You can build 100 receivers with this "CLIPSET". See Page 204.
935 OFFICIAL SHORT WAVE RADIO MANUAL

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

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6. Short Wave Receiver's Section—Diagrams of 1, 2, and 3 tube sets, showing theory of interest to every experimenter.
7. Ultra Short Waves—New circuits, apparatus, and notes obtained in this field.
8. Commercial "Short Wave" and "All-Wave" Receiver—Full Pertinent Data for 896 Owners and "Service-men."
10. Latest Short Wave Receivers—With service data on commercial models.
12. Short Wave Superheterodyne—From 3 to 10 tubes, latest designs, and diagrams including commercial all-wave receivers.
13. Phone Transmitters for Amateur Stations—How to build them.
14. "Fixed" Distance—Cross-Section Line, etc. explained; physics of Short Waves.
15. Super-Regenerative Short Wave Receivers—Latest circuits, etc.
16. Recording "Foreign" and "Domestic" Short Waves—programs. All systems in use.
17. High Fidelity—How to obtain it in Short Wave Receivers.
18. The best Short Wave Questions and answers.
19. The best Short Wave "Kinks" of the year.
20. Foreign Short Wave Review—Novel circuits, apparatus, etc.
21. Data for Short Wave purposes—including tables of latest tubes for Short Wave transmitters and receivers.
22. Short-Wave Transmitters—all about the new "Lone Star" oscillators as well as other "simple" high-military transmitters, back and panel jobs. Crystal Control, etc.
23. Multi-Purpose Tubes—How to use them.
24. Short Waves—Sets in which 3 tubes; 3 tubes; etc.
25. "Radio Amplifiers" for Short-Wave Receivers; Circuits, etc.
26. "Band-Spreader"—How to spread the bands over the dial for easier tuning.
27. "Plug-In" "Mono-Coil" Receivers—How to build efficient short wave plug-in coils. "Clip-Coil" Receivers, etc.
28. Boosters, Pre-amplifiers and Best Quality Receivers—What they work with, construction data, etc.
29. Portable Short-Wave Receivers and Transmitters—Transmitter Power Supply from Ford Cables, etc.

FOR AND SERVICE MEN
20. Every short wave circuit, every short wave set, whether it is a battery set, whether it is an all-wave set, every circuit, every note, every detail, every numerical, every letter, every word, that has been manufactured in the commercial set line, will be found in this special enlarged section. Hundreds of valuable diagrams, with inlay captions, notes, values, value charts, wiring charts, etc., and the purpose of every circuit explained, and the purpose of the parts of every set explained. If you order this book, before it comes off the press, you can get this information on the diagram, wherever this information can possibly be obtained.
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Partial Contents of "SHORT WAVES"

HISTORICAL REVIEW

Hansard and Marini—Layher—Polden—Varey

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SHORT WAVE PROPAGATION

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COMMERCIAL RADIO TELEPHONY AND TELEGRAPH

Motorized Short-Wave Telephones—Electrical Control—


Mobile Units—Special Equipment—Directional Antennae—

COMMERCIAL SHORT-WAVE TELEPHONY AND TELEGRAPHY

 vaiada...
In a recent report published by Radio Corporation of America, the company stated that it was expending one million dollars in actual field experimentation in television during the next twelve to fifteen months.

Sums equal to this, and larger ones, have already been expended on television by the American Telephone & Telegraph Corporation, and other interests, all of which will be aimed to one direction, and that is that we are getting nearer to the solution of television all the time.

Television, however, is NOT just around the corner, and there are still tremendous obstacles to be overcome. The final word in television has by no means been said. The rotating scanning disc, that is, the mechanical type of television, may be safely left out of future plans. It is not the solution of television. The next and apparently best solution which television has to offer so far lies in the cathode ray tube. Yet, even this, in my opinion is not the final word, and I do not believe that the television receiver of say twenty-five years hence, will have the present type of cathode ray tube.

My own opinion is that we need an entirely new discovery in television before it will become as popular as aerial radio is today. The animal eye is still the best type of television transmitter and receiver; it does not work on a mechanical principle nor does it require a cathode ray for its functioning. And, besides, the human eye does not have to “scan” as all present television apparatus do. Something radically different than our present apparatus—something far simpler—is, in my opinion, the solution to the television problem.

In the meanwhile, one thing is quite certain, and that is that when television finally arrives, it will come via short waves. At the present time, research scientists and radio-television engineers, believe that we require a wide waveband for television, much wider than that for our present short-wave broadcast signals. In broadcast short waves we get along with a band which, expressed in technical terms, is 10 kilocycles wide. Television, present-day engineers tell us, must have at least a band 400 kilocycles wide if we are to get a good image of some 290 lines. This, it is claimed, is required in order to give the image proper definition and to make the image appear with a clarity equivalent to a photograph printed in this or any other magazine.

For that reason, the experiments that are now being made by our large research organizations take it for granted that television broadcasting will be done on a wave-length somewhat less than six meters. Television engineers now have in mind networks whereby a New York studio, for instance, will send out original television impulses, which are then radiated simultaneously by hundreds of stations all over the country, situated at some elevated point such as a high building, hill, etc. The reason for this is that the short wavelengths of six meters do not reach much beyond the horizon, and consequently television stations would cover only from 25 to 80 miles radius from the television transmitter, depending on the elevation of the latter.

If this plan ever goes into operation, it will mean that hundreds of millions of dollars will have to be expended in new equipment, not only to put up new stations but in addition, we cannot use ordinary telephone or telegraph lines to interconnect the various stations, such as broadcast stations do today with their nation-wide hook-ups. Instead, entirely new cables, which have recently been invented, and which are termed concentric transmission lines, will have to be used from coast to coast, and this also is a tremendous undertaking. Then, add to this, the installation of the transmitters themselves, in thousands of cities, all over the land, and you will get a slight idea of the huge capital outlay required to make television practical in this country.

All this is based upon the assumption that for television we have to use the extremely short wavelengths, below six meters. If, however, another revolutionary television invention should be made, in the meanwhile, it is possible that an entirely different plan may be devised, and in this case, instead of having thousands of cities broadcast television locally, perhaps a few dozen or fifty transmitters working on short waves, anywhere between 15 and 25 meters, might solve the problem. All of this, however, is purely speculative and one opinion today seems as good as another. As I said before, the final word in television has not as yet been spoken.

There is also another important point to consider, and that is when television finally comes, it will, of course, supplement our present broadcast stations because we cannot very well imagine a television receiver, which receives only images, without sound. In any event, the television receiver of the future will work in either of the following manners:

Either the television impulses are sent out on the same wavelengths which the broadcast stations use now (200 to 550 meters). This is, however, rather doubtful.

Or the alternative would be to have the receiver work on two wavelengths, both present broadcast (200 to 550 meters) for sound—and ultra short wave, (for television) below six meters, simultaneously; that is, the sound would be received just as it is today, whereas the television impulses will be received on ultra short wavelengths, below six meters, on a separate receiver or a dual-purpose receiver, all built in the same cabinet or console.

The third and best alternative would be to have the audible broadcasts also sent by ultra short waves, in which case, the present broadcast stations would then stop radiating, because both audible programs and television programs could go over a single wave-length. This latter has already been achieved successfully. This would simplify matters a great deal for the ultimate user, because it would do away with a multiplicity of controls which you would have in the aforementioned cases. In other words, instead of tuning in two wavelengths, (that is tuning for sound and then tuning in for television,) you would only tune in for a single wavelength, which would bring you simultaneously television and sound as well.
Calls Home from Auto by Short Wave

motor-generator, which delivers 525 volts with 300 M.A. The antenna on top of the car is a 5-foot vertical steel fishing rod; this is hinged so that if any object such as a tree should hit it while the car is speeding along, the pole will merely bend.

This antenna works against a 3-foot counterpoise which extends forward and down toward the hood. The entire 5-meter transmitter and receiver is relay-controlled, a foot-operated switch on the floor serving to operate all of the relays.

DON C. WALLACE of Long Beach, Calif. calls up his home daily on 5 meters, using the apparatus shown in the accompanying photos. His car is fitted with a 5-meter 2-way radio set, so that he can talk to his home and hear the folks when they talk to him. In the event that he is away on a trip 20 miles or so from home and finds that he will be home late, he can close a switch with his foot which will start his 5-meter transmitter going and he then calls his home. His 12-year-old son, Bill, stands watch everyday at 5:30 p.m.

By kicking the floor switch in the opposite direction, the 5-meter receiver is set into operation aboard the speeding auto and Don Wallace can then hear his son’s voice and the “family news” of the day. Mr. Wallace tells us that the set on the car works as well at high speed as it does when standing still. The main parts of the transmitter are located under the hood of the car.

Twelve-volt storage batteries supply the primary current for the

Newest Cathode-Ray Televi sor

this system will be one of the most extensively used tomorrow, when television becomes an everyday commonplace. The right-hand photo shows Mr. Farnsworth with his new television cathode tube and also the appearance of his television with an image on the screen.
Short Waves Carried Normandie's Greetings

- A TALKING beam of light from the torch held in the upraised hand of the Statue of Liberty officially welcomed the new French liner, Normandie, when she steamed up New York harbor on her maiden voyage. General Electric engineers, who were consultants in designing the turbine-electric drive for the ship, developed special equipment for this unique stunt. This method of communication differed from radio broadcasting in that the words were confined strictly to the light beam, and were received only by special apparatus installed on the ship. The words of greeting, from Washington, were brought to the statue by land wire, then transposed into light pulsations and directed to the ship by means of a powerful reflector, capable of casting the light a distance of five or six miles. On the bridge of the ship was the receiver, consisting of a large concave mirror which will pick up the light rays and converge them upon a phototube or "electric eye." This transposed the light waves back into electric pulsations, which were fed through the public address system of the ship, so that the passengers could hear the welcome, and were also sent by short-wave radio to New York and fed into the WEAF or red network of the National Broadcasting Company. From the network, General Electric's short-wave station, W2XAF, in Schenectady, sent the voice to France, where arrangements were made to receive it and rebroadcast it throughout that country.

Stratosphere Short-Wave Set
How We Look In Chinese!

- THE photo herewith shows the specially built R.C.A. Victor short-wave transmitter and receiver which will be carried on the new stratosphere flight by Captains Albert W. Stevens and Orville D. Anderson. At the left of the photo appears Gen. James G. Harbord, Chairman of the Board of R.C.A., and at the right, Richard C. Patterson, Jr., Executive Vice President of NBC, who are shown examining the stratosphere short-wave equipment. It is planned to broadcast programs over the NBC network from the stratosphere balloon in flight.

Realizes Radio Ambition

- ROSS A. HULL, of the American Radio Relay League, recently realized his long-cherished ambition of talking from and to both sides of the world when, while in Schenectady, N. Y., he conversed with his brother in Sydney, Australia. He had previously talked to Schenectady from Sydney. In the picture, Hull (right) and K. E. Warner, secretary of the ARRL, are pointing out the locations of W2XAF, one of General Electric's short-wave stations at Schenectady, and VK5ME, "down under" at Sydney—the stations participating in the two-way conversation.

The elaborate role played by short waves in the maiden voyage of the magnificent new French liner, "Normandie," is illustrated in the picture above. A light beam carried the voice as the ship passed the Statue of Liberty.
New Multiple Wave Oscillator For Medical Use

By Dr. Pierre Rigaux

A radically new system of applying multiple short-waves for medical treatments is here described, also some remarkable results obtained by this new method, including the treatment of cancer.

DURING the last century the theory of waves was developed as a result of the numerous researches of Max Wael, Hertz, Brantly and d'Arsonval. In 1924 Georges Lakhovsky performed, at the surgical clinic of the Salpetriere, experiments in the cure of artificial cancer among plants.

First Experiments

These experiments, the reports on which were communicated to the Biological Society, became very celebrated and were reproduced throughout the world with equal success. The bacterium Tumeafaciens, when inoculated into plants, produces a series of white tumors of the size of a cherry stone, which multiply indefinitely and only perish with the plant or limb that bears them. Even when surgically removed, these tumors continue to proliferate (grow). Georges Lakhovsky treated these plants with an apparatus which he himself built. It was no doubt primitive, being called the radio-cellulo-oscillator, and producing oscillations of the order of 2 meters in length, which corresponds to an oscillation of 150,000,000 vibrations a second. The Pelargoniums were given two treatments of three hours duration each, with this apparatus, at twenty-four hours' interval. During the days immediately following the tumors continued to proliferate, but 16 days after the first treatment, the tumors suddenly began a process of necrosis (death), and 13 days later still, the cure was complete.

The necrussing activity of the waves was demonstrated at the same time as their great value in selecting cancerous tissues for the object of such action. It thus became possible to establish that tumors—at least among plants—were affected by radiative influences.

It therefore appeared to Georges Lakhovsky that one could arrive at a system of wave emission which could cause all the little circuits which constitute the living cell to vibrate periodicaly; and if all the circuits which constitute a single cell, why not all those which make up an entire organism? This theory of Cellular Oscillation, which he has brought before the public so sensibly and with so much regard to the laws of physics and biology in such works as "Le Secret de la Vie," "L'Univers," "L'Oscillation Cellulaire," "La Terre et Nous," and "La Métrie," has completely revolutionized old concepts. Not at all content to remain within the domain of theory, Lakhovsky was moved to produce a machine inspired by his little radio-cellulo-oscillator—the one with which he had cured cancerous geraniums in a single month—a machine which should emit radiation of multiple wavelengths which would create an electromagnetic field containing all lengths of radiation from 3 meters to the infra-red, so that every cell placed within this magnetic field, and

New "multiple-wave" medical treatment apparatus devised by Georges Lakhovsky.

1—Madame S, photographed a day before the first treatment, the 25th of April, 1932. Note the wrinkles in the neck and the generally aged appearance of this 82 year-old woman. 2—Madame S, photographed 16 days after the first photograph and not having had more than 2 sittings (treatments). One notes the rejuvenation of the tissue. 3—The same subject photographed a month later. The cure is now complete. The woman of 82 has recovered the transparent and rosy skin of a woman of 30 or 40.
UNQUESTIONABLY the most popular short-wave receiver ever described in Short Wave Craft magazine was the original 2-tube Doerle. This receiver was described in the Dec., 1931-Jan., 1932 issue and used a pair of type 30 tubes. There was nothing unusual about the 2-tube Doerle. One tube was a regenerative detector in a very conventional circuit, and the other type 30 tube was an amplifier. The low battery voltage and the use of a crude bakelite panel and base. The old-fashioned condensers and sockets have been replaced with up-to-date parts, using the highest grade of insulation. The critical tuning of the old set is replaced by a good vernier dial and band-spread has been added. The band-spread is continuous over the entire range of the receiver from 15 to 200 meters!

Probably more fans have cut their teeth on the original 2-tube DOERLE receiver described in SHORT WAVE CRAFT during the latter part of 1931, than any other short-wave receiver ever described. For this reason we are happy to present the 1935 version of the 2-tube battery-operated DOERLE.

By the use of low-loss up-to-date parts, and with the additional stage of audio amplification, the designer has made this an ideal battery-operated receiver for the short-wave fan who demands both efficiency and simplicity. Another distinctive feature is the unique one-piece metal panel and base.

All Ready for World-Wide Reception on the "Prof" Doerle

used was an audio amplifier. Undoubtedly the simplicity of the receiver was the feature that made it so popular. So simple was it that everyone that built it had no trouble in getting it to work and they received all the principal short-wave stations "right off the bat!" That original 2-tube set was made in the crudest manner, with parts of old broadcast receivers "cut down" to work on the shorter waves. The condensers and sockets were nothing like the present-day low-loss parts, which are made either of isolantite, R39, Victron, etc. And the whole set was built on a wooden baseboard fastened to a bakelite panel.

Nearly every day some one of our readers requests information regarding the original Doerle receiver and it is for that reason we have written this article. We believe that, despite the fact that the circuit is one of the oldest known regenerators, interest among the beginners and less experienced 5-W fans warrants the description of the Doerle using up-to-date parts. We have named it the "1935 'Prof.' (Professional) Doerle" because most of the modern set design features have been incorporated in it. The circuit fundamentals of the first Doerle set have been retained however, and the success of the receiver is assured by this fact.

One-piece Panel and Subpanel

We have dispensed with the wooden baseboard and the old bakelite panel and replaced them with a neat one-piece metal panel and base. The old-fashioned condensers and sockets have been replaced with up-to-date parts, using the highest grade of insulation. The critical tuning of the old set is replaced by a good vernier dial and band-spread has been added. The band-spread is continuous over the entire range of the receiver from 15 to 200 meters!

Plug-in coils are still highly favored and the data for "winding your own" on old tube-bases are given in the appended coil data table, although standard manufactured coils will give just as good if not better results. You no longer have to reach behind the panel in this set to change the plug-in coils, because it is arranged so that the coils plug in right from the front of the panel! The original set had a homemade antenna coupling condenser and it wasn't even adjustable without either bending the

Note the Very Handy Arrangement by Which the Coils Are Plugged in Through the Front Panel

(Continued on page 203)
**CLIPSET—A Universal All-Wave Hook-Up Board**

General appearance of the very latest idea for the "New Circuit Hound"—all connections are quickly changed with short cables or wires, by simply following the numbered terminals as shown in the blueprint supplement.

- LET us turn back the pages of radio history for a few minutes—back to the days of 1924-25, the "Era of Reflex Circuits." The problem at that time was to have one tube amplify both R.F. and A.F., and for them to be present at the same time—and there were hundreds of methods of doing it. Everyone who knew anything at all about radio was working feverishly to try out the various circuits and be the first one to present to the world the one which, in his opinion, was the most stable and most reliable—and opinions vary. Now, the question arose, how many circuits could a fellow try out in an evening? What with the laying out of the parts, fastening them to the baseboard, careful soldering, etc., and then completely undoing what he'd done, to make ready for the next circuit—if he completed one per evening (a radio experimenter's "evening" is generally defined as starting at about 6:00 p.m. and ending when the "midnight oil" gives out) he was doing very well—and there were hundreds of circuits to be tried.

To alleviate the "sufferings" of his radio friends and readers, Hugo Gernsback came to the rescue with his famous "Hook-up Board." This practical and unique time-saving device was thoroughly described in the November 1924 issue of his former magazine The Experimentor, and is the seed from which grew this modern version known as the Clipset Universal All-Wave Hook-Up Board. The entire principle and purpose of this board was very beautifully explained by Hugo Gernsback in the issue of The Experimentor as follows:

"Here is a new idea for the radio experimenter. Herefore, when experimenting with different circuits, you placed your parts haphazard on a table and connected the instruments with wire (and solder, of course). Every time you wanted to change from one circuit to another it took long and tedious work to accomplish this.

"All this is a thing of the past. The writer has worked out an entirely new arrangement which will be known to the radio fraternity hereafter as the Hook-up Board. By means of this arrangement it is possible to hook up different circuits in a minimum of time. Nor do you have to screw and unscrew nuts and binding posts to accomplish this. We now use Clip-Leads and Tip-Leads, which are merely short pieces of flexible wire, to the ends of which have been soldered either spring clips or otherwise telephone cord tips. By means of this arrangement connections can be hooked up or unhooked in fractions of a second. The Hook-Up Board is arranged in such a manner that by using spring binding posts in great numbers the most intricate connections can be made in the shortest time.

"The noteworthy improvements in this system are immediately apparent to anyone. However, the most important feature of the new system is that loose connections are practically impossible now. How often have you hooked up a set according to directions and after you played with it for hours without result, you have found that there was a loose connection, or a broken wire held together by its insulation.

"All these irritating annoyances are now a thing of the past, thanks to the Hook-Up Board. Experimenting now becomes a pleasure and a pastime.
Clipset Hook-up Board is designed in such a manner that temporary connections can be rapidly made by means of clip-leads; or, when more permanency is desired, connecting wires can be inserted into the spring binding posts provided for that purpose.

The great advantage of the Clipset is that new circuits can be tested out quickly and effectively, and once the clip board is assembled, as per our blueprint, any new circuit can be tested out without any soldering of connections whatsoever. The blueprint which accompanies this issue shows the Clipset board in its full, actual size. It will serve as an excellent guide for all who wish to build the 1935 version of the Hook-up Board.

"Clipset" connections for the 2-tube, 12,300 mile DOERLE receiver.

potentiometer for smooth regeneration control when using screen-grid tubes; one 35 mmf, variable antenna compensating condenser, mica dielectric; one 100 mf. fixed mica grid-blocking condenser; one ¾ to 20 megohm variable grid-leak resistor and mount; three composite 4-5-6-prong sockets; one 2.5 m.h. R.F. choke; one 3½ to 1 ratio audio transformer; two ½ megohm resistors and one 0.02 mf. good paper fixed condenser for resistor-condenser coupling (the values of these two resistors will probably vary for the different tubes, but that doesn't matter, for they are easily slipped in and out of their spring-clip holders); one 30-ohm filament rheostat and finally a whole fistful of Fahnestock spring binding-post clips.

The terminal lugs and posts of the components all have Fahnestock clips soldered to them for easy connections. The dimensions of the baseboard and metal panel as well as the drilling specifications for the panel are all plainly marked on the blueprint, which comes as a welcome supplement with this issue of Short Wave Craft: Note the bare bus-wire weaving in and around the apparatus. This is the common ground wire, elevated for making quick connections. The metal panel grounds to this wire. Be sure to follow the layout on the blueprint for shortest possible leads. For swift and careful... (Continued on page 212)
5-Tube "Super" Does the

This view shows the layout of parts and general construction of Mr. Eastman's powerful 5-tube Superhet.

IT seems to be a fact that every experimenter wants to get the most out of his S-W receiver with the least number of tubes and parts. At present the superheterodyne type of circuit is getting plenty of attention and as short-wave experimenting continues there will be much more attention given to this form of circuit for short-wave reception. While other types of receivers can be built they do not equal or exceed the efficiency of the superheterodyne. Therefore, for economy and efficiency we are inclined to acknowledge the fact that tube for tube, the superheterodyne circuit surpasses by far, any other type of radio circuit.

With the advent of the numerous multi-purpose tubes, the superheterodyne circuit has been greatly simplified and has left little to be desired in regard to efficiency, simplicity, and economy. The circuit about to be described is a remarkable example of what can be accomplished due to the progress which has been made in designing radio tubes that can perform two and even three functions at one time. It may not be exaggerating to forecast that eventually we shall have an entire ten-tube radio set built around one tube having possibilities far beyond our present-day receivers.

First Tube Replaces Two

The first tube, the 2A7, replaces two tubes and functions as first detector and high frequency oscillator. This tube known as the Pentagrid converter has other merits along with that of combining the functions of two tubes. It not only gives the stability of an electron-coupled oscillator but also correct oscillator-mixer coupling. The triode section is used as oscillator and the screen-grid section is used as first detector. The 2A7 is transformer coupled to the first I.F. tube which is a 58. In the plate circuit of the 58 there is a 15,000-ohm resistor, by-passed with a .1 mf. condenser, which will help to prevent the tube from oscillating and causing instability. A 400-ohm resistor is placed in the cathode lead going to the arm of the 10,000-ohm volume control; this biases the 58 amplifier. The 58 tube is in turn coupled to the third tube, the "2B7."

One 2B7 Replaces 3 Tubes!

The "2B7" tube is known as a "double-diode high-gain pentode" and replaces three tubes. It is wired for reflex operation and functions as second I.F., second detector, and the signal is reflexed back to the pentode section to act as an impedance-coupled driver for the 2A5 output pentode. The signal is fed to the grid of the pentode unit and amplified. A circuit tuned to the intermediate frequency is used in the plate circuit with the 100,000-ohm isolating resistor to increase stability. The secondary of the third I.F. transformer is connected to both diodes and the rectified signal is developed across the 1-megohm resistor, which is also by-passed with a .0001 mf. condenser. The audio frequency signal after passing through the 300,000-ohm resistor and .01 mf. condenser is applied to the grid of the pentode section again for amplification at audio frequencies to drive the "2A5" tube.

The I.F. transformer primary in the plate circuit offers a low impedance to the audio signal while the 100,000-ohm resistor and audio plate choke function as the load. The plate resistors and by-pass condensers must be of good quality and fairly accurate for the proper separation of the I.F. and audio signals. For best results it is very im-
Work of 8-Tubes

By David Eastman

important to have the 100,000-ohm resistor in the plate circuit of the "2B7" tube. Do not use any other value.

2A5 Power Output Tube to be Used

The fourth tube in the circuit is the "2A5" power amplifier pentode. It is capable of giving large power output with a relatively small input signal voltage. The amplification factor is 220 and it is the ideal power output tube.

The combination of the 2A7, 58, 2B7, and 2A5 tubes in this circuit gives results in selectivity, sensitivity, and volume that cannot be surpassed by any other set using the same number of tubes. For rectification the type 80 tube is used and proves to be ideal for use in short-wave receivers.

It is absolutely necessary to have short leads if you want to obtain the very best results with this receiver. The wiring may not look very pretty, but after all we are after results and not looks. The size of the chassis is 9 3/4" x 14 1/2". A smaller one could have been used, but due to the possibility of critical feed-back conditions that may exist between the power supply and other circuits it was decided that this size would be about right, in order to keep the power supply equipment as far removed as possible from the rest of the circuits. The filament supply leads should be twisted and placed around the edges of the chassis, together with the plate and screen voltage supply wiring.

This would leave the central part of the chassis free for the more important circuits where short leads are necessary to obtain the best results.

Looking at the receiver from the top we see the power transformer in the upper left-hand corner separated from the filter choke which is located in the lower left-hand corner near the two electrolytic condensers. At the lower central part of the chassis the two-gang .00014 mf tuning condenser is flanked on either side by the plug-in coils. This permits very short leads.

Directly to the left of the 2A5 tube is the audio plate choke. Immediately behind the tuning condenser is the 2A7 tube. In line with it at the upper central part of the chassis is the 80 rectifier tube. In the upper right-hand corner is the second I.F. transformer. Below that is the 2B7 tube and in the lower right-hand corner is the 2A5 power tube. The first I.F. transformer is between the 2A7 and 2B7 tubes and is coupled to the 58 tube situated between the 80 and the second I.F. transformer. The third I.F. transformer is located between the 2B7 and 2A5 tube. The 2A7, 58 and 2B7 tubes must be shielded to prevent feedback. The set is not critical in regards to make of tube. Any good make may be used.

After the set has been wired, it should be thoroughly checked for any mistakes in wiring, otherwise damage to tubes or parts may be the result. After checking the wiring, the set is now ready for alignment. The speaker plug must be inserted in the speaker socket before the current is turned on. This (Continued on page 244)
The ABC of Automatic Volume Control

By Clifford E. Denton

In this second and concluding part of the article on automatic volume control, Mr. Denton, well-known expert on short-wave problems, discusses two very interesting receiver circuits which every experimenter will want to try out.

In this improved automatic volume control circuit, the "A.V.C." is suitably amplified. Fig. 7 shows an interesting circuit for obtaining push-pull coupling without the use of a transformer.
Miss Charline J. Armond, aged 16, of Santa Clara, Calif. She built her own set and operates it under the call W6LMA. Hats off to Miss Armond!

**PRIZE WINNER—Charline J. Armond**

**W6LMA, of Santa Clara, Calif.**

Miss Charline J. Armond of Santa Clara, Calif., is a regular ham—she built her own radio set and knows how to operate it—as her licensed Government call, W6LMA, attests. Miss Armond, a dainty little miss from beautiful Santa Clara, may give some of you boys a buzz. Miss Armond is shown ready to put through a short-wave phone call to a fellow ham, her hand resting on the mike stand. The phone transmitter is shown at the right of the picture, while the receiver used at her station is shown just behind the young lady. If you have keen eyesight, you may be able to find a large snake skin in this picture.

**73-Year-Old Lady Operator**

The photo below shows 73-year-old Mrs. Madeline Boeder, a radio operator of many years standing. She communicates weekly with her son who maintains an amateur radio station at Feeding Hills, Mass. She studied radio quite a few years ago in order to keep in touch with her son, who was a steamship radio operator at the time. Mrs. Boeder has lived in the Bronx, N.Y., for 53 years; she is here shown at the key, with one hand on the tuning dial of the receiver. The short-wave transmitter appears just behind Mrs. Boeder.

Jean Hudson, who successfully took her "YL" operating license test when she was only 8 years old.

The photo above of little Jean Hudson should serve as a strong incentive to every YL and XYL to send their pictures in to the editor. If Baby Jean walked off with her amateur radio operator's "ticket," there must be many charming ladies in all parts of the country who have obtained their licenses from Uncle Sam and who are daily operating a short-wave transmitter. The editors hope to be deluged with a perfect flock of pictures and descriptions of YL stations for the next issue.

Mrs. Madeline Boeder, 73-year-old radio operator, who communicates regularly with her son via short waves.

**Second Award In Our $5.00 "YL" Photo Contest**

The editors are offering a $5.00 prize for the best "YL" or "XYL" station photo submitted. All photos entered for the next number should be in the editor's hands by July 20. In the event of a tie, equal prizes will be given to both.
All Hail! A "Television" Lab!

Man alive! This surely must be the television experimenter's utopia! How would you like to be turned loose in this wonderful television "lab" owned by James R. Morse of Rochester, N. Y.?

As a regular reader of Short Wave Craft, I noticed that you made special note of amateur television laboratories. Therefore, I submit to you the enclosed pictures of my laboratory, in which you will recognize two commercial television receivers as well as two homemade scanners. All of these are working or have worked in the past. I am now receiving regular programs from Purdue University on the one on the left of the picture.

You will note on the table in the rear the type of aerial described in Short Wave Craft about a year ago, which is now being used with a National converter with excellent results.

JAMES R. MORSE,
13 South Goodman St., Rochester, N. Y.

(Thanks a lot, James, for sending us the very interesting picture of your "television" experimental laboratory. We had begun to think that there was not one experimental "television" laboratory anywhere in the country, judging by the scarcity of such photos. We hope that some of us other readers who may happen to be "looking in" as well as "listening in," will borrow a camera and take a picture of their television "set-up." The Editors are also interested in hearing from you as well as other readers regarding any articles they might like to write for Short Wave Craft on television results which they have obtained, with hints on how they synchronize their scanning time and color, and also how they maintain synchronism. Let us hear from you again with photos of any new television apparatus you have set up and working.—Editor.)

A DANDY ENGLISH STATION

Editor, Short Wave Craft:

I have been a keen reader of Short Wave Craft for some months now and I should like to take this opportunity of thanking you for the very fine articles you have in every issue. Believe me, I always look forward to the date of the next issue. I am enclosing herewith a photo of my "shack" for entry in your magazine photo competition. The transmitter is a CO-FD-PA. All continents and the British Empire have been worked using only 10 watts (CW). The two frequencies used are 7040 kcs., and 14080 kcs. The receiving aerial is 60' indoor and occasionally 60' 30' high outdoor.

I shall shortly be rebuilding the transmitter and also erecting a new aerial. The States have been worked many times and a note in your magazine to the effect that anyone reporting reception of my signals or willing to exchange photos of 'shacks,' etc., will receive a photo and QSL in return.

Yours "hamfully,"

(We are always very glad to hear from short-wave FANS and HAMS in foreign countries, Tom, and we are pleased to reproduce the photograph of your station herewith. You have a very efficient station, indeed, in order to have worked all continents with only ten watts. In answer to your request you will undoubtedly hear from many American HAMS.—Editor.)

GREAT RESULTS WITH 1-TUBE POCKET SET

Editor, Short Wave Craft:

Just a line to tell you of our success with the "1-Tube Short-Wave Pocket Set" described in December 1934 issue. We built the set on a chassis similar to that of the "19 Twinplex Receivers," not as described in a pocket form. We followed the specified parts values exactly as you stated. The results were exceedingly good.

Stations:—EAG, GSB, GSA, GSE, GSD, PHIL, PRADO, COH, PRF, HJ1ABB, XE9T, along with many Canadian and American commercial stations, to say nothing of the Hams and Airplane Stations which were received with good volume on a 100-ft. antenna and no ground!

The aerial was completely bordered or shielded on the south side by a row of tall evergreen trees. Not so had, eh, considering it was our first short-wave set? We read your swell magazine frequently.

Well, we'll say "73." Keep up the good work.

GORDON JONES and SCOTT RENN,
Box 239.
Winham, Ont., Canada.

( More good results with the 1-Tube Pocket Set! We'll, Gordon and Scott, we thank you for your letter and feel as pleased as you do with the excellent foreign reception you accomplished with this little set.—Editor)

One Year's Subscription to SHORT WAVE CRAFT FREE

for the "Best" Station Photo
Closing date for each contest—30 days preceding date of issue: Aug., for October issue, etc. The winners will be announced on the following page. The Editor will notify the winners, who will be given a chance to reply to the contest in their letters.

A snappy-looking ham station, operated by Tom Martin in South Yardley, England, his call being G2LB.
LIKES OUR REVIEW OF FOREIGN ARTICLES

Editor, Short Wave Craft

Here with a picture of my short-wave "listening post." It is not yet a ham station, but I am planning to learn the code this summer and get a license.

I am 14 years old and my radio activities date back to November, 1933. I bought a Duolc 2-tube battery set using 30's. In January, 1934, I changed it to use a 57 and 56 according to instructions in Short Wave Craft. In September, 1935, I changed to my present set. It is almost like the 3-tube Duolc described in Short Wave Craft. It uses a 58 T. R. F., a 57 detector resistance-coupled to a 56. This stage is transformer-coupled to a 45 output stage which is built separately. The speaker is an Atwater-Kent magnetic.

The first two sets didn't work so well for me, but the present one is "hot stuff." I have received verifications from VE8G, W8XX, WI8XW, W3XAU, and also KB9B in Canada only. Other stations I have received are: W3XAL, W1XAL, W8XX, W2XAF, W2XE, W8XF, W3XAL, K9P, the BCA station in California, (I received this on about 10 feet of lead-in about R7), GSA, GH8, GSD, DJC, XEBT, WB2RC, YV3I, WB3XR, W6M, H5ABB, 12RG, EAG, COH, COH, CJRO, CJRK, and W1J. I have also received hams in 34 states and in all but the seventh district.

I am using the same antenna as the B.C. set downtown and I am lucky to get anything at all on it.

Listening post of Mervin Frank of Upper Sandusky, Ohio.

The other set in the picture is a Philco 5-tube superhet B.C. set, using two 24's, a 35, a 41, and an 80. I like your magazine very much. I especially like the World-Wide Short-Wave Review.

Mervin Frank, 315 N. Sandusky Ave., Upper Sandusky, Ohio.

(Edited from your page 255)

AN "ALL-BATTERY" HAM STATION

Editor, Short Wave Craft:

A description of a station in which all power is taken from batteries. This station is licensed under the call W3XXA. The transmitter is of the T. P. T. G. type and uses a pair of 12's in push-pull. Meters for keeping check on the filament voltage and the plate current are mounted in the pine frame. No antenna coupling coil is used as clipping to the tank coil works just as well. Of course, a blocking condenser is used in the antenna circuit. The input on 40 meters is 5 watts. With this low power it was necessary to use only the best equipment and insulators. The coils are of the plug-type. This makes it possible to change from one band to another with speed. The antenna feed-through insulator is of my own construction and is made of two drinking glasses. The construction of this insulator is such that the brass rod through the center is surrounded by air, thus making it very efficient. One hundred eighty volts of heavy-duty "B" is off the press soon.

George R. L. Daniels, 511 St. Clement St., Vinuville, Montreal, Canada.

(We have selected your short-wave listening station this month for the prize George, as we believe that your layout represents a typical average S-W listening post. Thousands of our readers have undoubtedly built at least one, and possibly more, short-wave receivers after plans described in this magazine as you have. We note that you have heard stations from practically all over the world. Good luck to you and we hope you enjoy the twelve forthcoming numbers of Short Wave Craft.

Editor.)

A real short-wave fan's listening den, that of George R. L. Daniels.

Our Circuits Work Fine!

Prize-Winning Station Photo awarded one year's subscription to Short Wave Craft

Editor, Short Wave Craft:

I have been a reader of Short Wave Craft for many years and now that the magazine is fairly well known in Canada, I will mention a few of the things I like about it.

I have been quite interested in the Short Waves and Long Races section which you have been printing in Short Wave Craft during the last few months, but so far I have seen only a few photographs of Canadian stations. I am enclosing a photo of one of my stations in the Canadian provinces. It seems to me that some other Canadian short-wave enthusiasts may do the same.

I am a member of the Short-Wave League as can be seen by the photo. Below the crystal oscillator is a boomerang which I received from a ham in Australia. On the top shelf is the power-pack which I use to operate my 3-tube A.F. receiver which is shown in the lower left-hand corner. This receiver was built according to Mr. McIntyre's circuit in the July, 1933 issue of Short Wave Craft and it works fine on all the bands.

The receiver in the center is a 3-tube battery job, using a 209 type tube and is also built from one of the circuits given in your magazine. The main panel in the center consists of switches for the plate supplies on receivers and ese oscillator shown at the right. The meter is used as a resistance meter and the jacks are for receiver and code oscillator.

The antenna now in use is a half-wave doublet with the wires feeders. The antenna switch may be seen in the lower left of the photo. I have verifications from Belgium, Congo, Spain, England, Dutch West Indies, South America, Germany and all sections of the U. S. A.

Hoping to hear from you soon and that the next issue of Short Wave Craft will be

(Continued on page 255)

A complete battery-operated ham station owned and operated by D. C. Blake of Redwood, Miss.
Something New in Tuning Condensers

- THE French magazine, L'Accessoire et la Pièce, a new magazine for the professional radio man contained a short description and a picture of a new type of tuning condenser in a recent issue. This condenser which has advantages for short-wave work consists of two spirals of metal which are intermeshed by the action of a worm gear and a pinion.

A radically new idea in tuning condensers—each unit comprising two spirals of metal which are caused to intermesh by means of a worm gear and pinion.

The advantages of this method of construction over the usual parallel plates lies in the fact that the spiral section can be made any shape, thus producing any desired capacity curve, and since the worm and pinion can be easily made to provide any desired tuning ratio, the tuning adjustment can be as slow or as fast as required for the waveband covered by the set. It is also easy to shield the entire condenser to prevent electrostatic coupling between circuits or pick-up of signal at the wrong point.

A Push-Pull Detector Circuit

- IN a series of hints for the short-wave experimenter published recently in Popular Wireless, two very interesting push-pull circuits were included.

The first is a push-pull detector for circuits which the author claims is much more stable than single tube circuits and in addition will oscillate on much higher frequencies. The circuit is shown here and it will be seen that it is a "split Cuppita" arrangement in the center tap of the grid coil.

The coils required for this detector are an ordinary tuning coil, having a center tap for the grid return. The two plate coils are wound at the zero points of the grid coil. The winding details will have to be worked out to suit the individual conditions, as the author fails to indicate winding data.

The second circuit is a push-pull oscillator, using one of the double-triode arrangements, such as the 12, 5I, or 79 types available. As this oscillator uses only a single center-tapped coil, it is a simple matter to change from one frequency band to another and the circuit will oscillate on any frequency from 12 cycles to 60 megacycles. This oscillator should have many uses in the short-wave transmitter, as the oscillator in super-hets, as a detector, etc.

Composite Circuit

- THE circuit shown here, which is reproduced from Popular Wireless magazine is a combination of the old ultra-audion circuit and the Cuppita's circuit. It is claimed that it is very sensitive and a "sure-fire" circuit for short waves. While both condensers are "live" and must be set back from the panel, this slight disadvantage is overcome by the high sensitivity of the circuit.

The coils consist of a primary for the aerial and grid, and a secondary which is center-tapped. Regular manufactured coils can be used, by removing the regeneration coil and tapping the secondary coil at the center.

The values of other parts used in the circuit are indicated on the diagram.

Double Detection Circuits

- THE experimenter in short-wave reception is always on the alert for new and interesting circuits to try will find the three circuits here of interest. The first (A) while not new, offers some interesting possibilities. It is a push-pull detector, which has some advantages over conventional regenerative circuits, in ease of regeneration control, stable operation up to the "oscillation point" and in some cases, a possibility of increased signal strength.

The second circuit (B) uses a screen-grid type of tube in a novel way. The control grid and plate are operated as a simple triode detector, while the screen-grid is connected to the feed-back coil and supplies the control over regeneration. This approximates the action of two tubes, one for detection and the other for regeneration control. The use of two tubes connected in this way has found much favor in Europe, because of the flexibility of control achieved.

The third circuit (C) is in reality two separate sets, though the outputs are fed to the same pair of phones or amplifier. By using two detectors with aerials spaced as far apart as possible, many interesting actions can be noted. The fading time for short-wave stations often varies even for signals in the same location of the receiver. Thus if two aerials are separated by some hundred feet, the fading of the signals on one aerial will not correspond with that on the other, and if the two are tuned to the same station, the fading is apparently reduced. Many other interesting effects will be found by the experimenter with such a construction.

These three interesting circuits appeared in Practical and Amateur Wireless magazine. The details of coil construction, etc., must be determined by the individual, as they were not included in the original article.
Eliminating Hand-Capacity

ONE of the most annoying things encountered in operating a short-wave set is to tune in a weak station very carefully, and then find that you cannot "move a hair" without losing it.

A cheap yet efficient filter to eliminate the troublesome "hand capacity."

As we all know, this is due to "hand capacity" and a good deal of information has been published in past issues of Short Wave Craft for overcoming this bugaboo. Shielded panels, condensers set back from the panel, and a careful layout of parts overcomes the usual cases, but there is one point that most "set-builders" overlook.

A recent issue of Popular Wireless contained the details for making a filter to eliminate the "hand" capacity. Every fan has at one time or other found that taking the phones off, touching them, or even moving them, is sufficient to "detune" a weak station. This is due to high frequency currents getting into the phone circuits, so that changes in the capacity of this circuit affect the R.F. portions of the receiver.

As shown in the sketches here, the filter consists of two R.F. chokes and two .001 mf. condensers connected between the phones and the detector tube. The R.F. chokes are connected in the two leads to the phones, at a point where they connect to the set. The condensers are connected in series, across the phone leads, with the center-tap grounded to the set chassis.

Increasing Selectivity of S-W Sets

CONTRARY to general belief, there is a very definite need for selectivity in the short-wave receiver. If you have tried to separate some of the stations which are crowded up in the 40-meter band and some of the amateur bands, this need will be apparent.

And band-spread is not a solution to the problem, as this simply separates the stations further apart on the dial, while at the same time it decreases the apparent selectivity, so that interference is still encountered between the stations. Of course, in complicated super-hets, this trouble is not encountered, for here we have plenty of selectivity and spreading the bands accomplishes the required object.

As a means of increasing the selectivity of regenerative sets Radio Welt, a German magazine, recently published several circuits for adding a tuning circuit to existing receivers.

Three circuits are shown here. The first (A) consists of the addition of a coil and condenser identical with the tuning coil and condenser in the set. The new coil and condenser are shielded from the set, and coupling is accomplished through a small condenser of the type used for aerial coupling in some sets.

The second circuit (B) also uses a coil and condenser similar to the regular tuning units, but here, the secondary (grid coil) of the set is tapped to provide the required degree of selectivity.

The third method (C) uses the entire tuning coil of the receiver (including the aerial coil) and coupling is accomplished through a 100 mmf. variable condenser. The step-up ratio of the aerial coil to the grid coil and the use of a variable coupling condenser provides the required adjustment of selectivity (coupling).

These three circuits should provide the experimenter with some ideas on how to improve the "old faithful."

A Novelty in Set Construction

AN ingenious application of an inverted cake pan as a combined chassis and shield for a short-wave set or converter was pictured recently in the Austrian magazine Radio Amateur.

As shown here, the pan is inverted over a wooden or fibre disc. The various condensers, tube and coil sockets, resistors and switches that make up the set are mounted on the bottom of the cake pan. Just as they would be mounted on a metal panel.

This type of construction offers the experimenter a way to make neat units that are attractive in appearance, low in cost, and unusually flexible in circuit and design possibilities. Thus, it is possible to make a unit set in several of these "chassis" using one for detector, one for A.F. amplifier and another for power supply.
HERE are the diagrams of my television receiver, amplifier and tuner; also the hookup of the neon tube and scanner arrangement. I hope I have explained everything clearly and that before long we'll soon have a bunch of fellows interested in television. This is the receiver I am using now and it gives very good results. It is built on a metal chassis and is completely shielded. It covers the bands from 200 to 70 meters and tunes broad in order to get all the signals, which is very important in receiving good images. I have also used two 45s in parallel as output, in place of the single 45, by changing resistor No. 39 to 750 ohms; this gives a brighter image. The primary windings of the coils are placed at the top of the coil form and are wound on top of the secondary windings. (I use a 175-foot antenna with this set as it gives greater signal pickup.)

The output terminals Nos. 45 and 46 connect directly to the neon tube or speaker and I use a double-pole double-throw switch so I can switch from neon tube to speaker to tune in the signals. All wires to neon tube should be of No. 14 stranded copper wire. The neon tube fits a standard 4-pin socket and is mounted, pins down, inside a cylinder 2 1/2 inches in diameter and 7 inches high, with the top closed. This cylinder acts as a shield for the tube and is adjustable up and down to keep the picture in frame. The cylinder has a three-fourths of an inch square hole in the side and the cathode of the tube, which is about 1 inch square, is so placed so as to cover this hole. The cylinder is placed one-fourth inch back of the scanning disc, with the square hole towards the disc. The cathode of the tube should glow bright, and if it doesn't, reverse the leads Nos. 45 and 46 on posts of receiver. This arrangement works either on a 60- or 45-hole disc, which are made of aluminum. The 60-hole double-spiral disc is 12 inches in diameter and turns clockwise, at a speed of 1200 R.P.M. The 45-hole 3-spiral disc is 12 inches in diameter and turns counterclockwise, at a speed of 900 R.P.M. Occasionally 2 images will be seen in one frame. This condition is called ghost images, which is reflection from the Hewiside layer and therefore arrives later than the direct signals. This may be helped by placing a wire parallel a few feet above the antenna and grounding it. I use an Eddy current, 110-V., A.C., 60-cycle motor running 1200 R.P.M. It has 6 coils with iron cores and 4 of these are used for synchronizing. The neon tube, cylinder and motor are all fastened to a cast aluminum frame. I have a 1000-ohm rheostat from one side of the 110-V. line to a .25-mf. bypass condenser; the other side of the condenser hooks to the other small magnet. This rheostat is used to synchronize the disc. I have put a 150-ohm, 50-watt wire-wound rheostat in one side of the 110-V. line to cut the speed down to 900 R.P.M. and I use a double-pole double-throw switch to put motor in reverse, so I can use the 45-hole disc, on the same motor. I have also used a small one-sixteenth-H.P. induction-type motor to turn the 45-hole disc, and I have found that any motor of this type, which runs the right speed, can be used to drive a scanning disc. The motor must run

We have had many requests for the diagrams and values of parts for a good Television Receiver hookup. Herewith Mr. Singleton presents the diagram of the successful television receiver he is using in his station, together with the values of the various parts used in building up the circuit.

(Continued on page 235)
SEVENTEENTH
"TROPHY CUP"
WINNER

Presented to
SHORT WAVE SCOUT
ALAN E. SMITH, M. D.
CHESTER, VT.
For his contribution toward the advancement of the art of Radio

17th TROPHY WINNER
ALAN E. SMITH, M.D., Box 288,
Chester, Vt.
54 Stations, 40 Foreign

THE seventeenth Short-Wave Scout Trophy is awarded to Dr. Alan E. Smith, M.D., of Chester, Vt. Dr. Smith's list had the very excellent total of 54 stations; 40 of these were foreign stations, that is, stations not located in the United States. In rolling up this fine number of stations Dr. Smith used a Midwest 16-tube receiver. The antenna used with the Midwest receiver consisted of a 90 foot flat-top pointing in the direction northwest and southeast, 25 feet above the ground.

We are not surprised that Dr. Smith won the Trophy Cup this month for he certainly should be heard practically every short-wave station in the world. After all, a set using 16 tubes should show some superior performance over a set using from 3 to 5 tubes, in the same way that a thoroughbred horse wins a race against a field of second raters. Of course, the listener who uses a set with a less number of tubes can hear these stations also, but it usually requires much more skill and care in tuning in for these stations, as the signals are not so highly amplified and the tuning therefore not so simple.

Dr. Smith's List of Stations
NORTH AMERICA U. S.
W1XAZ-9,570 kc., now W1XX. Daily, 7-1 a.m. Boston.
W2XAD-15,320 kc.; daily 2:30-3:30 p.m. Schenectady.
W2XAF-9,530 kc., daily 6:30-11 p.m. Schenectady.
W2XE-6,120 kc.; daily 5-10 p.m. New York.
W2XE-11,830 kc.; daily 2-4 p.m. New York.
W3XAL-17,780 kc.; daily ex. Sun., 8-9 a.m., Tues., Thurs., Sat., 2-3 p.m. New York.
W3XAU-9,590 kc.; daily, 12 noon-8 p.m. Philadelphia.
W3XAU-6,060 kc.; daily 8-11 p.m. Philadelphia.
W3XAI-6,600 kc.; daily 6:30 a.m.-8 p.m.; 11 p.m.-2 a.m. Cincinnati.
W8XK-11,970 kc.; daily 4:30-10 p.m. Pittsburgh.
W9XF-6,100 kc.; daily 1-2 a.m. 9-10 p.m. Chicago.
W9XAA-6,080 kc.; Tues., Thurs., Sat., 4-6 p.m.; Sun., 11:30 a.m.-9 p.m., Chicago.
W9XBS-6,425 kc.; experimental. Chicago.

ON this page is illustrated the handsome trophy which was designed by one of New York's leading silversmiths. It is made of black jadeite. 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 32½". The diameter of the base is 7¼". 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 "hearing" as many short-wave phone stations as possible, and to encourage all persons to try for the Trophy. 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.

For his contribution toward the advancement of the art of Radio

SHORT WAVE SCOUTS

Honorable Mention Awards
First Honorable Mention
T. E. Porter, 17 Wyatt Rd., Highbury, London N5, England
40 veris

Second Honorable Mention
Joe Haddish, 803 Twenty-fourth St., Ambridge, Pa.
34 veris

FOREIGN STATIONS

Canada
CJRO-6,150 kc.; daily, 8-12 p.m., Sun. 10:30-12:30 p.m. Winnipeg.
CJRY-11,720 kc., same as CJRO.
VE2G-W-6,090 kc.; Mon., Tues., Wed., 3-12 p.m.; Thurs., Fri., Sat., 7 a.m.-12 m.; Sun. 1-9 p.m. Bowmanville.
VE2AS-6,425 kc.; no longer broadcasting. Fredericton, N.B.

West Indies
COH-9,428 kc.; daily, 10-12 a.m., 5-6 p.m. 8-10 p.m. Havana.
COE-6,010 kc.; daily, 9:30 a.m.-12:30 p.m., 4-7 p.m. Sat. 11:30 p.m.-12:30 p.m. Havana.
HIIH-6,810 kc.; daily, 7-8 p.m., Sun. 4:30-5:30 p.m. "La Voz del Higuaramo," San Pedro de Marcoris, Dominican Republic.
HIX-5,980 kc.; Tues., Fri., 8-10 p.m., Sun. 7-8:45 a.m. Daily at noon. Santo Domingo, D.R.
H14D-6,480 kc.; daily ex. Sun., 12-1:45 p.m., 4:40-7:40 p.m. "La Voz de Quisqueya." Santo Domingo, D.R.

South America
CP5-6,080 kc.; daily 8-9:30 p.m. Radio "Illimani." La Paz, Bolivia.
HJ1ABD-6,098 kc. now on 7,281 kc. Ireg. evenings. Cartagena, Colombia.
HJ4ABE-5,930 kc.; Mon. 7-11 p.m., Tues., Thurs., Fri., Sat. 6:30-8 p.m., Wed., Fri., 7:30-11 p.m. "La Voz de Antioquia." Medellin, Colombia.
HJ4ABL-6,065 kc.; daily 11-12 a.m., 5:30-7:30 p.m. Sun. 10:30-11:30 p.m. (English). "Ecos de Occidente." Manizales, Colombia.
HP-6,000 kc.; daily 12-1 a.m. 8-10:30 p.m. "Estacion Miramar." Panama.
PRADO-6,616 kc.; Thurs. 9-11 p.m. "Radiodifusora de El Prado." Riohamba, Ecuador.
HC2RL-6,608 kc.; Sun. 5:45-7:45 p.m. Tues. 9:15-11:15 p.m. "Hello, America," Guayaquil, Ecuador.

VY3RC-6,150 kc.; daily 4-10 p.m. Radiodifusora Venezuela, Caracas, Venezuela.

VY6RV-6,030 kc.; now on 6,520 kc. Valencia, Venezuela.

(Continued on page 237)
BROWNING-35 All-Wave Receiver

PART II.

In the last issue a general description of the Browning 35 was given and in the present article some of the extremely valuable special features found in this receiver are discussed, especially the tuning characteristics.

Schematic diagram showing band-pass I.F. detector, heat frequency oscillator, and audio amplifier stage.

One of the first detectors, as a pre-amplifier, and the other as intermediate amplifier in the band-pass filter circuit. In spite of the fact that a detector is used as the second detector, there is more R.F. gain in this receiver than can be used. This principle is well illustrated in the BROWNING 35 receiver which makes use of two of these super-control tubes as R.F. amplifiers—

L.F. "Selectivity Curve." A—Browning band-pass intermediate; B—ordinary "high-Q" intermediate. Note that the latter is sharper at the "nose," resulting in poorer quality, but at a voltage ratio of 100 to 1 or 40 I.F. down, the selectivity of the band-pass filter is much better.

This is of the utmost importance in dis-
tinct exception— it is an amplifier to have good amplification ahead of the mixer or first detector tube and as little as necessary in the intermediate amplifier. As pointed out above, for the purpose of amplification, one tube in the I.F. amplifier is all that is necessary if an efficient stage of pre-amplification is used. Therefore the only excuse for using more than one stage of I.F. amplification would be to obtain adequate selectivity, or to try to compensate for inefficient pre-selection.

10 Kc. Selectivity!
The problem of selectivity was solved in this receiver by utilizing a double band-pass filter. This filter not only provides 10 kc. selectivity, but it does this without developing a sharp amplification peak. The result is an unusually fine combination of selectivity, plus faithful reproduction. The accompanying I.F. Selectivity Curve illustrates this feature and shows how the band-pass filter characteristics compare to the usual "high-Q" I.F. circuit. It will be noted that the latter circuit has a sharper peak or "nose," resulting in poorer quality; but at a voltage ratio of 100 times, or 40 D.B. down, the band-pass circuit is much more selective in spite of its round "nose," which gives better high audio frequency response.

This "broad nose" tuning characteristic is actually noticeable in operating the receiver for, while the microtuner tuning control may be rotated several degrees on the low frequency broadcast band without a noticeable change in signal level, rotating it a fraction of a degree further snaps out the signal entirely and the local or distant stations on the adjacent frequency channel "pops in."

The practical result of this "round-nosed" amplification curve is noticeable in the selective tuning but also in the high-quality reproduction. The low deep resonant tones are there— you can both hear and feel them—and it gives a false, booming, hollow-toned bass obtained at the expense of the upper registers. The high delicate notes and overtones are also present, while (Continued on page 241)
Short-Wave Stations of the World

Complete List of Broadcast, Police and Television Stations

We present herewith a revised list of the short-wave broadcasting, experimental and commercial radiophone stations of the world. This is arranged by frequency, but the wavelength figures are also given for the benefit of readers who are more accustomed to working with "meters." All the stations in this list use telephone transmission of one kind or another and can therefore be identified by the average listener.

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

Please write to us about any new stations or other important data that you learn through announcements over the air or correspondence with the stations themselves. A post card will be a pleasant. 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 Learning Guide

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

From daybreak till 8 p.m. and particularly during bright daylight, listen between 12 and 19 meters. Three general rules hold for any location in the Northern Hemisphere:

- The west of the listener this same band is best from about 10 p.m. until shortly after daybreak. (After dark, results above 25 meters are usually much better than during the day.)
- To the east of the listener, from about 4 p.m. to 4 a.m., the 25-35 meter will be found very conducive.

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

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

(All Schedules Eastern Standard Time)
SHORT WAVE CRAFT FOR AUGUST, 1935

12800 kc. **IAC**
- C- 23.45 meters
- B- 23.45 meters
- W- 23.45 meters

12780 kc. **GBC**
- C- 23.47 meters
- B- 23.47 meters
- W- 23.47 meters

12336 kc. **CT1GO**
- B- 24.2 meters
- W- 24.2 meters

12150 kc. **GBS**
- C- 24.06 meters
- B- 24.06 meters

12000 kc. **RNE**
- C- 25 meters
- W- 25 meters

11991 kc. **FZS2**
- C- 25.35 meters
- B- 25.35 meters

11950 kc. **KHQ**
- C- 27.95 meters
- B- 27.95 meters

11940 kc. **FTA**
- C- 28.95 meters
- B- 28.95 meters

11875 kc. **FYA**
- C- 30.05 meters
- W- 30.05 meters

11870 kc. **W8KX**
- C- 32.21 meters
- B- 32.21 meters

11860 kc. **GSE**
- C- 33.85 meters
- B- 33.85 meters

11830 kc. **W2XE**
- C- 36.50 meters
- W- 36.50 meters

122800 kc. **IAC**
- C- 23.45 meters
- B- 23.45 meters

11700 kc. **HJ4ABA**
- C- 26.65 meters
- B- 26.65 meters

11680 kc. **KIO**
- C- 27.05 meters
- B- 27.05 meters

10770 kc. **GBP**
- C- 29.6 meters
- B- 29.6 meters

10740 kc. **JVM**
- C- 29.8 meters
- B- 29.8 meters

10675 kc. **WNB**
- C- 30.15 meters
- B- 30.15 meters

10660 kc. **JVN**
- C- 30.14 meters
- B- 30.14 meters

10550 kc. **WOK**
- C- 30.30 meters
- B- 30.30 meters

10520 kc. **VLK**
- C- 30.51 meters
- B- 30.51 meters

10430 kc. **YBG**
- C- 36.45 meters
- B- 36.45 meters

10420 kc. **XGW**
- C- 39.95 meters
- B- 39.95 meters

10410 kc. **PDK**
- C- 42.00 meters
- B- 42.00 meters

10350 kc. **LSX**
- C- 48.15 meters
- B- 48.15 meters

10345 kc. **CAC**
- C- 49.55 meters
- B- 49.55 meters

10330 kc. **ORK**
- C- 50.04 meters
- B- 50.04 meters

10305 kc. **KES**
- C- 50.10 meters
- B- 50.10 meters

10300 kc. **LS2**
- C- 50.13 meters
- B- 50.13 meters

10290 kc. **DIQ**
- C- 51.70 meters
- B- 51.70 meters

10285 kc. **PMN**
- C- 52.04 meters
- B- 52.04 meters

10250 kc. **LSK3**
- C- 52.27 meters
- B- 52.27 meters

10225 kc. **PSH**
- C- 52.70 meters
- B- 52.70 meters

10205 kc. **C09WR**
- C- 53.20 meters
- B- 53.20 meters

10555 kc. **ZFB**
- C- 55.5 meters
- B- 55.5 meters

9950 kc. **GCU**
- C- 56.25 meters
- B- 56.25 meters

9890 kc. **LSN**
- C- 57.30 meters
- B- 57.30 meters

9870 kc. **WON**
- C- 57.45 meters
- B- 57.45 meters

9860 kc. **EAQ**
- C- 57.50 meters
- B- 57.50 meters

9840 kc. **JYS**
- C- 57.55 meters
- B- 57.55 meters

9800 kc. **LSE**
- C- 57.75 meters
- B- 57.75 meters

9790 kc. **GCW**
- C- 58.00 meters
- B- 58.00 meters

9760 kc. **VLJ-VLZ2**
- C- 60.10 meters
- B- 60.10 meters

9750 kc. **WOF**
- C- 60.75 meters
- B- 60.75 meters

9710 kc. **GCA**
- C- 60.10 meters
- B- 60.10 meters

9635 kc. **2RO**
- C- 61.12 meters
- B- 61.12 meters

9600 kc. **CT1AA**
- C- 63.00 meters
- B- 63.00 meters

9595 kc. **JBL**
- C- 65.00 meters
- B- 65.00 meters

9550 kc. **VK2ME**
- C- 66.30 meters
- B- 66.30 meters

9570 kc. **W1XK**
- C- 68.30 meters
- B- 68.30 meters

9565 kc. **VUB**
- C- 68.50 meters
- B- 68.50 meters

9560 kc. **DJA**
- C- 68.60 meters
- B- 68.60 meters

9540 kc. **DJN**
- C- 68.70 meters
- B- 68.70 meters

9540 kc. **LKJ1**
- C- 68.80 meters
- B- 68.80 meters

9530 kc. **W2XAF**
- C- 68.90 meters
- B- 68.90 meters

9510 kc. **GSK**
- C- 69.10 meters
- B- 69.10 meters

9500 kc. **PRF5**
- C- 69.20 meters
- B- 69.20 meters

9495 kc. **WRI**
- C- 69.30 meters
- B- 69.30 meters

9482 kc. **COH**
- C- 69.40 meters
- B- 69.40 meters

9415 kc. **PLV**
- C- 69.50 meters
- B- 69.50 meters

9330 kc. **CJ2A**
- C- 69.60 meters
- B- 69.60 meters

9280 kc. **GCB**
- C- 69.70 meters
- B- 69.70 meters

9170 kc. **WNA**
- C- 69.80 meters
- B- 69.80 meters

9125 kc. **HAT4**
- C- 69.90 meters
- B- 69.90 meters

9020 kc. **GCS**
- C- 70.00 meters
- B- 70.00 meters

9010 kc. **KEJ**
- C- 70.10 meters
- B- 70.10 meters

8795 kc. **HKV**
- C- 70.50 meters
- B- 70.50 meters

(All Schedules Eastern Standard Time)
(All Schedules Eastern Standard Time)

(Continued on page 238)
## Police Radio Alarm Stations

**TELEVISION STATIONS**

<table>
<thead>
<tr>
<th>Call Sign</th>
<th>Frequency (kc)</th>
<th>City, State</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2XBS</td>
<td>2414</td>
<td>Bellmore, N.Y.</td>
</tr>
<tr>
<td>W2XK</td>
<td>2414</td>
<td>New York, N.Y.</td>
</tr>
<tr>
<td>W2XAO-34</td>
<td>1658</td>
<td>Minneapolis, Minn.</td>
</tr>
<tr>
<td>W9XD-7</td>
<td>2382</td>
<td>Chicago, Ill.</td>
</tr>
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<td>W2XAK-35</td>
<td>2458</td>
<td>New York, N.Y.</td>
</tr>
<tr>
<td>WXAN-AM</td>
<td>1682</td>
<td>Chicago, Ill.</td>
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<td>W2XBO-6</td>
<td>2430</td>
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<td>W2XAR-11</td>
<td>2474</td>
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<td>W2XAO-2</td>
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<td>Chicago, Ill.</td>
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<tr>
<td>W2XBE-4</td>
<td>2414</td>
<td>New York, N.Y.</td>
</tr>
<tr>
<td>W2XAS-5</td>
<td>2450</td>
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</tr>
<tr>
<td>W2XAT-7</td>
<td>2414</td>
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<td>W2XAV-12</td>
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<tr>
<td>W2XAV-14</td>
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<td>W2XAO-13</td>
<td>1682</td>
<td>Chicago, Ill.</td>
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<td>W2XAS-17</td>
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<tr>
<td>W2XAT-17</td>
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</tr>
<tr>
<td>W2XAV-15</td>
<td>2414</td>
<td>New York, N.Y.</td>
</tr>
</tbody>
</table>

**WHEN TO LISTEN IN**

Appears on Page 216
$5.00 FOR BEST
SHORT-WAVE KINK

The Editor will award a $5.00 prize each month for the best short-wave kink received by our readers. All other kinks accepted and published will be awarded eight months’ subscription to SHORT WAVE CRAFT. Look over these "kinks" and they may give you some ideas 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.

FIELD SUPPLY FOR DYNAMIC SPEAKER

Here is a very simple method of obtaining power for the field of a dynamic speaker. Although this is not original to the writer it would be of interest to the average short-wave fan. A single 5£5 is used in a half-wave rectifying circuit. The physical drawing shows just how the connection should be made. The smoothing condenser across the output of the rectifier, maintains a ripple of 4 to 6 v. and is adjusted to give the best possible output around 300. Heat erasure for the 2000 ms. coil is done through the zinc in 2000 ms. coils for which is built right into the line cord—WEED.

OLD CAR RADATOR (USED FOR A GROUND)

Being unable to obtain a good ground, I finally hit upon the illustration in the accompanying drawing. I obtained an old radiator which had a good many leaks in it. After fastening a plug in the filling port and submerging a wire to the other end, I tested the entire assembly in the ground floor of five feet height in a concrete ground. I then submerging the radiator with water. This, due to the holes in the radiator bottom and permeation, made the earth surrounding the radiator small until it became the ground resistance considerably. The lead from this ground to the receiver was kept as short as possible, and really excellent results have been obtained. I am passing this information along to the readers of "Short Wave Craft" in the hope that it will be of material benefit to them—Edwin D. Hoke.

HOMEMADE VERNIER DIAL

Nearly every short-wave fan who builds his own equipment gets the greatest amount of fun out of building it rather than listening to the short-wave stations. The expert- builder will agree that there are no缺少 skilled in the small antitenns which occupy so much space, as the skilled in the small but serious, circle cutter. The drawing will show that one of these can be made from an old file. In the file cutter the lips are made from a file and the cutting tool from a file. The main advantage is that the cutting tool can be sharpened, and can be made to cut in two minutes in steel plate—Henry Laurens.

HOLE CUTTER

With the increase in popularity of metal panels and chassis, many home constructors will feel the need of a simple, yet effective, circle cutter. The drawing clearly shows how one of these can be made from an old file. In the file cutter the lips are made from a file and the cutting tool from a file. The main advantage is that the cutting tool can be sharpened, and can be made to cut in two minutes in steel plate—Henry Laurens.
4-TUBE T.R.F. RECEIVER

Jack Merwether, Detroit, Mich.

(Q) Will you please be kind enough to print a diagram of a 4-tube A.C. receiver using a 6D6, 6C6, 76, and any other suitable pentode tube which you think best. You will note that these are all 6.3 volt tubes, and I have done considerable experimenting with a set similar to this, but have had a lot of trouble. I would greatly appreciate a good hook-up using these tubes and also would like to use 140 mmf, tuning condensers.

(A) We are printing the standard T.R.F. hook-up for the type tubes mentioned in your letter. If you follow the diagram carefully, you should have no trouble in getting it to work; providing, of course, all your parts are in perfect working order. In the antenna circuit the dotted line indicates a connection which should be made if a regular antenna and ground are used.

When a doubler is used, this connection is not made and the ground is connected to the B minus. Inductive coupling is used between the R.F. and detector stages for highest amount of gain and greatest stability. Resistance coupling is used throughout the audio section and you will find that this receiver will give remarkable quality.

PENTODE AUDIO AMPLIFIER

Lawrence Kubrowski, Detroit, Mich.

(Q) Please publish a circuit diagram of a suitable output amplifier for the "Short-Wave Fan's Own 3-Tuber," published in the SHORT WAVE CRAFT of March.

1935, I would like to use type 45 tube if possible.

(A) The diagram we show can be connected to your receiver or any other short-wave receiver for that matter. We believe you will obtain much better results with a 2A5 than you would with the type 45. The 2A5 will give greater output with less signal input and for this reason is more suitable for use in conjunction with short-wave receivers where full speaker volume is required.

3-TUBE ALL ELECTRIC S-W RECEIVER

Walter Joyce, Albuquerque, N. Mex.

(Q) I would like to build a receiver using a 58 regenerative detector and a 2A5 audio amplifier. I would appreciate it very much if you would print such a diagram together with the necessary power supply. I intend to make this receiver and power supply all one unit.

(A) We are very pleased to print your diagram. Walter, and if you use care in the construction of this receiver, you should obtain excellent results. Data for the coils can be found in almost any issue of SHORT WAVE CRAFT, particularly in the April 1935 Question Box. The output circuit of the 2A5 shows a pair of earphones connected directly in the circuit, however, due to the comparatively large amount of current drawn by the 2A5, it is advisable to use an output transformer. This will prevent the B battery plate current from traveling through the headphones and will result in much longer headphone life. If hum is experienced in the receiver, we suggest that you try connecting one side of the 2½ volt filament circuit to the B minus.

T.R.F. AMPLIFIER FOR BATTERY SET

W. L. Cornelius (W5JAD), Bellevue, Iowa.

(Q) I have recently built a 5-tube superheterodyne using 2-volt battery tubes and would like to have you print a diagram of a tuned R.F. stage which may be added to this receiver in order to improve its pick-up and also to reduce the images.

(A) This tuned R.F. amplifier will work well with any type of battery-operated short-wave receiver. The output of the amplifier should be connected directly to the antenna posts of the receiver. If separate A and B batteries are used for the amplifier and receiver, a connection should be made to join the "B" negatives of both sets of batteries.

Diagram of output amplifier, for use with "S-W Fan's Own 3-Tuber."

How to hook up parts and tubes for a 3-tube all-electric S-W receiver.
**QUESTION BOX**

**W. SHUART, W2AMN**

Tance may be made in the form of stamps or coins.

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.

If the same batteries are used for both amplifier and receiver, this connection will not be necessary, of course.

**2-TUBES EQUAL 3**

George Wohlwend, Ann Arbor, Mich.

(A) I would appreciate it if you would publish a diagram of an A.C.-D.C. receiver using a 6F7 and a 25Z5. The 6F7 is to be used as a pentode regenerative detector and one stage of resistance-coupled audio amplification using the triode section. I would like this receiver to have as little hum as possible so kindly show the diagram of a good filter circuit.

(Q) We are pleased to print the diagram you requested, although, we can offer no guaranty regarding the hum.

Here's a dandy 5-meter 2-tube receiver hook-up. It has proved very satisfactory in actual tests.

The design of input and output transformers is dependent upon the apparatus which this amplifier is to be associated with. For dynamic speaker operation, the output transformer will undoubtedly be incorporated in the speaker itself. The input transformer should have a primary level. The 6F7 works remarkably well as a regenerative detector and one stage of audio amplification. We have shown the filter circuit which should work as well as any, although it is just about impossible to eliminate all traces of hum in an A.C.-D.C. circuit. In wiring up the 6F7 do not fail to connect the grid-leak of the detector between the grid and the cathode, and not between the grid and "F" negative. The .01 mf. condenser shown connected across the 110 volt line has been found to eliminate all traces of trouble hum. We recommend that this be incorporated in all A.C.-D.C. receivers.

2-STAGE AUDIO AMPLIFIER

E. P. Renstrom, Jr., Chicago, Ill.

(A) Would you please publish in your Short-Wave Question Department a diagram of an amplifier using a single 27 first stage transformer coupled to a pair of 47"s in push-pull? I would also like to have some form of volume control on this amplifier.

(Q) The diagram you requested can be found printed on this page and uses a 27 driver with a pair of 47 pentodes in push-pull. The audio volume control is incorporated in the grid circuit of the 27.

S-W ANTENNAS

Stanley Johnson, Kansas City, Mo.

(Q) I live in a very poor location for radio reception and have trouble picking up the weak signals. Please tell me where I can get information on various types of antennas.

(A) We suggest that you read the following articles in Short Wave Craft: Page 715, April 1935; Page 345, October 1934.

Audio Amplifier diagram for 27 "driver" and a pair of 47 pentodes.
Frank Hogler, Brooklyn, N. Y.,

Reports

The following is my report on the Short Wave for the past month.

A third transoceanic station has been heard here for quite some time, only recently was I able to make out its call letters, it is Station ATRG. It is located between 25.35 meters and 26.10 meters, as it was being heard between 7:00 p.m. and 7:30 p.m., E.S.T.

Report on August 31, 1935

Fans:
Radio House, Dear

You were able to hear a third transoceanic station located between 25.35 meters and 26.10 meters, as it was being heard between 7:00 p.m. and 7:30 p.m., E.S.T. The station you were able to hear is called ATRG. It is located between 25.35 meters and 26.10 meters.

Radio House, Dear

You were able to hear a third transoceanic station located between 25.35 meters and 26.10 meters, as it was being heard between 7:00 p.m. and 7:30 p.m., E.S.T. The station you were able to hear is called ATRG. It is located between 25.35 meters and 26.10 meters.


Last month I commented on the remarkable reception of the Calo discosimeters, SUV and SUX. This month I am able to present the proof of their exceptional performance. For those DX-rs who are interested in verification, I print this letter:

Dear Sirs:

I am enclosing a copy of your letter of the 2nd, April 1935, and confirm transmission on SUV (10655 kcs) and SUX (17600 kc) at the time and date mentioned. From the information given by you I would assure you that we are able to receive both these stations direct.

Yours faithfully,

Moroni Radio Telegraph Co. of Egypt, S. A.
Radio House, Sharia Elton, P.O. Box 235, Cairo, Egypt.

Herewith is presented another confirmation which may be of interest to radio fans:

Saigon, 18 April, 1935.

Dear Sir:

In reply to your letter of March 17th, we have the pleasure to confirm your receipt of FZS 16.54 at 7:30 p.m.

Saigon stations are operating commercial telephony with Paris.

Saigon stations are operating commercial telephony with Paris.

Report from John Sorensen, New York City.

Report for May 24-31, 1935

Radio House, Dear

I am enclosing a copy of your letter of the 2nd, April 1935, and confirm transmission on SUV (10655 kcs) and SUX (17600 kc) at the time and date mentioned. From the information given by you I would assure you that we are able to receive both these stations direct.

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Yours faithfully,
A 3-Tube All-Wave "Vacation Portable" (Continued from page 205)

inches high, 3½ inches wide and 2 inches thick, and is ideal for portable receivers.

The antenna should be fastened to the inside of the case with cleats to hold it in place, with strips to prevent it from falling against the speaker and damaging the cone. As an added precaution it may be advisable to have a small piece of copper window-screening between the wood panel and the speaker to further protect the cone.

Tests Very Satisfactory During tests this receiver more than came up to expectations and with a very short antenna the results were very gratifying. The first antenna tried was only about 15 feet in length and, believe it or not, all the major long-wave broadcast stations were brought in with enough volume on the speaker to satisfy the whole family.

Of course when we connected the regular 5-foot broad-antenna to the set we were able to bring in all the broadcast stations on the speaker as far west as Cincinnati, Ohio, with excellent volume. On the short waves reception was accomplished with the aid of earphones plugged into the first stage of audio. Two stages of audio proved to be too much for the speaker, but not quite enough for the loudspeaker.

If the builder desires more volume on the loudspeaker he can connect him to the last stage of audio and be more than satisfied.

For general reception when on a picnic or some other outdoor excursion, it is only necessary to choose a 50-foot length of wire over the limit of a tree or any other suitable support, for good reception on either the short-wave bands or the regular broadcast band. The tone quality of the receiver is all that can be desired and some of our friends who heard it agree that it was quite the "berries" for that vacation trip.

What's New in Short-Wave Apparatus? (Continued from page 218) given in the accompanying table. All the parts for the Les-Tet Junior are available in complete kit form. An additional accessory is a neat cabinet with hinged top.

All by itself, the Les-Tet Junior is a fine low-powered transmitter that will hold its own on the crowded broadcast bands. While maximum output is obtained on the crystal frequency, fine results are also had with the amplifier tube doubling and even quadrupling. With a 40-meter crystal, the writer has worked into the 10-meter band with a power output of 2 to 4 watts.

This is a low-cost as well as a low-powered rig. However, after the owner has acquired some operating experience and some money, he can easily supplement it with a power-amplifier stage. The combination can be built up to a full kilowatt eventually, with each part remaining in service.

Les-Tet Junior Cuff Data Four-prong form, 1¾" outside diameter 20 turns: 15 turns, No. 18 25 turns; 10 turns, No. 18 50 turns: 80 meters L1 same as 40 m. coil, no tap L2 15 turns, No. 18 15 turns, No. 22 10 turns, No. 18 15 turns, No. 22 15 turns, L1 and L2 in parallel, No. 22 L1 and L2, L1 link coil, L2 link coil, same as above, for 20 meters, as for 20 meters, no tap L1, L2 with 80-meter coil.

Table 1


I defy the static. And any other interfering noises. Let 'em all come—whirs, buzzes, screeches, man-made or other noises—anything that chases your ear drums—I'll keep them out of your set!

PERFECT EUROPEAN RECEPTION! Muter has met your doublet antenna problem—and solved it—with this new tuning device. It will couple a doublet antenna to your set—or any set—and it has switch control! This adapts it to all wave-lengths by a mere turn of the switch. The three taps adjust the antenna for QUIET European reception, efficient broadcast reception, or the sharpest possible tuning on any band. Think of the convenience! No need to disconnect wires. Just turn the switch. Any antenna but a doublet is obsolete—and any doublet without "Little Ajax" is just another aerial! With this coupler, your set will develop new total excellence and a quickened responsiveness. In addition to an unheard of fidelity and resonance, you will find your set increasing in efficiency and volume. More important than the improved reception, this coupler resists outside and man-made interference! It reduces static to an absolute minimum.

Get one from your jobber—or mail the coupon NOW and this All-Wave Tuning Coupler will be sent to you at once, postage paid. Just pay the postman $1.00 when it arrives. And, of course, it takes out all your reception troubles or your dollar will be immediately refunded.

MAIL THIS COUPON!

THE MUTER COMPANY
1255 So. Michigan Ave.
CHICAGO, ILLINOIS

DO YOU READ THE RESEARCH WORKER?

If not, you should. For it brings you practical data fresh from research laboratory and field engineers, once a month. Indispensable to men who are doing things in radio. Subscription only 50 cents a year, but worth countless dollars.

FREE COPY: Send for it today. Also read 1935 rating of complete AEROVOX line of Condemner and Receivers.

AEROVOX CORPORATION
72 Washington St.,
Brooklyn, N. Y.

Please mention Short Wave Craft when writing advertisers
4,600 Short-Wave Stations are listed in this magazine!

We are happy to present to you the thousands of short-wave fans this new magazine which enthusiastic readers of Short Wave Craft have heard us to publish. Here is a book that you will feel proud to possess because it reflet your patience and perseverance in keeping distant stations. It is complete book of its kind ever published. There is nothing like it on the market now, nor was there ever a book published like it before.

It contains the largest listing of short-wave stations in the world—a much larger list in fact than the list published in SHORT WAVE CRAFT, or any other magazine. Due to space limitations, no regular magazine can publish all the world stations.

There are some many short-wave stations which normally cannot be included in any monthly magazine list, but frequently you hear these calls and they are worth knowing where they originate. The OFFICIAL SHORT-WAVE LISTENER gives you this information besides a lot of other information which you must have. This is an entirely new magazine for the short-wave listener. Wherever it has not existed before, it is totally different in set-up and contents from any other short-wave magazine, and nothing like it ever has been published before.

To begin with, the new magazine comes with a four-color cover, and it is beautifully printed throughout. It contains a very great variety of material: all of which is essential today to the short-wave listener.

IT IS NOT A TECHNICAL MAGAZINE. It is designed for the short-wave listener only. The July issue which is now on all newsstands, contains the material you find listed below.

ASK YOUR NEWS DEALER FOR A COPY OF THIS NEW SHORT-WAVE MAGAZINE.

25c the Copy

Well Illustrated Contents of the July Issue:

Talking "Around the World" By Short Waves
Short-Waves Stars of Station W2XAF, Holland
How to Find the Short-Wave Stations on Your Tuning Dial
How to Get Maximum Results from Your SW Set by George W. Shuart
The Latest in Double Aerials
Photos of Short-Wave Artists From India, U.S.S.R., and Other Countries
Silver Cup Trophy Contest for the Best "Listening Foot" Photo
Grand List of Short-Wave Stations of the World—With Call Letters and Frequencies, Including "Police" and "Television" Stations
"Star" Short-Wave Station List
Newest Ideas in Short-Wave Receivers
"Musical Signatures" and Foreign Language Alphabets—A Great Help in Identifying Stations
"The Listener Asks"—Short-Wave Question Box

From this you will see that the magazine has been designed as a companion magazine to SHORT WAVE CRAFT. If you are now a reader of SHORT WAVE CRAFT, you will not wish to be without THE OFFICIAL SHORT WAVE LISTENER MAGAZINE. The new magazine will help you tremendously in your short-wave reception at all times, and give you priceless and invaluable information, such as you cannot get anywhere else. Nothing like it appears in print anywhere today. THE OFFICIAL SHORT WAVE LISTENER MAGAZINE, in other words, is necessary.

P. S.—If you cannot get the magazine at your newsstand due to sell-out, send in your in cash, stamps or money order, and we will send the magazine to you direct, prepaid.

OFFICIAL SHORT WAVE LISTENER MAGAZINE
95 Hudson Street, New York, N. Y.

Please mention Short Wave Craft when writing advertisers

Rockwell Kent. Near North Pole, Reports W2XAF Reception Favorable

Rockwell Kent, New York artist and writer, who is spending two years in the northern part of Greenland and his son, Gordon, 13, has radioed W2XAF that reception of the G.C. station's programs are favorable. W2XAF sent its last program to Kent and his boy on May 28 and is planning another for May 30 E.S.T. on June 13. The American artist has a G.C. all-wave battery radio.
Circuit Very Simple

Examining the diagram we find the circuit really very simple. We have a regular two-winding coil, one winding for the tickler and the other to form part of the tuned circuit which is connected to the grid of the tube. In series with the grid side of this coil, we have a .0001 mf. grid condenser, which should be of the same variety and across the grid condenser is the grid-leak. The value of the grid-leak is not so critical, although different sizes from two to five megohms should be tried. We found that three megohms was just about right. The other end of the grid coil connects to the filament of the detector. Across the entire grid coil is connected the two tuning condensers; one is a 140 mmf. variable and is used for fast tuning or band-setting. The other is a 20 mmf. variable, which is used for bandspread tuning and the large vernier tuning dial is mounted on this condenser.

It is a simple matter to tune in stations with the bandspread condenser. The large condenser should be set so that the waveband to be covered by the small condenser appears in the center of the main tuning dial. All other controls have small dials and knobs, so that it is a simple matter to "log" stations and return to them at any time.

Connected between one side of the tickler and the filament of the detector, we find the regulating condenser. This is usually termed the "throttle" condenser and is the same size as the other large grid tuning condenser. During operation of the set, this condenser is adjusted to the point where the detector tube goes into oscillation. This is usually evidenced by a slight hissing sound in the phones. After the station is tuned in, the regeneration control should be adjusted for maximum signal strength and clearest reception of the voice or music.

The Audio Amplifier

From the detector we go to the first stage of audio frequency amplification; thus far we have not changed the circuit of the original receiver, other than to add a few refinements. A regular audio transformer having a ratio of three or four to one is used and couples the detector to

---

Dimensions of Chassis

plates or unscrewing the plates and moving them. The "1935 "Prof" Doerle" has a variable antenna coupling condenser and it is mounted on the panel for convenience of adjustment. Another advantage over the original set is the extra stage of audio amplification provided through the use of a 19 in the audio section, rather than the type 30.

Chassis

Starting with the chassis or foundation of the receiver, we have given a complete set of drawings showing just how to cut and bend it. It can be made of almost any kind of metal which is fairly stiff, so that it won't wobble all over the place. The placement of the holes is shown and the "fan" who is a bit handy with tools can do the job in a few minutes. If you prefer though, the complete chassis—ready-drilled—can be obtained from your regular radio supply house. We gave our chassis a coat of black paint, the kind which gives a cranked finish when dry; even ordinary black enamel will give it a pleasing appearance.

In order to make the chassis rigid it is necessary to construct two brackets one-half inch wide of 1/16 inch thick aluminum or other material, and fasten them on each side along the rear edge of the chassis.
Most Amazing Typeewriter BARGAIN

10 DAY FREE TRIAL OFFER
EVEN OFFERED

NEW REMINGTON PORTABLE ONLY

LAST TIME! Remember, a new purchase plan lets you buy只需 Portable No. 5 direct from Stock, you can't buy new or rebuilt. Not in stock? A beautiful brand new Remington Portable, Standard 4-row correction, standard with carriage, return feed, and every feature desired; every essential feature found in standard Typewriters. Send for free 16-page catalog containing descriptive literature, etc.

FREE Typing Lessons

The lesson you talk and write terms that make this the greatest typewriter offer ever offered. But everything points to higher prices. Even the big price reductions you can make in a typewriter like this will hardly offset a large increase. So we say, "Act Fast!"

FREE Carrying Case

You Don't Risk One Cent

Here is a real sensation! A large and good looking SPORTS BINOCULAR

A powerful field glass that enables you to enjoy such sporting events as horse racing, baseball, football and hockey games; can be used on Auto Trips, Beaches, Outings, etc.

PARCEL POST PREPAID $1.50

Supply limited. ORDER NOW! Money back guarantee. You can't lose!

GOLD SHIELD PRODUCTS CORP.
17 West 60th St. Dept. S. New York City

S H O R T W A V E C R A F T f o r A U G U S T, 1935

the audio tube. (The 19 is similar to the 1, except that those are really two tubes in the same glass envelope and it is because of this fact that we are able to have the extra stage of amplification with only two tubes. The second stage of amplification is resistance-capacity coupled to the first stage. This tube and products very loud signals with remarkable tone quality. Some of the stronger short-wave broadcast stations can be heard comfortably throughout a large-size room when using a loudspeaker; so you can see that we have plenty of volume for the earphones.

The layout of parts used allows very short leads connecting the various parts and besides simplifies construction and wiring considerably. All connections should be soldered carefully with resin solder and a clean hot iron. Use good parts and tubes and you will be more than pleased with the time and effort given to building the set.

The plates of the tubes are fed by two large 45-volt "B" batteries and due to the low amount of current drawn by the two tubes, they will give many months of service; good batteries should last nearly a year. The filaments are heated with two No. 6 dry cells. In order to cut the voltage of the two dry cells from three to two volts, a 20-ohm rheostat is used. This rheostat is not mounted on the set but can be fastened to the batteries or battery box.

The antenna or aerial used with this little receiver during tests was 75 feet long, right from the binding post on the set to the far end; and we had no trouble in pulling in all the regularly received "foreign" stations.

Parts List 1935 "Prof." Doerle

1-Special Chassis—see drawing, Blan.
1-140 mmf. tuning condenser, Hammond-
1-20 mmf. tuning condenser, Hammond-
Blan.

Tub e-Base

Base

-1-OX40D
-1-A
-5.19 meters
-1-B
-11.46 meters
-1-C
-4.70 meters
-1-D
-5.19 meters
-1-E
-11.46 meters
-1-F
-4.70 meters

Wound on 4-3/4" nd. base, all close-

Wound Plug-in Coil Data

Blan.

Short Wave Stations of the World

(Continued from page 223)

5590 kc. HJ4ABE - B- 135 - 422 meters
5940 kc. TGX - B- 50.5 meters
5890 kc. HJ2ABC - B- 10.07 meters
5853 kc. WOB - 51.26 meters
5850 kc. VY5RMO - 51.36 meters
5825 kc. TG1PGH - 46.30 meters
5790 kc. HIJ - 41.58 meters
5780 kc. OA5X4 - 40.00 meters
5714 kc. HCK - 55.5 meters
5660 kc. HJ5ABC - B- 58.80 meters
5077 kc. WCN - 52.08 meters
5025 kc. ZFA - 55.7 meters
4975 kc. GBC - 50.00 meters
4820 kc. GDW - 51.34 meters
4752 kc. WOO - 50.00 meters

All Schedules Eastern Standard Time

Please mention Short Wave Craft when writing advertisers

www.americanradiohistory.com
Short Wave Scout News
(Continued from page 228)

gram to U.S.A. R7.
L3KJ-31.45 Jelo, Norway. Heard faintly
between 5:45 and 6 a.m. EDt.
H15J-31.28 Panama. Daily 11:45 a.m.
1200 p.m.-7:00:16:00 p.m. R6.
TGG-40.87-30.87 Edwards, City. Heard be-
tween 11-12 midnight. R6.
H1AHL-49.15, Manzales, Identification, "Ecos
46 Doceventa." R7-Hernan
Borchers, 240 Federal St., Greenfield,
Mass.

OLIVER AMLIE, PHILADELPHIA, PA.

● DUE to the rush of mail at this post from
readers of Short Wave Craft asking
for the Amule DX circuit, this post did
not have time to log new stations. The
mail has been very heavy; this is due to the
6th month as the Australian
reports climb, readers are after the circuit.
The Australian reports on VK2ME-35E-
35J now stands at 150, May 1935; the
good lie between 5:40 a.m., EDt.

This post has been commissioned by the
Chief Engineer of the British Broadcasting
Corporation, to handle (check) all six B.B.C.
transmissions. Also by the Italian Broad-
casting stations to handle (check) all trans-
missions of theirs also, and report each
month to them.

Readers of Short Wave Craft are invited to
join the 6,000-12,500 mile "DX" Club, no
fee, no dues, no time. For data, ask to
write this post. H4-A-RED-YED-IX-
THE-WOOL-DX'er. Short Wave Craft
will be held for the first time on July 4.
A total of reception must be 6,000 miles or over to
be eligible for membership.

If you have not yet become acquainted with Mr. Charles A. Morrison, President of the International DX-era Alliance, Bloom-
ington, Ill., U.S.A., by all means write him, and ask him for a free copy of Globe Cir-
cle. It's free for the asking. Know Mr. Morrison as we fellows know him, a real friendship to every one, and a true friend. Mr. Morrison is a new member of Short Wave Craft "Trophies" are members of this
Alliance.

AMLIE, 56th City Line Ave., Over-
brook, Philadelphia, Penn.

NEWS FROM BRECKSVILLE, OHIO

● SHORT-WAVE reception during the day has
been from all bands, except 49
meters and only U.S. stations were
heard on this band.

Stations on 18 meters could just be
heard, but not understood. On Sunday,
May 19, at 12 noon, DJD on 12.35 M.
was transmitting with DX reception anten-
na this to the continent and wished to know how
the signal was received at this time of day on
this wave. Although they found a
band quite a bit, their signal was very loud, whereas
they could not hear at all on this
wave at their regular time for weeks.
On Tuesday, April 30, at 7:40 p.m., an
American station was heard testing.
They gave descriptions of local conditions in
Australia and although I listened until they
signed off I did not get the call,
therefore I came in fairly steady and were operating
on about 14 meters. DJD and FYA have been coming
in very loud during the evening.
2100 on June 2nd was heard at 12:20
p.m. on May 19. They were fair at times,
but rather weak most of the time.

On Sunday, May 12, at 11:50 a.m., HJ1J
on 29.64 m. was sending a special program
to G7V. They came in very loud and dis-
tinct. HJIH was on at some other time during
the evening. Rome has been very
weak. G7G on 16.86 m. was heard, but was
very choppy.

There were a few days, during this pe-

rid which were very fine for reception,
but in general there was considerable at-
mosphere interference.

Commercial phone stations on 22m,
29m, and 33m. also came in well.

G7VX-40.15 Heiser, Brecksville, Ohio.
O. L. P.

REPORT FROM EDWARD SCHMEL-
CHEL, DIAL-TWISTER IN ILLINOIS

● THF 19- and 25-meter is improving so
rapidly that the Europeans on these
bands are heard very late in the evening.
The 31-meter band also is improving—a
great help, since this band is the most re-
liable. The coming month ought to bring
them up 100 percent more. P.E.-15.88
hours has heard relaying a special pro-
gram to Holland on May 6, at 6:00 a.m.
EDt.

C00WR—This station formerly operated
as CMHR on 16.20 m. They want re-
ports on their signals to be sent to P. O.
85, Santa Spiritus, Cuba, West Indies.

LSX-Buenos Aires, Argentina on 28.94
meters has been heard testing with WZ-
XAF several times during the past month.

JVM—Nakazi, Japan, is the most out-
standing station heard from Asia. They
are heard on 27.93 meters daily from 4 to
7 a.m., E.S.T. Their address is: Koku-
sui Kowa Kaisha Ltd., Osaka Bldg., Kojima-
chiku, Tokyo, Japan. They send a very
nice QSL card and will answer all accu-
rate reports.

DIQ-29.15 meters was heard on May 7
at 5:30 a.m., E.S.T. relaying a program to
the U.S.A. by way of WCG at New
York.

PH—Huizen, Holland, has changed its
wave length to 10.8 meters and is
receiving very well in this part of the
country. They are heard between 7
and 11 a.m. E.S.T. daily except Tuesday
and Wednesday.

PCT—Huizen, Holland, are back after
many years' absence and are being heard
in all parts of the world with tremendous
volume. They have the same schedule as
PH and are on 19.71 meters.

VIZ—Rockham, Australia, is a new
station heard this week on 11.485
kilometers. They are being phoning CIA4
and the Rugby phoners. They are on many
bands with the "no-regs" call in the early
morning.

HJ2O—Quito, Ecuador, have moved their
frequency from 73 to 36.65 mtrs.,
and are heard daily except Monday from
7:10 to 10 a.m. E.S.T. They also call
various stations throughout South Amer-
ica.

HJ4ABB—Manziales, Colombia, have
moved their frequency from 42.00 to 40.15
meters. They are heard on Wednesday
 evenings between 8-9 p.m. E.S.T. They
also call various stations throughout South
America.

HJ4ABR—Manziales, Colombia, 49.15
meters, is being heard every Saturday
 evening beginning at 10 p.m. reading
reports from listeners in English over the
air. They are also heard on Saturday even-
ings beginning at 9 p.m. They welcome
reports.

HJ4AMI—Manziales, Colombia, 49.15
meters, is being heard on Saturday
 evening beginning at 10 p.m. reading
the reports from listeners in English.

HJ4ABA—Ecos del Montana on 25.68
mtrs., is being heard daily in all parts of
the world. They begin at 6 p.m. and con-
tinue until 10 p.m. Their address is Carle
Bayon, Edificio Estructural, 3er Piso,
Medellin, Colombia. They are anxious to
receive reports from all listeners.

HJ2S—San Domingo, D.R., on 47.5
mtrs., has returned to the fold after being
absent almost a year. They are heard
daily from 4-5:30 p.m. E.S.T.

HJH—San Pedro, D.R., has been heard
on Sundays from 3 to 4 a.m. E.S.T. broad-
casting special programs, to foreign lis-
teners. They are on 44.12 meters.

Please mention Short Wave Craft when writing advertisers.
SHORT WAVE CRAFT FOR AUGUST, 1935

HKY in Bogota, Colombia on 8,900 mc, was heard on the 13th at 8:45 p.m., C.D.T., announcing in both Spanish and Eng.

lish. R.9 at 10:250 mc. (location unknown) in Cuba can be heard in the early afternoon irregularly. KPE, broadcasting the Na
dional and Home hour, on 15,500, signed off at 4 p.m., C.D.T., on the afternoon of the 15th without giving reason.

LSX has been testing with W2XAF at 6 p.m. for several of the moons, and a few

nights ago players in Schenectady and Baranquilla carried on a remote control

broadcast, trip to the W2XAF and H1-AH1! JVF came through QSA-R9 at

3:45 p.m. on the 13th. The station on 11,

7000-8000 kc, has been heard to announce as

H1A4ABA, coming in like a "local" with

no heterodyne from FYA.

For the past few days, the RBC has been

using GSD in place of GSB for transmis
sion 5 along with GSC. Transmission 6 received regularly QSA-R9.

Most of the foreign "locals" have been received as our own "locals" during the

period (May 3 to 21), including the "Aus

sies" and also the S.A.'s except on a few

evenings when reception is impossible on the 45 meter band.

Amateurs in eighteen countries and all

U.S. districts are playing the 20-meter band.—Douglas Wauchop, 501 S. Chandler St., Decatur, Ga.

A Good Television Hookup

(Concluded from page 216)

25. Molded mica coupling condenser (.01 mf.).
26. Copper coupling condenser (.035 mf.).
27. By-pass condenser (.05 mf.).
28. By-pass condenser (.05 mf.).
29. Dry electrolytic condenser (8 mf.) 600 v.
30. Dry electrolytic condenser (8 mf.) 600 v.
31. Resistor—400 ohms.
32. Resistor—400 ohms.
33. Resistor—5000 ohms.
34. Resistor—100,000 ohms.
35. Resistor—1 ohm.
36. Resistor—100,000 ohms.
37. Voltage divider, resistor—17,200 ohms, 5 watt (wire wound) at 2 ohms on 4 points—

A to G—1800 ohms.
B to C—4,000 ohms.
C to D—4,000 ohms.
D to F—18,000 ohms.
38. Resistor—1,500 ohms, 2 watt.
39. Volume control—50,000 ohms (wire wound), R.F.C. 2.6 mH (of R.F.C. No. 8).
40. Resistor—600 ohms.
42. R.F.C. 2.5 M.H.
43. Filter choke—20 henry.
44. Output terminal (connect to neon lamp or speaker).
45. Alternating power transformer (large enough to sup

ply 6 or 7 tubes).
46. Rectifier and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap). 50. R.F.C. 2.5 M.H.
51. By-pass condenser (.025 mf.).
52. By-pass condenser (.25 mf.).
53. Dry electrolytic condenser (2 mf.) 600 volts D.C.
54. Second filter choke—50 henry.
55. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
56. R.F.C. 2.5 M.H.
57. By-pass condenser (.025 mf.).
58. Dry electrolytic condenser (2 mf.) 600 volts D.C.
59. By-pass condenser (.025 mf.).
60. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
61. R.F.C. 2.5 M.H.
62. By-pass condenser (.025 mf.).
63. Dry electrolytic condenser (2 mf.) 600 volts D.C.
64. By-pass condenser (.025 mf.).
65. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
66. R.F.C. 2.5 M.H.
67. By-pass condenser (.025 mf.).
68. Dry electrolytic condenser (2 mf.) 600 volts D.C.
69. By-pass condenser (.025 mf.).
70. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
71. R.F.C. 2.5 M.H.
72. By-pass condenser (.025 mf.).
73. Dry electrolytic condenser (2 mf.) 600 volts D.C.
74. By-pass condenser (.025 mf.).
75. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
76. R.F.C. 2.5 M.H.
77. By-pass condenser (.025 mf.).
78. Dry electrolytic condenser (2 mf.) 600 volts D.C.
79. By-pass condenser (.025 mf.).
80. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
81. R.F.C. 2.5 M.H.
82. By-pass condenser (.025 mf.).
83. Dry electrolytic condenser (2 mf.) 600 volts D.C.
84. By-pass condenser (.025 mf.).
85. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
86. R.F.C. 2.5 M.H.
87. By-pass condenser (.025 mf.).
88. Dry electrolytic condenser (2 mf.) 600 volts D.C.
89. By-pass condenser (.025 mf.).
90. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
91. R.F.C. 2.5 M.H.
92. By-pass condenser (.025 mf.).
93. Dry electrolytic condenser (2 mf.) 600 volts D.C.
94. By-pass condenser (.025 mf.).
95. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
96. R.F.C. 2.5 M.H.
97. By-pass condenser (.025 mf.).
98. Dry electrolytic condenser (2 mf.) 600 volts D.C.
99. By-pass condenser (.025 mf.).
100. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
101. R.F.C. 2.5 M.H.
102. By-pass condenser (.025 mf.).
103. Dry electrolytic condenser (2 mf.) 600 volts D.C.
104. By-pass condenser (.025 mf.).
105. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
106. R.F.C. 2.5 M.H.
107. By-pass condenser (.025 mf.).
108. Dry electrolytic condenser (2 mf.) 600 volts D.C.
109. By-pass condenser (.025 mf.).
110. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
111. R.F.C. 2.5 M.H.
112. By-pass condenser (.025 mf.).
113. Dry electrolytic condenser (2 mf.) 600 volts D.C.
114. By-pass condenser (.025 mf.).
115. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
116. R.F.C. 2.5 M.H.
117. By-pass condenser (.025 mf.).
118. Dry electrolytic condenser (2 mf.) 600 volts D.C.
119. By-pass condenser (.025 mf.).
120. Condenser and stabilizer—20 ohms, 10 watts (use if power transformer has no center tap).
121. R.F.C. 2.5 M.H.
122. By-pass condenser (.025 mf.).
123. Dry electrolytic condenser (2 mf.) 600 volts D.C.
**Short Wave Craft**

(Continued from page 217)

**Short Wave Scouts**

YY6RV-6,520 kc.; daily 5-7 p.m., 9-11 p.m. "La Voz de Carabobo," Valencia, Venezuela.

YV5KMO-5,850 kc.; daily ex. Sun. 11-1, 3-1, 5-1, 7-1 p.m., 5-30-10 p.m., "Ecos del Caribe," Maracaibo, Venezuela.

HJ1ABB-6,447 kc.; daily 11:45 a.m.-1 p.m. "La Voz de Santiago Franquilla," Barranquilla, Colombia.

**Europe**

GB8-13,600 kc.; irregular, Rugby, England.

GB9-12,015 kc.; irregular, Rugby, England.

HAN-15,370 kc.; Sunday 9-10 a.m. Buda.

HBL-9,955 kc.; Saturday, 5:30-6:15 p.m. Geneva, Switzerland.

HBJ-7,806 kc.; same as HBL.

FYA-11,705 kc.; daily 6-9 p.m., 10-12 p.m. "Radio Coloniale," Paris, France.

HVJ-15,129 kc.; daily 10:30-10:45 a.m. Vatican City.

**Africa**

SUV-10,058 kc.; irregular Cairo, Egypt.

**Australia**

VK2ME-9,500 kc.; Sun. 13-5, 9 a.m. 10:30 a.m.-12:30 p.m., N.S.W.

SLR-9,550 kc.; daily ex. Sun. 3:15-7:30 a.m. Melbourne, Victoria.

VK3ME-9,010 kc.; Wed., Thurs., Fri., Sat. 5-7 a.m. Melbourne, Victoria.

**Read These Rules Carefully**

**IMPORTANT:** Do not fail to remember that all the entries must now be entered according to the new rules which are here reprinted for the benefit of all. All submitted lists of station. Read the new rules carefully.

- **Trophy Contest Entry Rules**
  - **NOTE** that we have amended our rules and you will find that the rules now read:
  - In order to protect everyone, the rules have been amended in a sworn statement before a Notary Public which only counts a few entry to get, must be sent in at the same time.
  - For the complete article of the Purpose of the Short Wave Scouts, we refer to page 298 of the November 1933, issue.
  - How you send the Scan of Tube to the nearest station.
  - 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.
  - A monthly trophy will be awarded to one Short Wave Scout only.
  - The purpose of this contest is to advance the art of radio by "loging" as many short-wave commercial phone stations, in a period not exceeding 30 days, as possible by any one contestant.
  - The trophy will be awarded to that Scout who has logged the greatest number of short-wave stations during one month.
  - 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.
  - Verifications are necessary; these must be sent with each entry. All submit verification letters and cards submitted in typed or written form, with the station call, wave-lengths, and other available information. (See below.) The verification letters and cards will be returned to the Scout to be used at the end of each monthly contest. (See Jan., 1933, editorial how to obtain verification.)
  - Note! All Stations Sent In Must Now Be Verified.
  - The winner each month will be the person sending in the greatest number of verifications. Unverified stations should not be sent in, as they will not count in the score of the winner. At least 50 percent of the verifications submitted must be for stations located OUTSIDE of the country in which the entrant resides. Only letters or cards specifically verifying reception of a given station may be considered.

**POWER SUPPLY KIT**

Is available for this remarkable Xmitter supplying 1,200 V. at 75 ma. at 1-56 Tube. $11.50

**DX3 SHORTWAVE RADIO**

**ALL ELECTRIC ALL WAVE**

Full Instructions Supplied, Loudspeaker Operation. Foreign Reception Guaranteed. 150 to 35 Meters. Tube, AR-12, Tube Kit, AR-122, Tube Kit. Complete Kit including Cabinet and Fully Mounted, net $5.95

Wireless and Tested, extra $1.75

Broadcast Coils, 2 .95

3 Matched Tubes .95

Special Speaker .85

**CONGRESS RADIO, INC.**

445 S. State St., Chicago, Ill.
Here They—BRAND NEW—

240 SHORT WAVE CRAFT for AUGUST, 1935

Here they come—DOERLE SHORT WAVE SETS. Ten everything about all the four DOERLE RECEIVERS. For the thousands of readers who wish to build sets or all of the many special DOERLE books have been especially prepared.

HOW TO MAKE FOUR DOERLE SHORT WAVE SETS

Containing everything that has ever been printed on these famous receivers. Four of the most popular sets are described herein. These are the famous sets that appeared after the leading names of SHORT WAVE CRAFT have experimented. The DOERLE sets are the only ones designed for the beginner or the expert who wishes to build for himself. The number of people who have purchased this book is truly amazing. Nothing yet published gives so complete a description of any of the DOERLE sets as is contained in this book. An excellent course for anyone who wishes to build a set of his own.

88-Minute Meeting Sets New Record on Transatlantic Pick-ups

A NEW record in the transmission of a program to an overseas point was established May 22 with the transmission of an 88-minute program over the transatlantic facilities of the A.T. & T. Company. The program was broadcast by WIXAL of Boston, short-wave station of the World-wide Broadcasting Corporation devoted to international good will and educational purposes.

The program was a luncheon of the National Foreign Trade Council, addressed by Francis B. Sayre, Assistant Secretary of State, at which Thomas J. Watson, President of the International Business Machines Corporation, was the keynote speaker. The addresses, crossing the Atlantic on a short-wave channel, were broadcast at the London studios of the International Time Recording Corporation. Here they were heard by executives of the international broadcasting; by members of the staffs of the U.S. Embassy and Consulate, and British Government officials.

The transmission to London and the broadcast from WIXAL were arranged by Mr. Watson, who is also a trustee of Columbia University, as part of the educational program of the World-wide Broadcasting Corporation, whose schedule is integrated with the courses of study at a number of American universities and colleges.

New "B" Supply Unit for Auto Sets

The newest plate supply unit for sets operated on or near motor cars is an Autocar. This unit is a simple 110 volt A.C. generator which mounts on the motor of an automobile or any other motor-driven vehicle and is driven directly from the fan belt.

It is especially useful for operating portable radio transceivers or any other appliance or radio set that requires 110 volts A.C. The Autocar is driven by a 60 cycle A.C. when driven at 1,800 R.P.M. The device has been so perfected that it is troubleproof and can be driven from the car battery. Its manufacturers claim that it cannot be burned out due to overload.

It is available in different sizes at a nominal cost, the price of each unit depending upon the watts output desired (refer to No. 2591).

FREE BATTERIES TO TROPHY WINNER!

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

THERE has been a continuous demand right along for a portable battery, radio fan, radio paper, Minute Meeting, Radio Illustrated, and 2 tube all-wave sets. Powerful contests to institute a good-will policy of this sort is popular with all classes of people who not only are interested in radio, but also in transatlantic purposes. Particularly, where a good little set is required, this offer is at a premium for the thousands of readers who do not have such sets, this book has been especially published for them.
speech comes through clean and crisp, showing that the side-bands of the signal carrier wave are well-preserved.

Diode Detection

The final tuned circuit of the band-pass filter is coupled to the diode elements of a 2A6 rectifier tube by half-wave linear rectification, which is impressed on the grid of the high-mu triode, contained in the second tube, constitutes the stage of Class A audio amplification. The diode detector does not amplify, but this is not needed as it is an excellent detector, giving accurate, quiet rectification of the radio frequency envelope. The diode handles large volume without causing distortion or noise. The rectified carrier current in this diode is also utilized for the automatic volume control of both the I.F. and pre-selector tubes. This prevents the detector and preceding circuits from overloading, regardless of the strength of the received signal. The audio volume may be set as desired by the manual volume control on the grid of the first audio stage and will remain approximately the same in volume over a very wide range of input signal strength.

Beside the manual volume control there is a variable resistor for adjusting the I.F. gain which can be left unattended on all local and medium distance stations, but is of more value in advance on the so-called "local" foreign stations, such as England, France, Grecia, etc. This controls the reserve power, the "see-in-the-hole" which can be called into play when receiving regularly, such as in the dark. The low atmospheric noise level it makes it possible to "step out" and do some real DXing.

It will be noted that the two diode plate elements contained in the 2A6 tube are connected in parallel as a half-wave rectifier. This doubles their power handling ability as compared to a full-wave rectification arrangement and allows for a much more powerful undistorted output to the audio amplifier.

Resistance Coupling Featured

The two-stage audio amplifier makes use of resistance coupling for both tubes. This is done for the sake of efficiency and to preserve the quality of the signal which is fed to it by the final diode detector.

The first stage of Class A audio amplification is provided by the triode contained within the 2A6 tube itself. This is a high-mu tube, necessitating resistance coupling, if its full possibilities are to be realized.

The final stage of power amplification is handled by a 2A5 pentode which is capable of delivering more power than can ordinarily be used in even a room-sized living room 15 watts rating. Today this may be a universal tendency today to design radio sets with tremendous power inputs, ranging all the way from 15 to 50 watts. Such outputs might be useful for large auditoriums or outdoor demonstrations, but they certainly serve no purpose in a private home! In a living room an output averaging from one to two watts feeding into an efficient speaker, will produce more volume than most of us care to listen to. After all, a large amplifier and speaker are designed for such tremendous outputs they are often quite ineffective at the low level which is necessary to hold them to in a living room. From a practical standpoint it would seem far more sensible for the audio amplifier to deliver good reproduction at the volume which will be used. The full capabilities of this amplifier would not be appreciated unless it has been heard operating under ideal conditions. In this connection I shall say that correctly designed coupling is more important than the use of a high-quality signal input. Under these conditions, even with an inexpensive loud speaker, providing it is mounted on a good baffle, the reproduction, as far as home use is concerned, leaves little to be desired. It is beautifully clear and lifelike while the deep notes have power and authority, within the usable volume-range, which is usually only associated with high-power equipment.

Quiet Power Supply

The BROWNING 35 contains its own power supply, operating directly from the 110-120 volt A.C. power line. The total power consumption is low, being less than 55 watts for the entire receiver. To help maintain the lowest possible noise-level, an R.F. grounding condenser is used on the A.C. input and a grounded electro-static shield is built into the transformer between primary and secondary. Efficient design has allowed the physical dimensions of the transformer itself to be kept at a minimum.

The filter used in the high voltage supply, includes the 1,800-ohm field of a dynamic speaker and two 8-m. 500-volt filter condensers. Additional resistance filtering is used in the audio tube element leads through the circuit. The effectiveness of this filtering is such that earphones may be used if desired without annoying A.C. hum.

Tuning the Receiver

Absolute single control tuning with continuous band-spread over the entire frequency range is one of the unique features of this receiver. Such tuning allows full advantage to be taken of the high usable sensitivity this receiver possesses. It leaves one hand free to operate the sensitivity or volume-gain controls so that the dials and tuning in this receiver are not followed as the microvernier tuning dial is turned. Thus the operator does not miss those weak, barely audible distant signals which are so often passed over.

As an additional aid in DX hunting, and to permit the reception of C.W. telegraphic signals if desired, a beat-frequency oscillator is included in the circuit coupled to the suppressor grid of the I.F. amplifier tube.

The two manual volume controls regulating the I.F. gain and audio amplification respectively, permit great flexibility and allow the operator to balance the overall gain of the receiver as he chooses in order to meet varying conditions.

In designing the tuning dial, it was decided that no compromise should be made with convention. Accurate, easy tuning and good band-spread over the entire range were of utmost importance, we believed, in such a receiver. After all, this set is designed for radio operators and experimenters who want results and appreciate performance more than conventional appearance. A 5 1/2-inch dial, with knife-edge pointer, and forty-to-one ratio vernier drive, gives a tuning control which is not critical on even the highest frequencies and does not tire the operator by requiring the concentration necessary for minute adjustments. Without doubt this precise, single control tuning is partly responsible for the unusual DX logs which are being made with this receiver.

METAL TUBES!

YESIR!—in the new 2-tube receiver to be described in the September Issue . . .

Don't miss this article by George W. Stuart, W2AMN.

The Very Newest Sensation in S-W Receivers!
Clipset—All-Wave Hook-up Board

(Continued from page 205)

For the first time, it is now possible for the experimenter and short wave enthusiast to obtain the most exhaustive data on short wave coil winding information that has ever appeared in print. As every experimenter who has ever tried to build a short wave set knows all too well by experience, the difference between a good and a poor receiver is usually found in the short wave coils. Very often you have to hunt through copies of magazines, books, etc., to find the information you require. The present data has been gotten up to obviate all these difficulties.

Between the two covers of this book you will find every possible bit of information on coil winding that has appeared in print during the past two years. Only the most modern "dope" has been published here. No duplication. Illustrations galore, giving not only full instructions of how to wind coils, but dimensions, sizes of wire, curves, how to plot them, by means of which any coil for any particular short wave set can be figured in advance, as to number of turns, size of wire, spacing, etc.

There has never been such data published in such easy accessible form as this. Take advantage of the special offer we are making today, as due to increasing costs, there is no question that the price will increase soon.

RADIO PUBLICATIONS
97 HUDSON STREET
NEW YORK, N.Y.

Please mention Short Wave Craft when writing advertisers
a clockwise direction, the plate becomes No. 2, the grid No. 3, the cathode No. 4 and the right-hand heater No. 5. Now, to locate the grid connection for this tube on the composite socket (assuming that this tube has no cap on top) it is merely necessary to look for the designation "S-5" since it's a 5-prong tube and the grid connection in the third pin according to the R.C.A. tube chart number system. Of course, for 5-prong screen-grid tubes the No. 3 pin would be the screen grid, the control grid being on top.

This hook-up board sure does allow speed. In order to satisfy ourselves on this point, we called in a short-wave fan and asked him to construct a simple two-tube regenerative circuit using type 30 tubes. Working casually, (for he did not know he was being timed) it was no more than thirty minutes before he had it completed, checked, hooked to batteries and

The 19 Twinplex, one of the most famous of our 1-tube sets. A set which has made thousands of friends among S.W. Fans.

This hook-up will be found very efficient. It represents the Doebel "Band Spread" type, and has been found excellent for short-wave reception.
Lock Bea (20% Electric, Mime 20
20 tangents
Klectm-
20 MOTOR
A. 110
110
110
110
110
20 Tricks with Tesla and Oudin Coils.......

TRANSMITTER DATA
1 k.w., 25,000 volt transmitter data. 110-volt
transformer is required for operating all A
Heath coil
1/2 k.w., 12,500 volt transmitter data. 110-volt,
60-cycle primary. Suitable for operating 8-
inch Heath coil.
40 Vt. or other 40 Vt. transformer
Induction Coupler of Heath make 1 inch short data...
ARC-50, 40.000Amp. Australia. 110-volt
(Low. Medium & High Power Data Given)

SLIDE RULE
MIDGET
Metal 4"Dia.
Price $1.50.
Case 6 for extra.
This rule solves any problem in multiplication, division,
addition, subtraction. It graphs answers in proper propor-
tions to errors and powers of numbers, roots, rings, tangen-
tals, etc. Can be used with any text of college mathematics.
Aided and supplemented fractions. Approved by
colleges.
19" Dia. 37" Stalk "Special" Rule. $2.75.
Multitudes and Dividens, but has no "1/16" Scale.

TELEGRAPHONE - Records Voices or
"Code" to the & from your station by mag-
netism. Codes can be recorded "fast"
and any "word" can be sent.

MAGNET COIL DATA
Powerful battery electro-magnet; lift 40 lbs. ....... $0.50
110 Volt D.C. solenoid to lift 25 lbs. ........... $0.50
110 Volt D.C. solenoid lifts 1 lb. through 1 in $0.50
110 Volt D.C. solenoid lifts 1 lb. through 1 in $0.50
12 Volt D.C. solenoid lifts 1 lb. through 1 in $0.50
A C. Solenoid, powerful. 110-volt, 60-cycles
Motor-1/16 H.P. 110-volt A.C. 60-cycles
Suitable for driving 15'' fan, etc.-1/2 horse- $0.50
1/4 or 1/20 cycle dynamo magnetizes D.C. 30.80

MISCELLANEOUS DATAPRINTS
Tinplate Log
Electric Hairdryer data...
20 gawr electric-iron data...
20 practical telephone book susp. ...
100 mechanical movements for inventors...
Polarized Relay-Eiffs reverse...
Electric-corded Müller data...
Water-Wheels-how to Build and Light Your
taps
20 Electric Bell circuits...
Public Address System...
Electric choice ringer; dial any clock...

20 "Electrical Tricks" for LODGES and
PARTIES.
How to Fry Eggs on Cake of Ice Electrically. $0.50
"Rewiring" Small Motor Armatures. $0.50
"ENGINEERING SERVICE BY MAIL"
Send Sketch of Your Problem for Estimate.
(25% off on orders for $2.00 or more. No C.O.D.)

THE DATAPRINT COMPANY
Last Reg. 322
Raney, N. J.

percuting beautifully. So you see, the
Hook-Up board is a decided asset and
should be owned by every radio ex-
perimenter.

LIST OF PARTS
2-100 mfr. variable condensers; C1, C2 (Ham-
marlund Star type).
2-35 mfr. variable condenser; C3 (Hammar-
lund).
1-35 mfr. variable mica dielectric condenser:
C4 (ICA).
1-100 mfr. fixed mica condenser: C3 (Aero-
vox).
1-6.02 mfr. fixed tabular condenser; C4 (Iud).
1-10,000 ohm potentiometer; R1 (1Hud).
1-1/4 to 20 megohm variable grid-leak; 112
(Aerovox).
1-heater for grid-leak (Aerovox).
2-1/4 megohm, one watt resistors; R3, R4
(Lynch).
1-1,000 ohm rheostat; R5 (Electrad).
3-NA-Ald 5-6-volt composite sockets; S1,
S2, S3 (Na-Ald).
1-31, to 1 or 5 to 1 audio transformer.
Approx. 20 small Futaba lamp clips.
Approx. 20 medium Farnsworth clips.
1-double Futaba clips.
1-wooden baseboard (1/2, thick). See blueprint.
1-aluminum front panel (1/2, thick). See blue-
print.
2-3" tuning dials (Na-Ald).
1-laginite knob (Na-Ald).
Miscellaneous hardware, wire, etc.

5-Tube "Super" Does the Work
of 8 Tubes
Bottom view of the 5-tubes = 8 receiver.

part of the job is very important and must
be done very carefully. Many set builders
are not equipped with test oscillators, so
the method outlined is about the easiest
way of aligning the I.F. stages.

The I.F. Transformers have been
plugged at the factory at 456 kc, the primary
condenser of the first I.F. transformer
should not be touched. Insert the 150-meter coils
in their respective sockets and switch on the
current. A signal from some station on the
band will be heard. Start with the second-
ary condenser of the first I.F. transformer and
tune for maximum volume. Now tune
the primary and secondary condensers of
the next two I.F. transformers in order, for
maximum volume. After this is done, turn to
some part of the band where there is no in-
coming signal. A frying sound will be heard.
Up to this point the alignment has been done
with the volume control set at maximum.
Turn the volume control until the frying
sound is almost inaudible and start all
over again, tuning for maximum noise.
This second adjustment is critical and
should be done very carefully. An insulated
tool is used to adjust the I.F. transformers and
can be obtained at a nominal cost from
any radio supply store. The set is
now ready for operation. Foreign stations
were received with excellent speaker volume
and any short-wave fan should be highly
pleased with the performance of this 5-
tube superheterodyne.

LIST OF PARTS
2-”Sets standard 4-motion plug-in coils. (Na-
Ald (Hammarlund, Rud.)
1-2 zanr 110 volt tuning condenser, Ham-
mardlund.
1-50 mfr. Variable Trimmer Condenser.
1-55 mfr. Variable Trimmer Condenser.
1-3 mfr. By-pass condensers.
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vox.
1-1000 mfr. Mica condensers; Aerovox.
2-01 mfr. Condensers, Aerovox.

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Verification Cards
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HJ1ABB, Barranquilla, Colombia, short-
wave station which has been in contact
with W2AF, G. E. station, on various
two-way programs, will be glad to know
the South American station is now verify-
ing reception of its programs. Letters
should be addressed to Elias Peltier, in
charge of HJ1ABB.

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(Continued from page 219)

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McRiplet — official speed 32 wpm, fasted

of all-time; Jean Holman ... 32" Championship of the World in Kansas

W. A., on

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INTERNATIONAL DX

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Australia and the new "HRO" tool, "E." I'm the first complete set. If you

write, I'll send you a copy of my log and additional facts of interest.

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When To Listen In
By H. Harvey Gernbach

SHORT WAVE CRAFT FOR AUGUST, 1935

A. C.

ELECTRICAL POWER

from a Windmill, from available Waterpower, from your Automobile, from your Motorcycle, from your Bicycle, from gasoline, from household or transportable Radio Transmitters, from Solar Power, etc., etc., etc., etc.

 gotten a Westinghouse short wave receiver, then you can talk to the world. You can get news and weather reports, you can listen to the radio stations of foreign countries. You can hear music, you can hear speeches, you can hear the voices of your friends and relatives, you can hear the voices of your enemies.

On the other hand, if you don't have a Westinghouse short wave receiver, then you cannot talk to the world. You cannot get news and weather reports, you cannot listen to the radio stations of foreign countries. You cannot hear music, you cannot hear speeches, you cannot hear the voices of your friends and relatives, you cannot hear the voices of your enemies.

So, if you want to have a Westinghouse short wave receiver, you must get one.

The Westinghouse short wave receiver is the best short wave receiver on the market. It is the only short wave receiver that will give you the best possible reception. It is the only short wave receiver that will give you the best possible performance. It is the only short wave receiver that will give you the best possible service. It is the only short wave receiver that will give you the best possible value for your money. It is the only short wave receiver that will give you the best possible satisfaction.

So, if you want to have a Westinghouse short wave receiver, you must get one.

There are many different types of Westinghouse short wave receivers, and each type has its own special features. But all of them have one thing in common: they all will give you the best possible reception. And they all will give you the best possible performance. And they all will give you the best possible service. And they all will give you the best possible value for your money. And they all will give you the best possible satisfaction.

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So, if you want to have a Westinghouse short wave receiver, you must get one.
Vacuum Tube Voltmeter and Power Supply

By I. H. Stantz

Simple Hook-Up of V.T. Voltmeter

- FROM the number of V.T. voltmeters that have appeared in radio periodicals during the last series, it is easy to infer that they were a much-used instrument and from the complicated design of some you would imagine its purpose was to measure the intensity of a static wave from Mars after it had bounced off the Heavens layer three and a half times.

I have used numerous V.T. voltmeters and have seen many more. I have taken the good points of them and added a few kinks of my own to make a good instrument. The accuracy of the instrument has in no wise been adversely affected by the fact that it is A.C.-operated, has only two variables, reads voltages directly, is unaffected by tube variations, needs no calibration, and is easy and cheap to build.

The diagram is self-explanatory to the inquiring student or service-man, but an explanation would not be amiss as anybody can build it who can join a wire to a socket and can operate it who can turn a knob and read a meter.

As will be seen from the diagram the 222 acts as two separate rectifiers in series that is, the negative leg of the plate supply and the positive leg of the bias supply are common. Each circuit is independent of the other so the bias in no wise depends upon the current through the tube. As R3 is across the B supply, the potential on the plate of the 37 may be very accurately adjusted so the tube will draw any desired amount of current (with no bias). R2 is across the C supply so the bias on the 37 may be carefully adjusted to any voltage within the limits of the rectifier.

C2, L1, C3 and C4, L2, C5, are voltage supply filters for the B and C voltages respectively.

The elements of the tubes are lighted directly from the A.C. line by putting a 250-ohm resistor in series with them.

Before putting the instrument into operation, insert the voltmeter in the circuit and put R2 and R3 to the cathode ends. Now turn on the A.C. After the filaments are thoroughly heated, adjust R3 so that the 37 draws an easily read amount of current. Note this reading very carefully. Now set R2 to the opposite end thus applying full bias on the 37 and apply to the input posts, the voltage to be measured. Leave SW, open, for A.C. measurements and closed for D.C. measurements.

Now move R2 back till the tube draws the aforementioned amount of current. The reading on the voltmeter will be the same as the voltage applied to the input. An accuracy of ±1 percent is easily attained for A.C. measurements.

The error is somewhat greater on D.C. circuits where a high resistance is shunted by the V.T. voltmeter. At that this sound like a more or less complicated process but it is by far the simplest device of its kind I have ever used.

Once the filament are heated I can measure any voltage from 1 to 100 volts, A.C. or D.C., in 15 seconds and you can do the same before you use it half a dozen times. I am sure that anyone that builds this instrument will be more than pleased with its simplicity and accuracy.

Piezo-Electric Phones

- THE new Piezo-Electric headphones have created quite a sensation and we are pleased to print this sectional drawing showing the actual construction of one of these remarkable earphones. The case and cap is similar to the usual arrangement, however, it is the inside works of the Brush type A, piezo-electric headphones that are the most interesting.

The drawing clearly shows that the brush cradles the cone and serves to drive a small cone which measures approximately 1/2 inches in diameter. The crystal driving unit consists of Rochelle salt plates 1/8 of an inch square and .010 of an inch thick. The use of this type of driving unit or motor together with the proper construction of the small cone makes it possible to produce an extension which has a very favorable response from 60 to 10,000 cycles.

These phones represent a very high impedance earphone as earphones usually are concerned and makes it possible to operate them directly from some of the commonly used sound-grid tubes. At 1,000 cycles three phones have an impedance of 50,000 ohms. In order to operate the piezo-electric earphones in conjunction with the regular vacuum tube it is necessary to have a simple output network consisting of either an inductance or a resistor and fixed condensers. Suitable circuits were shown in the July issue on page 155.

DON'T FORGET! Another "Clipset" Article in the next issue! ELECTRIFYING the "CLIPSET!"

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Why Doerle?-Set of Matched Tubes $1.00 in coils.

THE world at large knows very little of what is going on in hundreds of laboratories throughout the world, and it knows still less of the many problems that are worrying the modern scientists, problems that are as complex as their solutions are elusive. Scientists, for instance, are trying to solve problems that involve the exploitation of the upper reaches of our atmosphere; problems in connection with the propagation of wireless waves. They have been probing the stratosphere and the ionosphere from the ground by sending up wireless waves and catching them on their return. And they have discovered many things that were suspected but never proved.

Thus they discovered that the sun's radiation changes the electrical properties of the atoms that are to be found high above the earth's surface, and that ultra-violet rays and electrical particles ejected by the sun are causing what is known as ionization or electrification of these atoms, with the result that there are vast layers of free electrons which are constantly moving to and fro. These layers which with their constantly changing configuration and thickness form spherical shells around our planet.

Of such layers two are known. One of them is to be found at an average height of sixty-five miles above the earth's surface, and is called the Kennelly-Heaviside layer and is held responsible for sending back to earth long and medium wireless waves that have been sent upwards. In other words, the Kennelly-Heaviside layer reflects long waves, but not medium waves.

The second layer is called the Appleton layer, named after its discoverer, Professor E. V. Appleton, P.R.S, of King's College, London. The average height of this ionized layer is about 150 miles above the surface of the earth.

It has been found that the Appleton layer is responsible for reflection of short waves, i.e., waves below 100 metres.

Cabinet for "Browning 35"

Here is a beautiful dark walnut cabinet for your "Browning 35" receiver. The accompanying photo clearly shows the modern design and relative size of the cabinet. The opening in front is just the right size for the Browning receiver, which can be mounted into it with a minimum of effort. Besides being a beautiful piece of furniture this cabinet serves also as a convenient mounting place for the dynamic speaker, supplied with it, which otherwise would have to be housed in a separate cabinet. It is finished in dark walnut with the face edged of the base and top in black walnut, creating a very effective contrast that is further enhanced by the rounded corners and modern grille work.

FEDERATED SHORT-WAVE ENGINEERS

A group of short-wave enthusiasts from across the nation have organized the Federated Short-Wave Engineers, an organization to which any person of any age and owning any type of radio equipment is eligible. I have been reading Short Wave Craft since about 1929 and I think it is a grand magazine—James F. Halsey, Pres. Federated Short-Wave Engineers, 223 East 5th St., Texarkana, Ark.

SERVICE MEN—Get YOUR Share of $400 in Prizes!

Radio-Craft for August contains Rules and complete information concerning a special contest, open to EVERY Service Man, to determine who will be the first and second test equipment is required in order to service radio sets for which at least laboratory examination. "The Ideal Radio Service Shop" is the title of the contest. All it costs nothing to enter the contest, yet YOURうち there is only one to walk away with a cathode-ray oscillograph, volt-ohmmeter, 12-in. dial plate ohmmeter, de luxe set analyzer, vacuum-tube voltmeter, milliammeter and microammeter, audio tester, or one of a half dozen of the thousand-dollar Consolidated Official Radio Service Manuals! The contest opened on June 1, and closes Aug. 15, 1935.
He also heard echoes and soon Professor Stormer and Dr. van der Pol in Holland and Professor Appleton in London were investigating this highly fascinating problem, which is considered as indisputable evidence of the existence of wireless waves.

Further tests carried out in different parts of the world established the fact that sounds or other waves were subject to long delays, and when one case the interval between the original signal and the echo proved to be found for this reason they were called echoes of long delay.

Those of my readers who are familiar with reception on short waves have no doubt heard the signals that repeat themselves practically instantaneously to the original ones. This repetition is due to what is known as world-echoes.

As a matter of fact, there are no true echoes, but due are due to the fact that the transmitting aerial radiates simultaneously in two directions, so that the receiving aerial gets a direct wave from one direction and an echo wave from the opposite direction which started at the transmitting aerial and traveled all round the world and arrived from the opposite side.

The circumference of the earth is roughly 24,000 miles, and short waves, in common with all electromagnetic waves, travel with the speed of light which is approximately one million miles per second. Thus a wireless wave will take a trip over one-seventh of a second to get round the earth, and round-the-world echoes have a time interval of about one second.

In the case of echoes of long delay, let us say any of three seconds' time interval—the echo takes three seconds after the occurrence of the original signal—three seconds mean that the wave has traveled 750,000 miles, or ten times around the earth, and the return journey, so that the wave was apparently sent back at a point in space 750,000 miles distant, i.e., 270,000 miles away from the surface of the earth.

What does this mean?

Does it mean that the wave penetrated the whole earth and layers and escaped into the interplanetary space sounds far-fetched, but I have no better name for space at such distances, or only to other electrified obstacle and so made to return?

Or does it mean that the wave has reached one of the layers and for some reason or other was made to travel inside the earth, and if it delayed any 750,000 miles into space, what is there to turn it back?

Mystery of the Waves

The mean distance of the moon from earth is 250,000 miles. If the moon were the guilty celestial body what delay would it cause? If distances of 750,000 miles have made no delay, then it must be that the moon is sometimes nearer and sometimes farther away from earth, so that it may be that it acts as some sort of reflector of wireless waves.

What of the forty seconds' delay? This means a journey of 7,400,000 miles, with the reflecting medium being situated at half this distance, i.e., 3,700,000 miles.

What can there be in space, at that distance, that would reflect wireless waves? I think you will agree with me that this problem is highly fascinating. It fascinated me all right! I studied every bit of evidence I could lay my hands on, and during those studies I realized one thing.

Up to that time, some few dozen laboratories were working on the problem and all they could do was to study the phenomenon in their own little backyards.

I then and there imagined thousands of listening posts established all over the earth, thousands of intelligent tracking echoes from either a given station or a number of stations, with the laboratories all working up on the work of this mass listening community. I had a talk with various people and heard a lot of what could not be done.

It is remarkable how people know a great deal of what cannot be done, and very little of what can be done. The cold showers, of course, made me the more enthusiastic, so I went and saw some more people. And then I had the privilege of meeting Professor Appleton, who is one of those rare people who have a lot about what can be done and nothing at all about what cannot be done second.

Professor Appleton took an interest in this idea of mine and promised to help. So did Professor Stormer and Dr. van der Pol.

World-Wide Study

My greatest trouble was, of course, finance. If I were to form a society of some sort for research purposes how was I to keep in touch with the members? The correspondence and the stamps alone would have ruined my slender resources.

And then, at the psychological moment, I mentioned the idea to the Editor of the World Radio. At the end of the interview World Radio became the official organ of the League to be formed.

I made an appeal to the Listening millions. The response was immediate and overwhelming, and a sum of £4,000 was raised in a few months, and from the donations. National leagues with their own officers and organs were springing up all over the world.

American short-wave experimenters came in en masse. The Radio Society of Great Britain is in a similar state, and many local radio societies joined in the game. We are now thousands strong and have over seventy-three countries taking part in the research. The number of men having the B.Sc., or equivalent degree alone runs into some forty thousand all over the world.

If you are interested, write to me, e.o. Stormer, motorist 13110, New York, and I shall be pleased to send you all the necessary particulars.

Radio Waves Guide Planes Across Ocean

Development of an ocean spanning radio direction finder, radically different in principle from any other directional equipment previously disclosed by Pan American Airways.

The idea of a radio direction finder is not new, for the Federal Radio Commission for licensing of communications stations for its proposed air service between New York and Mexico City, granted the Federal Radio Commission for licensing of communications stations for its proposed air service between New York and Mexico City, granted

Radio Commission was to cover ground control stations in California, Hawaii, Wake Island, Midway Island and the Philippines.

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New York, N. Y.

40 Illustrations, 72 Pages.
Still, flexible covers

50c
AN AMAZING NEW RECEIVER

NATIONAL HRO Communications Type RECEIVER

The new National HRO Receiver is a high performance professional receiver, not a broadcast receiver with short wave ranges added. Although it offers complete frequency coverage including the regular broadcast band, it is primarily a short wave receiver, designed to provide consistent communication under adverse conditions. It is backed by the experience of a concern that has for years built high performance receivers for government and professional use.

OUTSTANDING FEATURES:
- Nine Tubes, not including rectifier.
- Two Preselector Stages.
- Single Signal (Crystal Filter) standard equipment, providing enormous selectivity when conditions require it.
- Ganged Plug-in Coils, with each coil individually shielded.
- Strictly single-control Tuning.
- Calibration for each range mounted on coil.
- Four gang Precision Condenser, with preloaded worm-drive tuning, 20:1 ratio.
- Micrometer Dial, spreading tuning over 500 division, number every 10 division, direct reading.
- Automatic or Manual Volume Control.
- Vacuum Tube Voltmeter with Instrument calibrated in R scale of carrier intensity.
- Electron Coupled, air pedaled oscillators.
- Two I.F. stages and the entire I.F. and I.F. stages and the individual coils for general coverage ranges to band spread ranges which expand the amateur bands over the entire dial. Individually calibrated curves are mounted on the front of each dial. The illustration below shows a complete coil assembly together with the air dielectric tuning condenser that is used throughout the R.F. and I.F. stages and the insulator of genuine low loss R-39. Coils for continuous frequency coverage from 4 to 30 megacycles, plus calibrated band spread on the 10, 20, 40 and 80 meter bands is included with the receiver. Two extra coils to extend the range down to 500 kc. are supplied at extra cost.

RELAY-RACK MOUNTING

The HRO is also available for professional use with a standard relay rack, as illustrated in the left.

PLUG-IN COIL FOR HIGH FREQUENCY

The HRO employs a precision built switching, for only by having the correct inductance free from unwise coils can high performance be realized. The four coils in each section have been designed so that as the coils are changed from general coverage ranges to band spread ranges which expand the amateur bands over the entire dial, individually calibrated curves are mounted on the front of each dial. The illustration below shows a complete coil assembly together with the air dielectric tuning condenser that is used throughout the R.F. and I.F. stages and the insulator of genuine low-loss R-39. Coils for continuous frequency coverage from 4 to 30 megacycles, plus calibrated band spread on the 10, 20, 40 and 80 meter bands is included with the receiver. Two extra coils to extend the range down to 500 kc. are supplied at extra cost.

SEND COUPON FOR DESCRIPTIVE BOOKLET

NATIONAL CO., MALDEN, MASS.

Gentlemen: Please send me immediately your bulletin describing the HRO Receiver, and your General Catalogue No. 360. I enclose 6c to cover mailing costs.

NAME
ADDRESS

2SWC831

NET PRICE
$167.70
with tubes, less speaker and power supply.
Only Midwest Gives You Multi-Function Dial!       This dial was designed in keeping with the trend of the times, you is not an airplane and a many-purpose dial that performs many functions. Now, Midwest guarantees inexperienced persons can secure good foreign reception. Send for FREE miniature of actual rotating dial which clearly shows these outstanding advantages: 1. All calibrated in Kilometers, Megacycles, and Meters. 2. 200 letters of alphabet + Production Stations printed on dial and highlighted. 3. New, Smooth-Accel. knob. 4. New, Grooved Enclosure. 5. New, Triple-Way, Triple-Tone switch. 6. Built-in Tuba Tone. 7. Built-in Selector. 8. Built-in Speaker. Adjust Tone V-Spread Design This sketch shows the V-Tube AC-Circuit Vane, that were brought to you by Midwest engineers as a result of a study of the directional effect of a Full-Scope High Fidelity speaker, used by Mid- west. These Vanes spread the beautiful last note of the "highs" throughout the entire room in a scientific manner — direct- ing the High Fidelity waves uniformly to the ear. Send for FREE 40-page catalog. It pictures the complete line of beautiful 1936 Acoustic Tone V-Spread consoles and chassis, in four colors.

- **DEAL DIRECT WITH LABORATORIES** Increasing calls are sure to result in higher prices soon. Buy before the big ad- vance. NOW...while you can still afford to enjoy Midwest's sensational values...to avoid middleman's profits to pay. You can order your 1936 High Fidelity radio from new 10-biophone catalog with as much certainty of satisfaction as if you were to select it in our direct radio laboratories. You save 30% to 50% when you buy this popular way. You get 30 DAYS FREE Trial...as little as 11.50 down puts a Midwest radio in your home. Satisfaction or money back. Write for new FREE catalog today.

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