations, operates speaker, 1,800 miles verified. Blueprint, 6 others, 25c coin. MODERN RADIOLABS, 151-A Liberty, San Francisco.

The Resco S-W Converter

The simplest S-W converter—the "Resco"—it uses but one type 27 tube. It really converts your "broadcast" set into a short-wave "superhet". Name of manufacturer on request. (Refer to No. 184.)



Value of C-1 = .0001 mf.; C-2 = .00014 mf.; C-3 = .0001 mf.; R-1 = 100,000 ohms; R-2 = 100,000 ohms. Aerial coil L1; Grid Coil L2 (above tap); L3 Coil below tap.

● IN the accompanying photograph we have a novel short-wave 1-tube converter. It uses a single 27 tube only. The plate and heater voltages for the 27 are obtained by inserting the adapter-plug in one of the 5-prong tube sockets of the receiver and then plugging the tube into the adapter-plug. The "B" negative connection is made by a separate wire to the ground connection or directly to the chassis of the receiver. The output of the new RESCO converter is then fed directly into the antenna circuit of the broadcast set, making the broadcast set a short-wave superheterodyne. Plug-in coils are used to cover the various short-wave bands and there is only one tuning control on the converter. It is mounted in a neat 7¼"x4½"x5½" cabinet. This converter works on the autodyne principle, which is the simplest form of frequency conversion. The 27 tube works as first detector and high frequency oscillator combined.

Coil Data:	L1	L2	L3
80-200 Meter	8	27	8
40- 80 Meter	5	10	5
20- 40 Meter	3	7	3

Use No. 24 enameled wire, space wind L2-13. Plug 4 prong adapter into 45, 71 or 182 tube socket or 5 prong adapter into 47 tube socket. If power tube is 45 or 47, use 27 or 56 tube in S-W Converter. If power tube is 71 or 182-type, use 37 tube in Converter. Set receiver dial to approximately 900 to 1100 kc., selecting a point away from nearby stations; use volume control on set for short wave as well as broadcast reception.

DON'T FAIL

to WRITE the Editor and tell him what kind of articles you would like to see published in this Magazine. Remember—

It's Your Magazine!

Book Review

● KRUSE'S RADIOPHONE GUIDE has just made its appearance on the market. It measures 6⅞ x 10 inches and consists of 38 pages bound with a paper cover. This book has been copyrighted by Robert S. Kruse, well known short-wave consultant. The booklet is well written with plenty of worth-while information covering modulators and modulated amplifiers, together with the latest information on grid modulation. It is profusely illustrated with circuit diagrams and graphs and it should be a valuable addition to any amateur's book shelf.

William Ferguson Has Fine Canadian Station

(*Continued from page* 149)

is connected in parallel with the main tuning condenser. I found that with the regular tuning condenser there was hand capacity effects and now I tune in the stations with the regular tuning condenser and if the volume decreases when I take my hand away then I re-tune with the small condenser at the side and with it there is very little hand capacity effects as it is so far away from the coils, etc. The lower compartment contains the batteries.

You will also notice a double pole double-throw switch on the post at the right of the cabinet, this is for switching either to the phones or to the loud speaker.

The receiver on the shelf at the right is the original one tube set that I bought which I have since converted into an oscillator for code practice.

The second photo shows part of my workbench along with some supplies.

After listening to the amateurs on the various wave bands and hearing lots of code I decided I would like to learn the code too and become a licensed radio amateur. It was not till early in the Spring of 1933 that I learned the alphabet and, of course, Spring and Summer came along and I did not do much at radio work again until the Fall of 1933. About the beginning of December, 1911, I took up code in earnest and decided to master it. I listened in to the amateurs but they all seemed to be going *fast* and at that time the slow ones seemed fast to me.

I struck on an idea for learning the code which may or may not be new, but I am passing it along for what it is worth. I took a radio magazine and took a paragraph and counted about 200 or 300 letters in it. I then got a pencil and paper and wrote down those 200 or 300 letters like this ./. .//.. . .///. (radio) until I had the whole paragraph done. I would then try to read this backwards placing the letter on top of each sign and when finished would check over to see that it was correct. I would also time myself to see how long it took to read it backwards. After I had a lot of pieces done in this manner I would give them to my wife who did not know much about code and she would send them to me using the key and buzzer. She made the dots and dashes from the signs I had on the paper. I copied the letters from the dots and dashes she sent. The first time she tried this she was able to send to me at a rate of about 8 w.p.m. In a very short time she got used to the sounds for the letters and could then send to me without having to have the signs written down. Before long we were doing 15 w.p.m. I found this a good way to learn the code and it saved a lot of time fishing around on the dial trying to get someone who was going slowly enough to copy. My speed on December 30, was 8 w.p.m. and in a month's time I was able to do about 15 w.p.m. It meant about an hour's hard study each day but it was worth it. You can learn the code if you set out to do so in earnest.

I secured my Amateur Certificate early in February, 1934, and am now building my transmitter and hope before long to get on the air. Radio is sure a great hobby and you get lots of fun out of it.

WILLIAM FERGUSON,
247 Holmwood Ave.,
Ottawa, Ontario, Can.

(A vote of thanks to you, William, for your interesting letter, and the helpful hints on learning the code. You will find the transmitting game extremely interesting, especially when you "contact" foreign amateur stations.—Editor.)

CORRECTION NOTICE.

● WE REGRET that in the letter of Mr. Cecil Hinkley's, reproduced together with photograph of his station on page 85 of the June issue, that an error was made in the spelling of the set that he so highly praises, viz., "The ALAN Prize Winner". The name "Alan" was mispelled as "Allen".

When to Listen In

Conducted by M. HARVEY GERNSBACK

Broadcast Tips

The KDKA DX CLUB of Pittsburgh, Pa., broadcasts tips on reception of both broadcast and short-wave stations over KDKA (980 kc.) and W8XK (6,140 and 11,780 kc.) each Sunday night for one hour beginning at 11:30 P.M. (Eastern Standard Time). The broadcasts are in charge of Joseph Stokes while Edward Lips conducts the S-W section. The club would appreciate receiving information on all stations from all listeners. Address KDKA DX CLUB, Hotel William Penn, Pittsburgh, Pa.

Big Ben

Listeners to the programs from the Daventry stations have noticed the absence of BIG BEN, the famous chiming clock, from the programs since the 29th of April. Big Ben is now having its regular 10 year cleaning and overhauling. This work will take about eight weeks so that "Ben" should be back with us around July 1st. In his absence "Big Tom," the clock in the tower of St. Paul's cathedral in London, is carrying on with the time service. "Big Tom" does not have such a deep voice as "Big Ben" and uses a different chime melody.

CJRX

CJRX at Winnepeg, Manitoba, Canada, has shifted its wavelength to the following: 11,780 kc., 25.47 met. It is generally on from 8-10 P.M.

Time Signals

We have received many requests for information on government stations which transmit time signals. Herewith we present a list of all the U. S. government stations sending this service. *These stations do not use phone transmission, only code.* The transmissions are easily identified, however, by means of the accompanying instructions.

The time signals begin at 5 minutes before the hour (or ½ hr.). They consist of a dot (.) (heard as a "peep" in an oscillating regenerative receiver or in a "super" with the beat frequency oscillator going), for every second, omitting the dot at the following seconds: 29, 51, 56, 57, 58, 59 during the 1st minute; 29, 52, 56, 57, 58, 59 in 2nd minute; 29, 53, 56, 57, 58, 59 in the 3rd minute; 29, 54, 55, 56, 57, 58, 59 in the 4th minute; 29, 51, 52, 53, 54, 55, 56, 57, 58, 59 in 5th minute. At end of the 60th second of the 5th minute a one second dash (—) is sent. The beginning of this dash is the exact hour.

Call	Location	Frequency Wave	Transmission (E.S.T.)
NPG	San Francisco, Cal.	8,590 kc., 34.9 m.	2:55-3:00 A.M.
		12,885 kc., 23.28 m.	9:55-10:00 P.M.; 11:55-12 Noon
NSS	Washington, D. C.	4,525 kc., 66.3 m.	11:55 P.M.-12 Midnight
NAA	Arlington, Va.	8,410 kc., 35.65 m.	11:55-12 Noon
		12,615 kc., 23.78 m.	11:55-12 Noon
		16,820 kc., 17.8 m.	11:55-12 Noon
		9,050 kc., 33.1 m.	9:55-10 P.M.; 2:55-3:00 A.M., 3:55-4:00 P.M.; 6:55-7:00 P.M.
NPM	Pearl Harbor, T. H.	8,090 kc., 37.08 m.	2:55-3:00 A.M.; 11:55-12 Noon
		16,180 kc., 18.54 m.	9:55-10:00 P.M.
NPO	Cavite, Philippine Isles.	8,870 kc., 33.8 m.	11:25-11:30 P.M.
		9,050 kc., 33.1 m.	7:55- 8:00 A.M.
		17,740 kc., 16.9 m.	11:25-11:30 P.M.

Melbourne

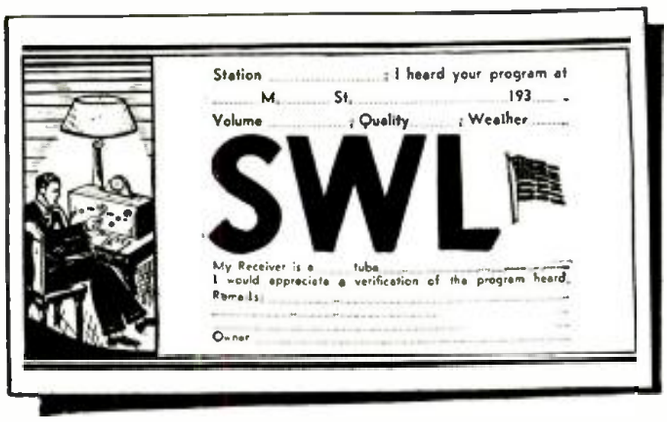
A new addition to the ranks is VK3LR at Melbourne, Australia. This station is operated by the Postmaster General's Dept. It has been experimenting irregularly for some time but is now on a regular schedule, daily except Sunday, from 3:30-7:30 A.M. (E.S.T.). Programs are relays of long wave broadcast stations in Melbourne. From 3:30-5 it relays station 3AR and from 5-7:30 station 3LO. The wavelength is approximately 31.3 meters. (Very close to that of VK2ME and GSC.) (VK2ME, during June, operates on Sunday from midnight—2 A.M., 5-9 A.M., and 11:30 A.M.-1:30 P.M.).

Zeesen

The German stations are operating as follows: 12:35-2 A.M. on DJB (Asia), 6:35-8:45 A.M. on DJA (Asia), and DJB (North America), 1-4 P.M. on DJC and DJD (Africa), 5-8 P.M. on DJA (South America), and from 8:30-11 P.M. on DJC and DJD (North America). All time Eastern Standard. All but the first broadcast are heard with varying strength in New York at present. On May 1st the African programme in celebration of May Day remained on till slightly after 5 P.M. and the South American programs started slightly before 5. The African was radiated on DJD and also DGU at Nauen (9,650 kc.), and the South American program on DJA. For about fifteen minutes listeners had the privilege of having a choice of two separate programs from Germany, one in English, one in Spanish.

Daventry

Daventry now works as follows: Transmission 1—4:30-6:30 A.M. on GSD and GSB; transmission 2—6-8:30 A.M. (6:30-8:30 A.M., Sundays), on GSH, 21,470 kc., and either GSF or GSG; this is the first time that GSH has been used. Transmission 3—8:45-11 A.M. on GSF and either GSG or GSE, 11 A.M.-12:45 P.M., on GSE, GSB and GSF (only 2 will be used at one time). Transmission 4—1-3 P.M. on GSF and GSD; 3-5:30 P.M. (3-4:30 P.M., Sundays), on GSD and GSB. Transmission 5—6-8 P.M. on GSD, GSC and GSF.



Verification Request Card

● HERE'S the latest—a verification request card. All you have to do is to add the figures from your "log", giving the *volume, quality, weather, remarks*, etc. The designers of this useful card, the American Sales Company, will send 10 cards free for the asking, and larger quantities at a nominal cost. The card resembles those used by short-wave amateurs and measures 3½ x 5½". It is printed in two colors on a stiff card.

My 20 Years of Radio Thrills

(*Continued from page* 139)

which was then the smallest A.C. operated receiver, has two 224-A tubes for the tuner, with a Loftin-White amplifier. In other words a 224-45 and an 80, with a 6-inch dynamic speaker.

Next to the midget receiver is a 20-40-160 meters short-wave coils. Then comes my *short-wave* receiver. This was built last summer from an article in the March issue, SHORT WAVE CRAFT of this year by Mr. Kahlert on page 652, properly describes my receiver, with the exception that I use a 2A5 power tube. This receiver has an untuned stage of 58, tuned stage of 58, a regenerative 58, detector direct coupled into the 2A5.

The amplifier in the picture sports a K. K. Universal microphone and the "beginnings" of a "velocity" ribbon microphone I am building.

Under the table is a phonograph motor and pick-up encased in a cabinet.

The room in the front is the same size. (12 x 15 ft.), turned around and is made into a *Studio*. The walls are covered with 5 ft. x 8 ft. celotex, ⅛ inch thick. Doors and windows are draped with *monk's cloth*. The floor has one-inch broadloom carpet with a felt base. It is fairly "soundproof".

Seventy-five per cent of this apparatus is home-made and I have received most of my information through radio magazines.

For many years my folks were against my experimenting with *wireless*; in fact the old buggy-boo of lightning striking the house due to the outdoor antenna resulted in an argument with my father and my pulling it down, "but where there's a will, there's a way". I ran bell wire up through the window-casing into the attic of a frame house and then draped it around the rafters. Entrance through the attic was made by a small 2 x 2 ft. hole. Hi! Those evenings consisted only of hearing the regular press (code); notices from the *Herald* "barge offices", stations, etc,

Back in 1919, Alfred H. Grebe with his amateur station 2ZV in Richmond Hill, S. I., broadcasted the first *political* speech by having Mayor John F. Hylan speak into an ordinary telephone. My dad being a personal friend of Mayor Hylan's, consented after 2-3 weeks "plugging" to sit in and listen to the experiment. 2ZV was about 10 blocks from my house. I had gone to the operating room, and when Mr. Hylan began to talk I ran home to tell dad. The minute I opened the door, he beat me to it, saying he was listening to the address and recognized his voice. That was the beginning of a beautiful new "radio" friendship. Dad has since "kept up-to-date" with radio.

As I was the only "radio fan" in my neighborhood (1920 to 1923), on many special occasions I had as many as 50 to 60 friends in to listen. This resulted in them buying radio sets much sooner than they would have otherwise done. Today—I maintain two "complete" rooms, which are a haven to my friends. One room, as the picture describes, is my operating and experimenting "Lab". The other a fairly well "soundproofed" *studio*, where we enjoy perfect reception. From an R.C.A. *Photophone* loudspeaker.

At present I am building a complete public address system on a "panel rack", consisting of a 30-watt amplifier, a mixing panel, a 33-1/3 or 78 R.P.M. phonograph motor, not only for *reproduction*, but also fitted with *recording head*. A 4 stage P.A. tuner, necessary monitoring speaker and controls are included. This rack will be standard size, 19 inches wide, 14 inches deep and 6 feet high.

At the top of the window, you will notice the old 6 inch blade lightning switch, which I am still old-fashioned enough to maintain.

The two pyrex insulators on each side of the center window is the "hangover" of the only time I started in to be a "licensed ham". About 1927, a New York jobbing house, was selling the old R.A.C. amateur transmitting units, consisting of 4-202's in one unit, the other 4-216B's. Both these units had beautiful 16 x 12 inch engraved

bakelite panels. I set them up on an angle iron rack and changed them considerably.

I became so enthusiastic that I signed up for a *Code Class* in R.C.A. Institute under Mr. Duncan. I went just one week. That Saturday a friend of mine brought a "pal" of his along and he saw this piece of apparatus and bought it. The apparatus then became a "commercial broadcaster" in New Jersey; so ended my only crack at "Ham" (transmitter) operation.

From 1929 to 1933 when *television* spurted up, I tried my hand at it. I felt satisfied that my image reception was as good as was practical for the time being. Lately I once in a while put a hand at it but with W2XR on from 5 to 6 p.m. it does not fit in with my available spare time schedule. W9XG, Purdue University, in Indiana, on Tuesday and Thursday from 9-10 p.m., E.S.T., are fairly good here in New York, but synchronization is bothersome; someday I will get around to that too.

The beginning of new short wave activity in 1926-7-8 naturally focussed my attention on them. The "veris" (verification cards) on the wall prove this. Last year with fairly regular schedules of "foreign" stations available, I decided to put together a real S-W receiver job.

This new S-W receiver is an improvement over an earlier model consisting of untuned 24, tuned 24, 24 detector, and 27 audio; changed to untuned 58, tuned 58, 58 regenerative detector, resistance-coupled direct into a 2A5 power tube. I maintain a separate power-pack and plate supply to reduce A.C. hum. Under the table is an 80 rectifier "set-up".

Mr. Kahlert's article in the March, 1934, SHORT WAVE CRAFT, describes my receiver 95 per cent, although I built mine last summer, 1933.

I claim that the continued and growing success of short waves and their programs will make many "headaches" for the local (domestic) poorly operated and poorly managed broadcast stations (200 to 550 meters).

My short-wave antenna is a single wire, 30 feet long and 25 feet high. By broadcast antenna is a single No. 14 wire, 50 feet high on one end, 25 feet at the other. A Lynch noise-reducing antenna layout "works" the Westinghouse *remote-control* family B.C. receiver, a 11-tube superheterodyne. The ground wire to the radiator is coupled to the water pipe in the cellar, just to make sure.

In closing I pride myself on the collection of apparatus, of which I have built 75 per cent myself. It has given me many hours of enjoyment and the benefit I have received can not be discounted. And I owe a lot of credit to our editor, Hugo Gernsback, for much of the information I have received from his many radio articles and magazines.

I have built sets all the way from crystal and 1-tubers up to a sixteen-tube outfit, about 6 or 7 years ago. I also remember going into the contest when my friend Arthur Lynch "shut-down" all American stations to listen to Europe in 1925. I was also one of the first to have the first 8-tube kit superhet manufactured by Radio Receptrad (about 1924-5).

A Real 110 Vt. A.C.-D.C. Portable

(*Continued from page* 151)

1 83 ohm, 25 watt Resistor (wire-wound).
1 Line Cord, 132 ohms.
1 30 henry Midget Filter Coil.
1 3-inch Vernier Dial. National.
1 Tube Shield. Hammarlund.
1 79 R.C.A. Radiotron (Arco.).
1 25Z5 Radiotron (Arco.).
1 Pair Featherweight Phones (2,000 to 4,800 ohms). Trimm.
1 Set Na-Ald (15 to 500 meter) 4-pin plug-in Coils.

S-W Scouts Trophy Winner

(*Continued from page* 147)

W2XE—25.3 M. New York City, N. Y. See letter.
W8XK—19.7 M. Pittsburgh, Pa. See card.
W8XK—25.2 M. Pittsburgh, Pa. See card.
W8XK—48.8 M. Pittsburgh, Pa. See card.
W9XF—49.1 M. Chicago, Ill. Heard here 10 to 11 P. M.
W8XAL—49.5 M. Cincinnati, Ohio. See letter.
W3XAL—49.1 M. Bound Brook, N. J. Sat., 4:30 P.M. to 12 Midnight.

Stations—Not Verified

W2XBJ—31.7 M. Rocky Point, N. Y. Testing with Byrd, around 9 P.M.
WEA—28.8 M. Rocky Point, N. Y. Tests with England, around 10 A.M.
KNRA—33 M. Seth Parker Schooner. Heard irregular around 9 P.M.
KNRA—45 M. Seth Parker Schooner. Heard irregular around 9 P.M.
VK2ME—31.2 M. Sidney, Australia. Sundays, 4 to 8 A.M.
VK3ME—31.5. Melbourne, Australia. Saturday, 4 to 6 A.M.
HJB—20.06 M. Phone with Hialeah, Florida. Mornings.
WNC—19.9 M. Hialeah, Florida. Phone with HJB, Bogota, Col. Mornings.
KEE—38.8 M. Bolinas, Cal. Irregular about 9 P.M. Relays chain programs.
GCW—30.06 M. Rugby England. Testing with records about 11 A.M.
HIZ—47.5 M. San Domingo, Dominican Rep. 3:40 to 4:30 P.M.
CFU—52 M. Rossland, B. C., Canada. Tests with CFN, around 10 P.M.
VE9JR—25.6 M. Winnipeg, Canada. 5 to 9:30 P.M. daily.
XETE—31.2 M. Mexico City, Mexico. Irregular, 9 to 11:30 P.M.
YVIBC—49.02 M. Caracas, Venezuela. Heard irregular, 4:30 to 9 P.M.
HJ5ABD—46 M. Cali, Columbia. 7 to 9 P.M. Irregular.
W4XB—49.6 M. Miami, Florida. Saturdays, 8 to 11 P.M.
W1XAL—49.6 M. Boston, Mass. Sundays, 5:30 to 8:30 P.M.
HJ4ABB—41.6 M. Manizales, Columbia. Irregularly heard on Fri., 8 to 9 P.M.
WOA—44.4 M. Lawrenceville, N. J. Irregular around 9 P.M.
KEJ—33.2 M Bolinas, Cal. Calling KKH Hawaii around 10 P.M.
KWU—19.46 M. Dixon, Cal. Phones Hawaii, 3 to 5 P.M.
I2RO—25.4 M. Rome, Italy. 12 to 5 P.M.
TGX—33.5 M. Guatemala City, Guatemala. Sundays irregular, about 8 P.M.
DJD—25.5 M. Zeesen, Germany. 7 to 9 P.M.
FYA—25.6 M. Pontoise, France. 2 to 5 P.M.
DJA—31.3 M. Zeezen, Germany. 9 to 11 A.M.
KES—28.8 M. Bolinas, Cal. Relays chain programs around 8 P.M.
G6RX—49.4 M. Rugby, England. Testing around 9 P.M.
YV11RMO—48.9 M. Maracaibo, Venezuela. Heard 8 to 9 P.M. on Tue.
HJ3ABD—40.5 M. Bogota, Columbia. 7:30 to 9 P.M.
LSX—28.9 M. Buenos Aires, Arg. Plays records while calling New York, 8 to 10 P.M.
HJ3ABF—48 M. Bogota, Columbia. 7 to 9 P.M.
HJ1ABB—46.5 M. Barranquila, Columbia. 7 to 9 P.M.
HJ4ABE—50.8 M. Medellin, Columbia. Fridays, 7 to 9:30 P.M., irregular.
HCJB—73 M. Quito, Ecuador. Irregular. 7:30 to 9 P.M.
HVJ—19.8 M. Vatican City, Italy. 4 to 4:15 A.M. daily.

Trophy Contest Entry Rules

● NOTE that we have amended our rules, and you will find that the rules now read:

Fifty Per Cent Verified and 50 Per Cent Unverified

In other words, if you send in a list of 100 stations, and at the same time you send in 50 verification cards, you will get credit for 100 stations, beginning immediately. This, we believe, should take care of all SHORT WAVE SCOUTS handsomely and give them the benefit of the doubt.

In order to protect everyone, the rules have been amended that a sworn statement before a Notary Public, which only costs a few cents to get, must be sent in at the same time.

It is to be hoped that the amended rules now make it much easier for the would-be entrants.

For the complete article of the Purpose of the SHORT WAVE SCOUTS, we refer to page 393 of the November, 1933, issue.

Here are the rules amended:

You wish to know how you can win this valuable trophy, and here are the simple rules. *Be sure to read them carefully. Do not jump at conclusions.*

1.—A monthly trophy will be awarded to one SHORT WAVE SCOUT only.

2.—The purpose of this contest is to advance the art of radio by "logging" as many short-wave commercial phone stations, in a period not exceeding thirty days, as possible by any one contestant.

3.—The trophy will be awarded to that SHORT WAVE SCOUT who has logged the greatest number of short-wave stations during one month.

4.—In the event of a tie between two or more contestants, each logging the same number of stations, the judges will award a similar trophy to each contestant so tying.

5.—Verifications are necessary; these must be sent in with each entry. All cards or verification letters must be sent in at the same time, with a statement by the SHORT WAVE SCOUT, giving the list of stations in typed or written form, with the station calls, wave-lengths, and other valuable information. (See below.) The verification letters and cards will be returned to the SHORT WAVE SCOUT at the end of each monthly contest. (See Jan., 1933, editorial how to obtain verifications.)

6.—Inasmuch as not all stations send out verification letters or verification cards, each contestant is entitled to report not more than 50% of station calls for which no proper verification is submitted. For example, if you should mail a list of 100 stations, and submit 50 verification cards or letters with this list, the Judges would allow the 100 stations, providing such data is given for the 50 unverified stations as to enable an intelligent check to be made by the Judges. In the interest of all SHORT WAVE SCOUTS, however, contestants should try to send in as many verifications as possible. Each list submitted must be sworn to before a Notary Public, as follows:

The undersigned declares under oath that the stations listed in this list and submitted in the SHORT WAVE SCOUT Contest were received by me during the past thirty days, that the reception was bona fide and was obtained by me without assistance from any outsider, and that I personally listened to the station announcements as given in this list.

7.—This is an *international* contest in which any reader, no matter where located, can join. It is allowable for SHORT WAVE SCOUTS to list stations in their own countries, if they desire to do so.

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

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

10.—In order to have uniformity of the entries, when writing or typing your list observe the following routine: USE A SINGLE LINE FOR EACH STATION; type or write the entries IN THE FOLLOWING ORDER: Station call letters; frequency station transmits at; schedule of

(*Continued on page* 188)

• • • SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE • • •

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

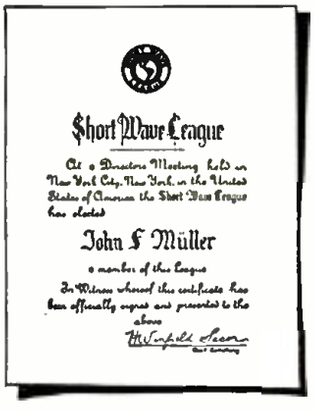
Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.

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

MEMBERSHIP CERTIFICATE

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

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



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

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

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

SHORT WAVE LEAGUE LETTERHEADS

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

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

A—50c per 100

OFFICIAL SHORT WAVE LEAGUE LOG AND CALL MAGAZINE

Here is the finest book of its kind ever published. It contains the largest listing of short wave stations in the world, much larger in fact than the list published in SHORT WAVE CRAFT and other magazines. All experimental stations, no matter where located, are listed. A large section is provided where calls can be listed in a proper manner. This log section gives dial settings, time, date, call letters, location, and other information. Another section has squared-paper pages on which you can fill in your own frequency curve for your particular receiver. It helps you to find stations which otherwise you could never log. It is the only book of its kind published.

B—Official Log and Call Magazine ..... Prepaid **25c**

B—25c per copy

RADIO MAP OF THE WORLD AND STATION FINDER

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

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

GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

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

SHORT WAVE LEAGUE LAPEL BUTTON

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

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

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

C—25c each

SHORT WAVE LEAGUE SEALS

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

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

SHORT WAVE MAP OF THE WORLD

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

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

D—$1.25 each

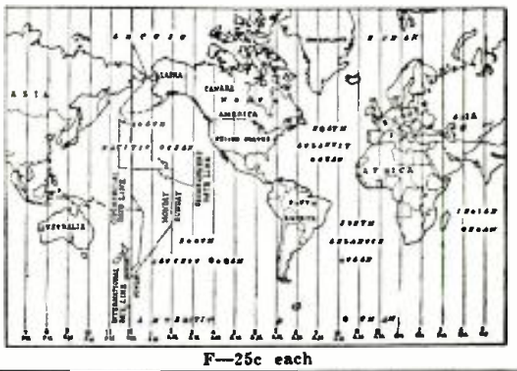
PLEASE NOTE THAT ABOVE ESSENTIALS ARE SOLD ONLY TO MEMBERS OF THE LEAGUE—NOT TO NON-MEMBERS.

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

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

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

G—15c for 25



F—25c each

E—35c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE 7-34
99-101 Hudson Street, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

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

Gentlemen:

I am already an enrolled member in the SHORT WAVE LEAGUE ☐

I am a new member and attach my application to this coupon ☐

Please send me the following short wave essentials as listed in this advertisement:

.....

.....

.....

.....

.....

.....

.....

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

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

Name .....

Address .....

7-34 City and State .....

County .....

SWAPPERS

SWAPPERS are swappers of correspondence. During the past few years we have noted that Short-Wave enthusiasts love to get acquainted with each other by mail in order to swap experiences.

Use a postcard only. Never write a letter. Address postcard as follows: SWAPPERS, c/o SHORT WAVE CRAFT, 99-101 HUDSON STREET, NEW YORK, N. Y.

On the blank side of the postal PRINT clearly your name address, city and State:nothing else! No charge for this service.—EDITOR.

ALVIN G. ABRAMS
570 West 191st St., New York, N. Y.
E. ADAMS
509½ Yonge St., Toronto, Ont., Can.
WILLIAM ALBRIGHT, Jr.
Sheridan Lake, Colo.
CARROLL ANDERSON
1666 Malasia Rd., Akron, Ohio
FRED APSEY, JR.
277 North Academy St., Galesburg, Ill.
PAUL J. AUBIN, WI-EAF, CSCG, ARRL
3 Water St., Putnam, Conn.
HAROLD S. BASS
209 E. Oak St., Princeton, Ind.
RICHARD C. BENOIT, JR., SW3
71 Navesink Ave., Highlands, N. J.
EMILE A. BERUBE
151 West St., Lawrence, Mass.
FRANK J. BLAZEWICZ
172 Bay St., Jersey City, N. J.
MICHAEL BOHONOS
10719-93d St., Edmonton, Alta., Can.
ORVILLE BRAATEN
R. F. D. 1, Farwell, Minn.
QUINCE BROWN, JR.
Care P. O. News, Bristow, Okla.
NOEL A. BROWNFIELD
3229 Davis St., Oakland, Calif.
WILMA E. BRUHNKE
3272 N. 8th St., Milwaukee, Wis.
CHARLES W. BURTON
4021 Overland Pkwy., Toledo, Ohio
HELEN CARLSDN
1398-8th St. Old, Milwaukee, Wis.
ELIAS CHASSAR
7517 Calumet St., Swissvale, Pa.
FRANK CHOINIERE
4 Dudley Ave., Cohoes, N. Y.
J. C. COCHRAN
Idaville, Pa.
L. CONLON
547 Canal St., Beaver, Pa.
W. L. COOK
521 E. Ninth St., Erie, Penna.
W. J. COVEYDUCK, JR.
33 Hamilton St., St. John's, Newfoundland
RICHARD CRANSTON
P. O. B. 569, Waterbury, Conn.
BENNY DANCE
Route 1, Box 554, Selma, Calif.
JOSEPH H. DAVIS
261 W. Main St., Batavia, N. Y.
ROBERT E. DAWES
334 Elk St., Buffalo, N. Y.
JOE DE SOUSA, JR.
109 High Rock St., Needham, Mass.
ERNEST DOANE
131 Ocean St., Lynn, Mass.
H. R. DRAKE
53 Elizabeth St., Dover, N. J.
KENNETH D. DREW
73 Mason Ave., Cranston, R. I.
CHAS. H. DUPONT
18 Vincent Apts., Price Hill, Cincinnati, Ohio
ELMER EATON
1318 So. Newkirk St., Philadelphia, Penna.
LEE EDWARDS
2313 G St., Omaha, Nebr.
HILLIS R. ELLINGTON, W4CJP
Box 465, Wake Forest, N. C.
DON ELSER, W8GXL
Box 78, North Lima, Ohio
O. FELIX
3215 So. Avers Ave., Chicago, Ill.
LAWRENCE J. FERRI
7244 VanDyke St., Tacony, Pa.
ALFRED FLUETTE
542 Privilege St., Woonsocket, R. I.
FRANCIS FRANKLIN
Rt. No. 2, Box 421, Sebastopol, Calif.
EDWARD A. FUXA
Brainard, Neb
ARTHUR GARTON, W90FY
Marathon, Iowa
IAN GILLEAN
604 Clarke Ave., Westmount, P. Quebec., Canada

(*Continued from page* 186)

transmissions, if known (all time should be reduced to Eastern Standard which is five hours behind Greenwich Meridian Time); name of station, city, country; identification signal if any. Sign your name at the bottom of the list and *furthermore state the type of set used by you to receive these stations.*

11.—Don't list amateur transmitters in this contest, *only commercial phone stations*, no CW and no "code" stations.

12.—This contest will close every month for the next twelve months on the first day of the month, by which time all entries must have been received in New York. Entries received after this date will be held over for the next months contest.

13.—The next contest will close in New York, July 1st.

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

15.—Trophy awards will be made every month at which time the trophy will be sent to the winner. Names of the contesting SCOUTS not winning a trophy will be listed in Honorable Mention each month.

16.—From this contest are excluded all employees and their families of SHORT WAVE CRAFT magazine.

17.—Address all entries to SHORT WAVE SCOUT AWARD, 98 Park Place, New York City.

The "Clip-Coil Two" Rolls 'em In!

(*Continued from page* 141)

tion. No change in coil construction will be necessary if tubes are changed.

Tuning this receiver is a very simple matter and the most inexperienced beginner should have absolutely no difficulty in pulling in the *speech* and *music* from the foreign stations. As a starter we suggest attaching the grid clip to the first turn of the grid coil and the tickler clip to the third or fourth turn on the tickler coil. The tuning range will now be from approximately 50 to 80 meters. This will take in the airplane beacons, weather reports, etc., together with the 75 meter amateur *phone* section. For short-wave "phone" *broadcast*, attach the grid clip to the fifth turn from the outside of the grid coil and the tickler clip on the fifth turn of the tickler coil. This will take in the 25 to 49 meter short-wave "phone" broadcast bands and the "foreign" stations can be tuned in on this setting.

When tuning in a station the procedure is to adjust the regeneration control until a slight rushing sound is heard in the phones; this will indicate oscillation of the detector tube. Now, rotate the main tuning condenser until a whistle, which indicates the "carrier" of a station is heard. Retard the regeneration control until the whistle *just* disappears. Then reset the tuning condenser for maximum volume; when tuning to another station it is advisable to readjust the regeneration control so that the detector is oscillating again in order that no stations will be passed. It is much easier to tune in a station when the detector is in an oscillating condition because each station will produce a whistling sound in the phones. The antenna coupling condenser should, of course, be adjusted for maximum volume. As this condenser is adjusted the regeneration control and the main tuning condenser will have to be reset. If the antenna condenser is adjusted properly, there should be no "dead-spots" in the band; that is, spots where it is impossible to obtain oscillation. Perfect tuning can only be attained after considerable experience has been had in operating a set. In all cases, adjustments should be made very *carefully* and *slowly* in order that no stations will be missed. We feel certain that this latest invention, the "Clip-Coil", is due to become very popular and we will be very pleased to hear from our readers as to the *results* they obtain with it.

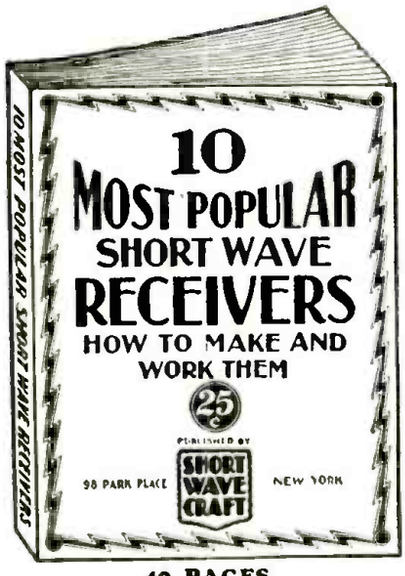
The 4 ESSENTIAL SHORT WAVE BOOKS

'ROUND THE WORLD FANS USE THESE GREAT SHORT WAVE BOOKS

These great books contain everything on short waves that is really worth knowing—they are books which have been most enthusiastically welcomed by short-wave fans. The cost of the books is extremely low in comparison with the valuable material which they contain.

There is not a short-wave fan, experimenter or interested radio-minded reader who will not want these books. Right up-to-the-minute with new material on outstanding developments in the short wave field. The books are authoritative, completely illustrated and not too highly technical.

Ten Most Popular Short Wave Receivers. How to Make and Work Them



40 PAGES
OVER 75 ILLUSTRATIONS

IMPORTANT

THERE IS NO DUPLICATION BETWEEN THIS BOOK AND OUR OTHER VOLUME—"HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS." ALL THE MATERIAL PUBLISHED IN THE NEW BOOK HAS NEVER APPEARED IN ANY BOOK BEFORE.

This new volume is a revelation to those who wish to build their own short wave receivers. The editors of SHORT WAVE CRAFT have selected ten outstanding short wave receivers and these are described in the new volume. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hookup and all worthwhile specifications. Everything from the simplest one tube set to a 5-tube T. R. F. receiver is presented. Complete lists of parts are given to make each set complete. You are shown how to operate the receiver to its maximum efficiency.

CONTENTS

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

2-R.F. Pentode SW Receiver having two stages of Tuned Radio Frequency, by Clifford E. Denton and H. W. Secor.
Mr de Luze S-W Receiver, by Edward G. Ingram.
The Binneweg 2-Tube 12,000 Mile DX Receiver, by A. Binneweg, Jr.
Build a Short Wave Receiver in your "Brief-Case," by Hugo Gernsback and Clifford E. Denton.
The Denton 2-Tube All-Wave Receiver, by Clifford E. Denton.
The Denton "Stand-By," by Clifford E. Denton.
The "Stand-By" Electrified.
The Short-Wave MEGADYNE, by Hugo Gernsback.
A COAT-POCKET Short Wave Receiver, by Hugo Gernsback and Clifford E. Denton.
Boy, Do They Roll In on this One Tuber! By C. E. Denton.
The S-W PENTODE-4, by H. G. Cisin, M.E.
Louis Martin's Idea of A GOOD S-W RECEIVER, by Louis Martin.

25c

The Short Wave Beginner's Book

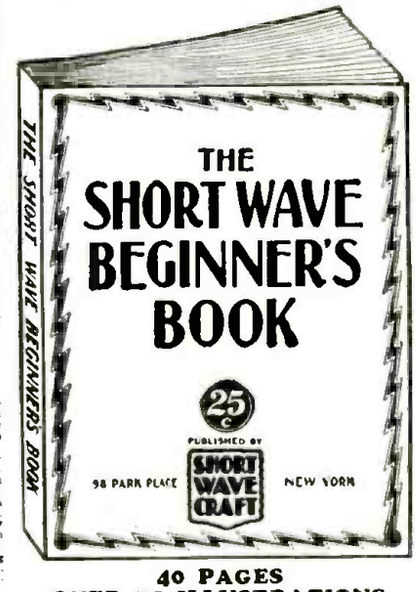
Here is a book that will solve your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

The book is profusely illustrated with all sorts of photos, explanations and everything worthwhile knowing about short waves—the book is not "technical." It has no mathematics, no "high-faluting" language and no technical jargon. You are shown how to interpret a diagram and a few simple sets are also given to show you how to go about it in making them.

It abounds with many illustrations, photographs, simple charts hookups, etc., all in simple language. It also gives you a 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

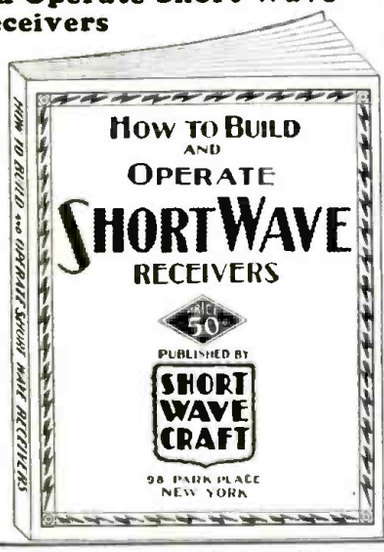
Getting Started in Short Waves—the fundamentals of electricity. Symbols, the Short Hand of Radio—how to read schematic diagrams. Short Wave Coils—various types and kinks in making them.
Short Wave Aerials—the points that determine a good aerial from an inefficient one.
The Transposed Lead-in for reducing Man Made Static.
The Beginner's Short-Wave Receiver—a simple one tube set that anyone can build.
The Beginner's Set Gets an Amplifier—how the volume may be increased by adding an amplifier.
How to Tune the Short-Wave Set—telling the important points to get good results.
Regeneration Control in Short Wave Receivers.
Audio Amplifiers for S. W. Receivers.
How to Couple the Speaker to the set.
Learning the Code—for greater enjoyment with the S-W set.
Wave length to Kilocycle Chart.
Wire Chart—to assist in the construction of coils.
Kinks in the construction of S-W Receivers.



40 PAGES
OVER 75 ILLUSTRATIONS

25c

How to Build and Operate Short Wave Receivers



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

The book comes with a heavy colored cover, and is printed throughout on first-class paper. No expense has been spared to make this the outstanding volume of its kind. The book measures 7½x10 inches.

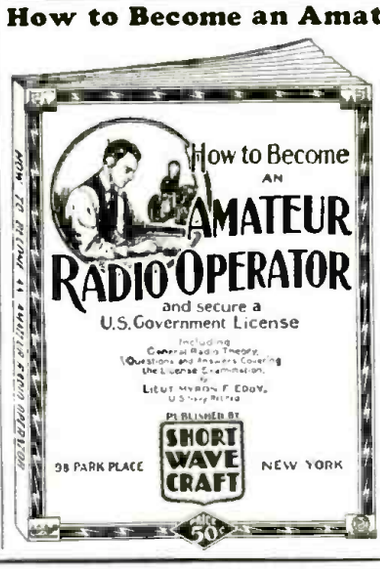
This book is sold only at such a ridiculously low price because it is our aim to put this valuable work into the hands of every short-wave enthusiast.

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

Over 150 Illustrations
72 Pages 7x10 Inches

50c

How to Become an Amateur Radio Operator



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

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

Partial List of Contents

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

Over 150 Illustrations
72 Pages 7x10 Inches

50c

All the books shown on this page are published exclusively by

SHORT WAVE CRAFT

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

SW-7-34

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

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

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World-Wide Short-Wave Review

(*Continued from page* 145)

Ultra Short-Wave Generator

The idea is to shield the free ends of the wires from the generator and thus to prevent the formation of standing waves which may absorb a considerable amount of energy. A variable condenser of 10 mmf. inserted between the cathode and the Lecher system gives an additional control. The values of the tuning circuit may be changed considerably without causing the appearance of a maximum in the generated energy. This maximum, similarly to the phenomena in a Barkhausen-Kurz generator depends upon the plate voltage and the emission of electrons.

Experiments were conducted with another arrangement which enabled a continuous variation of the length of the Lecher-wires. As shown at "B" the conductors consisted of telescoping rods and tubes. The frequency of the generator is surprisingly high but it was impossible to reduce the wavelength of the generator below 130-140 centimeters. The oscillations stop when the neighborhood of this wavelength limit is reached. Probably this phenomenon depends upon the fact, that the separate cathodes cannot be made perfectly uniform and therefore they will not have the same temperature when heated with the same currents. The electron emission of the various cathodes is different and the field inside of the tube is no longer homogeneous and the vibratory movement of the electrons is unnecessarily retarded.

Attempts were made to influence the phenomena inside of the tube by the action of external fields. For this purpose the rectifying tube was surrounded by a sleeve made of a metal gauze to which various voltages were applied. However, no changes were observed: whether positive or negative potentials were used; neither the frequency nor the energy output varied.

The curve (1) at C presents the energy output as a function of the heating current. The oscillation starts with a considerable output as soon as the heating of the cathodes is high enough to cause a considerable increase of the anode (plate) current (curve "2" of the same illustration). When the electron density in the neighborhood of the plate continues to increase, the vibration of the electrons is reduced considerably by the heavy space charge, the output is reduced to a fraction of its maximum value and can be increased again when the emission is brought to an excessively high value, i.e., the tube will be *overloaded*.

▲ ▲ ▲

In August Issue!

A Low-Cost Power Supply for S-W Receivers
By LEONARD VICTOR

My 2-Tube A.C.-D.C. "Wave Master"
By HAROLD MITCHELL

A Dandy 4-Tuber for Beginner or Old-Timer
By J. CALEB PHIPPS

A Cure for S-W Fading

In this system, several carriers are transmitted simultaneously, the frequencies of which differ from each other by less than the "middle" of the sidebands. Because of the fact that the phenomenon of fading never occurs simultaneously over wide frequency ranges, the proposition can be accepted that on at least one of the transmitted frequency channels the reception will be free from volume variation and so prevent serious fading.

Only a single aerial and a separately excited oscillator are used for the transmission of the several carriers; only a single modulator is needed. The circuit at "A" shows the circuit of the transmitter. The last amplifying stage is of the push-pull type. The output transformer of the modulating stage is connected to the two grids. The carriers are impressed on the common circuit grid-filament of the two tubes. The R.F. voltages impressed on the two grids are identical in phase and amplitude and after being amplified would have been completely eliminated in the coil La, if it were not for the modulation voltages which break up the symmetry of the push-pull and shift periodically the operating point of the tubes. The aerial radiates only modulated carriers and both side bands are present.

Instead of a single oscillator, several carrier generators may be coupled to the same output arrangement, as shown at B. Care must be taken to have loose coupling in order to avoid reaction (feed-back) between the separate oscillators and to prevent the effect of "pulling in" (in this case one oscillator forces another to leave its own frequency and operate on the frequency of the former).

Short Wave League

(*Continued from page* 177)

time with the exception of "Radio News." The *Electrical Experimenter* at that time was edited by you and Mr. H. W. Secor, Associate Editor. I do not know the exact year off-hand but the *Electrical Experimenter* was supplemented by *Science and Invention* and then led to SHORT WAVE CRAFT. My library of old magazines consists of a number of both the *Electrical Experimenter* and *Science and Invention* and I have been pleased to add SHORT WAVE CRAFT to this collection.

I became interested in radio in the early days of the *Electrical Experimenter* when the "spark coil" was at its best. My reason for discontinuing at that time is a notice which I am quoting and which many old-time amateurs will remember: "Notice to All Radio Amateurs—As most of our radio readers are undoubtedly aware, the United States Government has decided that all amateur wireless stations, either licensed or unlicensed and equipped for receiving or transmitting shall be closed." Thus, my activities in radio ceased.

I have followed the various radio magazines and have kept interested in the art and have watched the development of short waves which is particularly interesting at this time. I am writing this letter to express my opinion in regard to the "No code test below six meters" and as I have been very interested in the pros and cons of the letters published in SHORT WAVE CRAFT.

Frankly, I am for the *codeless license* below six meters and although I admit right here that my experience is limited, I am abiding by the rule of common sense. I wish to state that I hold the position of village clerk and in my official capacity, my duties are of issuing various kinds of licenses and preparing ordinances for the issuance of licenses, and it is my belief that a license should be issued, except professionally and under particular circumstances, only for purposes of identification and honest business relations. I frankly wish to say that many people who hold a license are in my opinion less qualified and are abusive of the privileges for which the licenses are issued.

Although the amateurs have the privilege of using the assigned wavelengths of twenty to one hundred and sixty meters inclusive, they freely and frankly state that a *no-code test* below six meters would cause "interference" and should not be allowed! While most of them are willing to admit that they do not operate five-meter transmitters and if they have operated them, have abandoned them because of the short distance and results obtained.

I am sure that these amateurs who have the use of these bands would not be willing to stay off the air one or two nights a week to allow those who are willing to cooperate by transmitting code lessons to those less fortunate in code practice, in order to obtain their license, because their transmissions cause QRM.

It is my belief that the band between five and ten meters is being reserved by the Federal Radio Commission as the most appropriate band for municipalities and police work, and I do not hesitate to say that in the future, legislation will prohibit the sale of short-wave sets in this band, because under the present operating conditions, individuals with short-wave radios in their homes, picking up police calls in their vicinity often rush to the scene and unwittingly help in the escape or hinder the officers in their duty, and as a municipality has no reason for wanting its police affairs to go beyond its confines and to eliminate the home listeners in the band between five and ten meters, is probably the reason that this is being reserved.

I believe that in many rural communities the use of five meters would be an asset and I wish to state *why*. There are in some rural communities a lack of adequate telephone service and there is always during the winter season the element of weather interferences with telephone services. Therefore, if these five-meter trans-receivers could be used, should a doctor be needed or in case of fire or necessity they were responsible in saving a human life, what American amateur would want to prohibit their use?

Aside from this, it would give an opportunity to those who unfortunately are unable to be located near cities where they can secure code practice and obtain technical radio information. So far as the cities are concerned, I do not believe there would be too many applications for the use of five meters and this could be governed by the population. It is my opinion that a license could be issued by the Federal Radio Commission for a fee, *but without examination*, and that a portion of this fee could be used as a salary to amateurs who at the present time hold a license in various districts throughout the United States to see that the five meter privileges are not abused.

It is also my opinion that this step would surely be a development in the promotion of short-wave art and would surely be a patriotic means of circulating thousands of dollars through the purchasing of new equipment, fees, materials, and would promote employment in this stage of the depression.

I would propose that the SHORT WAVE LEAGUE present a petition to his Honor, Franklin D. Roosevelt, President of the United States, stating that the Federal Radio Commission be requested to consider the issuances of licenses below six meters, eliminating the preseut examination and that as a result thousands of dollars would be spent, thus promoting additional use of materials, employment, and an increased circulation of currency, and that the petition be endorsed by thousands of amateurs.

Very truly yours,
LEONARD F. SCHNEIDER,
94 Main St.,
Brewster, N. Y.

What One "YL" Did

Editor, SHORT WAVE CRAFT:

Should the "code test" be abolished below six meters? Absolutely *not!*

I have read with considerable interest the comments regarding the abolishment of the "code test" below six meters.

I have just received my "ticket" from the Federal Radio Commission, having successfully passed the Class B "Exam."

When I started to take the "exam." the Inspector first made us (for there were about 22 aspirants for the much coveted "ticket", including a "Yl" (young lady) about 16 years old) take the code test. I'll admit that we all were a little nervous at the start of the code.

As the Inspector started the oscillator 22 pencils started to write. As the C.W. signals continued to pound into our ears, one could hear numerous sighs (either of relief, or over-anxiety), chorus in unison. I had the seat opposite the "Yl". As we continued to leisurely copy the code. I raised my eyes from my paper and glanced across the table and looked at the "Yl". There she was, chewing a wad of gum nonchalantly, and with one hand, was flicking an imaginary (?) thread off of her arm, and all the while she was copying code. The code test was completed in about five minutes. It was the easiest, most interesting part of the whole test. Just recently I received a letter from the "Yl"; she had successfully passed! So there you are, all you ham's out there who are always kicking about the code test. To tell the truth, the code speed should be doubled, instead of the present rate of speed. If a "Yl" can breeze through a code test at the measly, almost disgustingly slow rate of 10 words p.m., and hundreds of you "would-be" hams kicking and cussing just because you are required to copy a few simple words, well, ... (censored) ! !

Amateur radio has no room for the fellow who doesn't know code, or has no intention of knowing it.

Therefore all of you hams who *do want* a code test, should keep on fighting for the good cause, and upholding the real standards of amateur radio.

GEORGE E. STAREK,
1341 Douglas Ave.,
Racine, Wis.

• Index to Advertisers •

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

DOERLE WORLD-WIDE RECEIVERS

Official Doerle Receivers

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

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

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

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

ONLY FIRST CLASS PARTS USED

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

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

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

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

WHAT DOERLE FANS SAY

I received the 3-tube Doerle receiver and the set sure is a wonder. In just two weeks time I have received the following stations: KEE, HS1ABB, W1XB, PHI, W1XAZ, WMA, W8XK, W2XE, W3XF, DJB, GSE, YV1BC, KNRA, XETE, VE9JR, W8XAL, GSB, PSK, W3XL, W3XAU, EAQ, G6RX, W2XAD, HJ1ABB, VE2GW, GOA, FYA, WNC, HJB, YV3BC, LSX, KKQ, HC2RI. I think this is very good as the street car line is two blocks west and the I.C. electric railroad is about 150 ft. east of here. You may, if you wish, use this letter in whole or part in advertising your Doerles. **Mr. Glenn L. Thompson, 3612 Lake Park Ave., Chicago, Ill.**

THIS IS GOING SOME!

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

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

2-TUBE 12,500 MILE BATTERY SET

$8.71

This receiver is exactly as illustrated. Size of panel is 9" x 6¼", base 9" x 6½". **List of material used:** 2—Hammarlund .00014 mf. condensers; 1—20 ohm rheostat; 1—high quality audio transformer; 2—Kurz Kasch vernier dials; 3—bakelite low-loss sockets; 1—micamold antenna condenser; 1—.0001 mf. mica condenser; 1—5 megohm grid leak; 2—phone-pin jacks; 1—Ant-Gnd. assembly; 1—set of 4 bakelite plug-in coils; 1—set of hardware, hook-up wire, etc., and complete constructional details and diagrams. Shipping weight, 5 lbs.

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