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Denton    Mitchell    Shuart    Barnett    Cisin    Victor

HUGO GERNBSACK
Editor

H. WINFIELD SECOR
Managing Editor

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OUR COVER

- THE front cover painting shows the very latest in short-wave receiver designs—the "Mono-Coil 2." It eliminates "plug-in" coils by means of a simple switch—and most important of all, it does this with high efficiency and without dead-end losses. For full details see page... 204

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Short-Wave Marvels

An Editorial By HUGO GERNSBACK

As the art of radio progresses, it becomes more and more apparent that short waves, and particularly the so-called microscopic, ultra-short waves, hold the promise of many marvels that we, of today, hardly appreciate.

Every day brings new discoveries and new applications of the ultra-short radio waves. As these waves get shorter and shorter, they take on entirely different properties from those with which we are familiar. For instance, every one knows that the ordinary radio set, which operates on broadcast waves, can be used with an indoor antenna. The broadcast waves go through stone and brick as though they did not exist.

With the ultra-short waves, however, particularly when we get down to about 4 inches (10 centimeters) or so, it is necessary that the transmitter and receiver be in actual sight of each other. The waves no longer follow the curvature of the earth but, if an attempt is made to use a radio receiver with a transmitter beyond the horizon, it is found that the waves shoot off into space, never to return.

The ordinary broadcast waves are reflected around the Heaviside Layer, as though the upper ionized atmosphere were a curved mirror. The ultra-short waves—4 inches and thereabouts—seem to ignore the Heaviside Layer, and no longer reflect from this mirror, but shoot right out into space, probably to return. In this respect, these short waves are similar to the rays of a searchlight directed heavenward; the light beams go out into space and never return, and so with the ultra-short waves. We have to use parabolic mirrors to confine these waves, just as if we were using a real optical searchlight.

It has often been asked, what use these microscopic short wavelengths may have? Particularly for the layman, let us state that these wavelengths can be used for any service for which other waves are used. In other words, we can transmit speech and the usual forms of aural entertainment over these short wavelengths, just as successfully as we can do it on the higher wavelengths.

As these waves pierce fog and mist (although they do not go through stone and earth) they can also be used for aircraft landing beacons; and, of course, they can be used for television transmission, as long as the transmission is within "sight" of the receiver. That means that, in the future, television impulses may be relayed by telephone wires, just as radio programs are relayed by telephone wires today. Each city will have a television transmitter to broadcast these microscopic waves from an elevated point; so that the television signals can be received by individual antennas throughout the town. And, of course, the transmitter would transmit, not only the television impulses, but the musical entertainment as well; all over the same microscopic wavelength!

What wavelength we will finally use for television is, as yet, difficult to state. One thing is certain, however—that it will be below 6 meters. The actual wavelength, has not, as yet, been chosen, because sufficient experimental work has not yet been done in this particular art. As a matter of fact, we know practically nothing of what happens to radio waves out in space; that is, during the interval of time after the radio wave leaves the transmitter and before it arrives at the receiver. There are many good guesses about the subject, but we know little; and I am afraid that it will be many years before we get an inkling as to what actually takes place.

There are many other uses for the ultra-short wavelengths, and each particular wavelength has its own special field of utility. As we have reported many times in this magazine, short waves are used for therapeutic (medical) purposes. Similar wavelengths are used for killing certain insects which infest various grains. It seems that, in time, every possible insect pest will be fought successfully by short waves, once we know which wavelength is the best to use against each particular pest which now creates havoc with our crops. It seems certain that agriculture, in the future, will utilize extensive short-wave installations whereby entire fields will be sprayed with short waves, while the crop is growing, in order to kill off many varieties of insects. The same principle will be used, not only for grain crops, but by fruit growers and cotton growers as well.

In mining, that is, in explorations for precious metals, ore, oil, etc., the ultra-shortwaves require a special technique; and already many companies in this country, as well as abroad, are successfully prospecting by means of ultra-short waves.

There are no doubt many other marvels which remain, as yet, to be discovered; because the surface has not even been scratched—of what short waves will do in the future. Remember, that all the applications listed here are comparatively new. During the next twenty-five years you may expect many surprises; and it is evident that most of them will come out of the short-wave and ultra-short-wave research laboratories.
THE photo, above, shows one of the most interesting short-wave transmitting stations in the world—that located in Java. The buildings shown house the radio telephone transmitting stations operated by the Netherlands Indies Telephone Administration at Malabah, near Bandong, Java. This station is designed to carry the East Indian voices across the Pacific Ocean 8,700 miles to Point Reyes, California, the receiving station of the Bell System.

A "Walking" Station

The photograph shows the wires comprising the antenna, the wires appearing exaggerated as they have been touched to make them clearer. A second group of wires which are not visible in the picture is used as part of the antenna radiating system. With this system in operation calls from the East Indies can be made direct to California, instead of passing through the old round-about circuit half way around the world, by way of San Francisco to New York, London, Amsterdam, and Bandong. Thanks to this new high power short-wave radio- phone transmitting station at Malabah, the old circuitous route will be abandoned.

Lightweight, Two-Way Short-Wave Set

THE photo, below, shows one of the smallest, high efficiency, two-way, short-wave sets ever built. It was successfully tested recently on the schooner "Golden State", before being packed as part of the scientific equipment carried by the Darwin Memorial Expedition.

This two-way set has a transmitter and receiver cabinet weighing twelve pounds and the hand-driven generator weighs 10 1/2 pounds. The gentleman shown cranking the generator in the picture is Neville Priestly, relief airplane pilot; the young lady is Miss Lillian Gorman, secretary to Wolfgang Von Hegan. The expedition is engaged in a scientific foray into the lands and waters of the Central Americas and the wide range of equipment carried includes gas guns for "knocking out" wild animals; underwater cameras to photograph deep sea phenomena, a diving bell and an airplane.

Here's the very latest style in short-wave receivers for the police force—the batteries are carried in the leather pockets on the belt.

- WHILE "personal" short-wave receivers to be carried "on the hip", as it were, have been designed and used to some extent by members of one of the European police organizations, one of the very first portable short-wave receivers designed to be carried by American policemen is that here illustrated. The batteries are carried in the leather pockets on the waistline belt. The receiver comprises a 1 tube set with a small control knob for the volume, off-switch, and tip jacks for the head phone.
Dr. de FOREST Wins
FEED-BACK Verdict

By H. WINFIELD SECOR

Dr. Lee de Forest, after twenty-two years of constant patent litigation through the highest courts, has at last been awarded the credit due him for the invention of the feed-back audion circuit. The previous court opinion awarded this credit to Edwin H. Armstrong, who has contested the honors for originating the feed-back circuit through these many years. Not only is it a distinct pleasure to see the honors awarded to the real inventor of the feed-back audion circuit, but it is extremely interesting and important to note that Dr. de Forest, not only was the inventor of the feed-back or regenerative receiver circuit, used by thousands of short-wave fans all over the world today, but he also receives honors for the invention of the audion or vacuum tube oscillator. This means that every "Ham" or commercial vacuum tube transmitter owes its allegiance to Dr. Lee de Forest, as well as the regenerative or feed-back receivers. Also, the far-famed superheterodyne receiver would not be in existence today, if it were not for the oscillating vacuum tube devised by Dr. de Forest.

What the "Feed-Back" Circuit Does

Thousands of our new friends in the short-wave field perhaps do not realize what a difference the de Forest invention of the feed-back circuit means. Simply explained, we might say that if the grid and plate circuits of a three-electrode tube, for example, are not inductively or electrostatically related, then the signal that you would hear in the phones of the ground station would be very weak—so extremely weak as to be nearly, if not quite inaudible in many cases. Now by a single stroke of radio magic, we wind a few turns of wire adjacent to, and in inductive relation to the grid coil, these few extra turns of wire being known as the tickler, and we connect it in the plate circuit of the tube. A tremendous improvement in the strength of the signal is now noticed immediately and the degree of regeneration is varied until the signal is of the greatest clarity. This is done in any one of several ways; for example, by turning the tickler coil on its axis in close proximity to the grid coil; or by the use of the well-known "throttle" variable condenser, as in the popular Reinartz circuits.

Pages and pages of testimony have been given in the various court fights through which Armstrong and de Forest have carried the legal battle as to whom was the true inventor of the feed-back circuit.

Dr. de Forest in a recent letter addressed to Hugo Gernsback, editor of SHORT WAVE CRAFT, states that while he was experimenting and setting up audions (vacuum tubes) in cascade telephone repeaters during the summer of 1912, that on one occasion, having only one operative audion tube on hand, momentarily, Mr. H. E. Van Etten, his assistant (and Dr. de Forest) endeavored to make this single audion tube do double duty by deliberately connecting its output circuit back into inductive

(Continued on page 231)

Dr. Lee de Forest, who has become famous in the world of Radio, as the recognized inventor of the three-electrode tube or "triode," and as the inventor of the famous "feed-back" or "regenerative" circuit.

PROBABLY the greatest radio patent fight in history has now come to a close, as far as Dr. Lee de Forest is concerned. We hope that the recent Supreme Court decision handed down on May 21 by Judge Cardozo will bring a hard-earned peace of mind as the inventor of the regenerative vacuum tube circuit, and further, that honor is at last given where honor is due.

Summed up in a few words, this twenty-two-year-long legal battle, which has repeatedly passed through the highest courts in the land, was actually based on the argument as to whom first conceived and used the feed-back audion (vacuum tube) circuit. Today, twenty-two years after Dr. de Forest conceived the brilliant idea of connecting the audion output (plate) circuit so as to feed-back into the input (grid) circuit, thousands of radio fans and hams all over the world are busily turning the knobs on their regenerative short-wave receivers and bringing in stations from half way around the world as a regular daily performance.

Dr. de Forest Gets Double Honors

Dr. Lee de Forest has now become twice a hero to the radio fraternity throughout the world; first, he took the really sensitive two electrode vacuum tube devised by Fleming, the English inventor and scientist, and, in a flash of brilliant scientific insight, conceived the idea of inserting the third electrode into the so-called Fleming valve. Immediately new possibilities began to develop, so far as the vacuum tube was concerned, as a detector and amplifier of radio signals. It has been stated many times by eminent radio engineers that without Dr. de Forest's conception of the third electrode or grid which he added to the original two-electrode valve or tube, that the future of the vacuum tube in radio circuits would have been extremely limited indeed. After Dr. de Forest had performed this very worthy service in the practical application of radio, he now comes in for highest honors again by his conception of the regenerative audion circuit.

Here is Dr. de Forest's original diagram showing the "regenerative" principle or "feed-back" between grid and plate circuits. This diagram will go down in radio history as the basis of one of the longest and most expensive patent litigation contests the world of science has ever seen.
15 to 2000 Meters on this Receiver—all on One Switch

By CLIFFORD E. DENTON

Here's a “red-hot” receiver hook-up which permits tuning in waves extending over three bands—short-waves from 15 to 200 meters; broadcast waves from 200 to 2,000 meters, and the third band from 550 to 2,000 meters. Thanks to the new Na-Ald S.W. coil-switch selectors, a “twist of the wrist” gives you command of all waves from 15 to 2,000 meters—all without having to change a single plug-in coil. This set works on 110 volts A.C. or D.C.

Here's the secret of the 15 to 2,000 meter receiver—a “tandem gang” of Na-Ald coils plugged into two Na-Ald switch units, both switches being gauged on a single control shaft.

Audio Stage Uses 77 As a Triode

In the audio stage a 77 type tube is used as a triode. The suppressor and screen-grid were connected to the plate circuit and this tube gives an effective

(Continued on page 241)
My 2-Tube A.C.-D.C. 'Wave Master'

By HAROLD MITCHELL

How many times have you longed for a handy 2-tube A.C. receiver about the size of a lunch box, one that you could plug into any 110 volt A.C. or D.C. lamp-socket? Here's just the set, and tests showed that it has very smooth tuning qualities. It uses a 6F7 as detector and A.F. amplifier, with a 37 as a rectifier.

In this receiver, Mr. Mitchell makes "two tubes do the work of three"—without reflexion! The 110-volt line current supplies the plate potential.

"AN economical set"—a phrase that has been used and misused, many many times in the description of shortwave radio sets. The writer believes that this phrase should be used only with a receiver that is economical in every respect. By this is meant a set that is inexpensive to build, inexpensive to outfit with tubes and last but not least, inexpensive to operate. With all this in mind the "Two-Tube Wave-Master" was designed. The parts although of the best possible makes were chosen with the pocketbook in mind and should not cost over seven or eight dollars.

The set uses but two tubes, one 6F7 and one 37, both of them being of the 6.3 volt variety. The heater current drawn is only .3 amperes thereby making them ideal for use in the series heater arrangement of the Cinem A.C.-D.C. circuit. (Pat. App. Serial No. 592,586.) This circuit is a real break for the "S.W." Fan who does not have the necessary cash for a power transformer.

The first of these tubes that we will discuss is the 6F7. This tube through its versatility is used as a screen-grid regenerative detector and a resistance-coupled audio stage. The 6F7 is a tube consisting of two individual units, a pentode unit and a triode unit, both contained in the single bulb and built around a common cathode. The tube has a small seven-prong base and a cap connection for the pentode control grid. The 37 is a general purpose triode of the heater-cathode type. It is used as a half-wave rectifier in this circuit and as most every fan has used one before, we will not dwell on it.

Now that we know what's in the set—let's build it.

(Continued on page 235)
How I Brought The 5-

By CLIFFORD E. DENTON

The problem of building 5 meter short-wave receivers has received considerable attention of late from set designers. The circuit to be described is exceptionally simple and after many tests in the field has proven its ability to satisfy the most exacting demand for this type of reception.

The Circuit

An analysis of the circuit diagram shows that two tubes are used. The first tube combines the function of the regenerative detector and the local quenching frequency generator. This is a modification of the popular electron-coupled circuit so widely employed in short-wave regenerative receivers. The output of this first 56 tube is resistance-coupled to the 56 audio tube, which of course, can be connected to a pair of earphones or to the input of an audio amplifier if further amplification is desired. The combination regeneration and quenching frequency control consists of a 100,000 ohm potentiometer connected between the plate voltage lead of 100 volts and the ground. The quenching frequency in this receiver will be around 14,000 to 15,000 cycles, dependent upon the accuracy of the 2½ millihenry choke and the .004 mf. condenser connected between the plate coupling (.1 megohm) resistor and the cathode of the first 56 type tube. This condenser and the 2½ millihenry choke coil form a series resonant circuit and except for the effect of the plate coupling resistor and of the grid-leak and condenser their constants will determine the quenching frequency.

It is interesting to note that the main tuning condenser bridges from the grid to the plate circuit and that a positive potential is applied to the grid of the first 56. Of course, this potential is applied through the 2 megohm grid-leak, which shunts the 56 detector circuit grid-condenser. Any current drawn by the grid in this condition will cause a voltage drop across the 2 megohm grid-leak, thus there will be a very small positive charge on this grid. Suffice it to say that this point is quite contrary to the ordinary circuit operating condition, and while many students of the subject may conclude that this would not be satisfactory for really good operation, a few tests, even in bread-board style, will show that this circuit is capable of exceptionally smooth results. This receiver has been tested out on many types of antennas, all of which seem to prove satisfactory; in fact, everything from a 12-ft. wire inside the room of an apartment house, to a 100-ft. antenna stretched out high above the roof and free and clear works well.

Duplex Communication

In every instance the receiver performed satisfactorily and in many cases duplex communication was held on 5 meters with this receiver, in a manner that highly pleased those amateurs who were permitted to use it. The antenna is

The 5-meter field is expanding rapidly as improved transmitters and receivers are being designed to facilitate the tuning of these extra low-wave stations. Both picture and schematic diagrams are given above for the Improved 5-Meter "Bear-Cat."
Meter "Bear-Cat" Up-To-Date

Here is one of the simplest imaginable 5-meter super-regenerative receivers. The author carried out a large number of experiments with this receiver and satisfied himself that it was a really "smooth-working" job before he offered to describe it to the readers of SHORT WAVE CRAFT. The set is easy to build and inexpensive so far as the cost of materials is concerned. Only two tubes are used and instructions for operating the receiver are given. It uses 2—2.5 Vt. A.C. or 2—6.3 Vt. A.C. or D.C. tubes.

Coupled to the main tuning coil, that is, to the small series antenna condenser, which consisted of a piece of bus bar or No. 18 tinned copper wire, around which No. 19 push back wire was wrapped three times, with the insulation of the wire serving as a dielectric and with a total capacity of a few micromicrofarads.

It is absolutely imperative that the main tuning condenser be operated from an insulated shaft, and also insulated from the hand, to prevent short-circuits to the ground and also to minimize hand-capacity effects which would be present under ordinary conditions. In this circuit, by ground we mean the aluminum case, as no regular ground can be made to the chassis, as it consists of a piece of wood cut to fit inside the aluminum box. The grid coil consists of 10 turns of No. 18 enameled wire wound on a diameter of 1/4 inch and supported in the air. The plate coupling tap, if it may be called that, is made 3½ turns from the plate end of the coil. The audio stage is very conventional and of course

(Continued on page 240)

An Ultra Short-Wave Transmitter

**FIGURE ONE** shows a very simple construction for an ultra short-wave transmitter. The tube is mounted between the choke coils upside down in order to have the connections to the grid and to the plate as short as possible. The midget condenser of about 15-20 mmf. which controls the wavelength is connected across the oscillator coil and is clearly seen on the photograph. Fig. 2 gives the diagram of the circuit, an ordinary 3-point oscillator. For this transmitter a power output tube (type 45 or 71) is used. A by-pass condenser of .05 mf. is connected across the filament to protect it from accidental voltage surges, which during the previous tests destroyed one of the tubes. The modulation is performed in the plate circuit, but without the aid of a special modulator tube. For this purpose an A.F. push-pull transformer is used, of which the secondary is connected in the plate circuit. One of the primaries is operated from a buzzer, while the other primary is connected to the output ends of a 2-stage audio amplifier, in order to also enable telephony transmission. The plate tension of 200 volts is supplied from the D.C. line. However, satisfactory results can be obtained with 150 volts from batteries.

We gave a description of the transmitter without mentioning its faults. The main trouble lies in the unsteadiness of the wavelength, a fact which makes impossible a more or less accurate work. We observed also a variation of the loudness, which cannot be explained here by the phenomenon of fading. These faults are almost completely eliminated with the construction of a push-pull transmitter, a type which is used by the majority of the American

(Continued on page 242)
The "**Mono-Coil 2**"

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**It Eliminates**

plugged into the socket and four more soldered connections to the terminals of the socket. Quite a few weak points for only one part of a set, and the most important part at that! As for the inconvenient part of it, little need be said; even plugging them in through the front of the panel doesn't help so very much. The idea of using plug-in coils is so deeply rooted in the minds of the short-wave public, that manufacturers hesitate to bring out something new for fear that it will be a general "hit." However, some of them have made an attempt at it and "hats off" to them for their courage. Nevertheless there is still plenty of room for improvement and probably will be for many "noons" to come.

A Receiver to Cover the S-W "Broadcast" Bands

The short-wave programs broadcast from foreign countries hold the most interest among the short-wave "Fans." Few other than regular Amateurs or "Hams" are interested in the so-called code or "Ham Bands." Set manufacturers have realized this and are now making "all-wave" sets covering only the international broadcast channels. This is a very wise move and it will only be a short time when the general public will learn that what goes on in the private channels such as the telephone, police and airplane channels is none of their business, even if it has to be called to their attention by legislation. Some of us have attempted to build our sets to have maximum efficiency on those frequencies that are intended for our enjoyment and keep our "wash" on our own "clothes-line"?

It sure is a joke, when one stops to consider a moment, that in order to cover the entire short-wave spectrum, we have built our sets after a fashion that spoils the most interesting part of the game that is, the international broadcast channels, by jamming them into a couple of points on the dial. That's our price for not minding our own affairs—seems foolish, doesn't it?

How Single Coil Was Developed

After many months of hard work on fancy band-switching arrangements, the writer stands ready to take back any that he may have said about plug-in coils being the only thing to use in short-wave sets; and sadly admits possessing a "one-track" mind. The coil used in the set shown in the photographs took a long time to develop because it is so very simple. After wasting many switches and miles of wire, the light began to dawn and the simple and most efficient assembly came into being. It is a well known fact that a sectional coil with taps, if constructed properly, can be made to work just as efficiently as separate coils. The problem has always been to obtain smooth regeneration in a detector using this method.

A single tickler winding can be made to produce oscillation over a fairly great frequency range, but it will not allow a very high degree of sensitivity or rather, an equal degree of sensitivity on both ends of the tuning range of the coil. A tapped tickler can be used but this necessitates the use of a two-gang switching arrangement. In fact, if a two-gang switch were used, individual coils and forms could be used and probably work out as well as the system used in this receiver. But we don't want separate coils—we had that in "plug-ins."

The final point of attack was to build a coil, having taps, as efficiently as possible with a single moving contactor and worry about regeneration later. The coil was wound on a one-inch diameter bakelite tube, three inches in length. The winding consisted of three sections with two taps brought out so that two of the sections could be "shorted" out. With the proper number of turns and the correct spacing between the sections, this coil when tuned with a 25 mmf. (.00025 m.f.) variable condenser, had a tuning range of from 16 to 56 meters. It was necessary to use close-wound coils (no spacing between turns), in order to have the fields of the windings as small as possible, to prevent losses due to the...
At last—a real solution to the problem of "how to eliminate plug-in coils" is here offered by Mr. Shuart. The "Mono-Coil 2" is a 2-tube receiver which will cost only a nominal amount to build; it covers the short-wave "broadcast" bands, 19-25, 25-38, and the 49 meter channels by merely turning a switch. The benefits of "band-spread" are included! Uses 2.5 Vt. or 6.3 Vt. tubes.

"Plug-In" Coils Efficiently

By GEORGE W. SHUART, W2AMN

NO MORE PLUG-IN COILS!!

The "plug-in" coil has been a sore spot in the realm of short-wave receivers for a long time—at last this great "bugaboo" of pulling out and pushing in short-wave coils has been wiped out by a single stroke of masterly genius—thanks to the extensive researches of George W. Shuart, who here describes the "Mono-Coil," which permits changing of bands even more efficiently than by the use of plug-in coils! Only one very simple single-pole switch is required for changing the bands with the "Mono-Coil"; and the beauty of it is that this coil lends itself particularly well to "T.R.F." and "Superhet" receivers, all the switching being done with one single knob. The "T.R.F." Mono-Coil receiver will be described in the Next Issue! Don't miss it!

Schematic and picture diagrams which will enable even the "beginner" to build the "MONO-COIL 2" short-wave receiver are given above. This set is particularly designed for the short-wave "FAN," who wishes to listen to the European and other "foreign" and domestic musical and vocal programs broadcast daily.
How To Build A Simple Booster

By GEORGE W. SHUART, W2AMN

Every dyed-in-the-wool short-wave "Fan" wants to build an R.F. Booster, which will amplify those extremely weak distant stations. Here is a "corking" single-stage R.F. booster of unusually fine design and low initial cost. It works on 110 Volts A.C. or D.C.

- THERE is nothing more annoying than receiving a station just a little too weak to enjoy. Many of our readers have asked us to describe a simple and inexpensive booster stage, one which can be added to any type of short-wave receiver from a one-tube battery set to a multi-tube superheterodyne.

The booster shown in the photographs is the answer to their request and it sure is a "life-saver" when it comes to those hard-to-get stations. It is a decided benefit to those living in poor locations where the back-ground noise is high and the average station is none too strong. While selectivity is not materially in-

creased with a tuned R.F. stage, there is a decided increase in over-all signal strength and the signal-to-noise ratio is slightly better than without the benefits of a "preamplifier".

"A.C.-D.C." Circuit Used

It was decided to make this booster an "all-electric" affair, which could be operated from either A.C. or D.C. house mains, bearing in mind that about ninety per cent of the S.W fans live in homes having 110 volt lighting systems. This, of course, does not mean that the booster can't be built for battery operation. The same circuit can be used on batteries by just disregarding the rectifier and filter parts in the diagrams. A 6-volt battery is then needed for the filament supply and 90 volts of "B" batteries to furnish the plate voltage.

The chassis used to build up this amplifier is larger than necessary and some folks may wonder at the use of a precision dial being used. The whole story is that the chassis is to be used for another set and it was a pure economic move. The builder can use any convenient size chassis and the entire unit can even be mounted on a wood base-board.
My Idea of A Good Battery All-Wave Portable

By MANDER BARNETT, England

Specifications for a very "smooth-working" little receiver suitable for portable headphone reception, using a 32 type tube as the detector, and a 30 tube as the A.F. amplifier. This set is especially designed for battery operation, thus making it thoroughly portable and independent of electric line current supply. The "A" battery comprises two 1.5 volt dry cells and the "B" supply requires either one or two 45-volt batteries.

- THERE are many good reasons why a portable short-wave receiver should be an attractive proposition and it is rather a pity in some respects that more attention is not given to the development of this type of receiver. The particular set to be described here is a portable receiver of the semi-midget class, covering all waves from about 14 to 550 meters and producing really good headphone reception from short wave stations all over the world. It is not so small as some A.C. midget receivers, chiefly owing to the necessity of including batteries for A, B, and C supplies in the same case but on the other hand, it is not too large for portable use and won't take up much extra space when packing your baggage for the summer trip to the mountains. Even if you're not considering a trip to the wilds this summer, a set of this type will be very handy for semi-permanent use and makes a good auxiliary receiver for use where there isn't room for a twelve or fourteen tube super-boostadynes. As this portable was designed to be really serviceable, it was not considered worth while to cramp matters very much in the way of battery supplies, such as could be done by using perhaps about 20 volts B supply consisting of midget cells. Receivers of this type can be perfectly successful but their use is limited and this receiver was required to stand up to fairly heavy use and receive distant foreign stations with as much punch as possible. Needless to say, it is exceedingly sensitive and easy to handle and with a normal antenna will bring in many short wave stations at good headphone strength, whilst the writer, using the set in England has heard good signals from W8XK in Pittsburgh, using only about two feet of antenna wire. Now some of the technical data: It was a wise gentleman who said that a radio receiver was no better than its tubes and the tubes for this receiver were carefully chosen to produce the best possible results, combined with economy of battery consumption, particularly in the case of the filament supply, and for these reasons a type 33 was chosen for the detector tube, followed by a single 30 output tube. In a receiver of this size and type a power tube such as the 31 is unnecessarily for output purposes and whilst advantages could be gained by using a pentode output of the 33 type, the filament consumption would be greatly increased, thus reducing the service life of the A battery, the total drain on which, when using the above tubes, amounts to only 0.12 ampere. The total anode (plate) consumption is between three and four milliamperes so that a small capacity battery will give very good service with this receiver. A 60-volt battery was used as this is the standard European size of small B battery but tests were made to settle the fact that the receiver would work perfectly well with a 45-volt battery so that an American battery of this type can be used perfectly well. The filament battery consists of a small two-cell dry battery, giving 3 volts when new, whilst the C battery is a single 1.5 volt dry cell which is mounted permanently under the chassis. Two 45-volt blocks could be used if preferred, in which case a 4.5 volt C battery would be necessary and as there is hardly room for this under the chassis, extra leads would have to be taken from the chassis and the C battery placed alongside the other batteries.

The regeneration control on this receiver is really smooth and is smooth on all the short wave bands, this is due partly to the potentiometer control used and partly to the method of biasing the input grid of the 32 tube. Instead of using a variable potentiometer to provide the correct bias, the grid leak is taken to the centre point between two resistors, R2 and R3, both of which are of identical value. Their actual value is not important so long as they are identical and are of a size which will produce a negligible drain on the filament battery. For convenience's sake, the two resistors actually used have a value of 500 ohms each. Without this arrangement, that is, by taking the leak (Continued on page 245)

A very neat job indeed, Mr. Barnett, and we are sure that this 2-tube portable battery receiver will make a host of friends for you.

Here is the chassis of Mr. Barnett's well-designed 2-tube battery type receiver, which is intended for headphone reception.

As the diagram indicates the regeneration control on this 2-tube receiver is so arranged as to provide maximum smoothness in adjusting the set to its highest sensitivity.

www.americanradiohistory.com
New Small Size Tubes

- IN AN advance release to this magazine, the Maranophone Co., Ltd., has just announced a new type of tube of a very small size. At present two types of these tubes are made, both triodes, one with a higher mutual conductance than the other.

- The applications of these small tubes should be numerous as they are also economical in battery consumption. They operate at 1 volt and require 0.1 ampere to heat the filament.

- Extremely small portable receivers, deaf aids and other devices are possible by the application of these tubes. Portable transmitters and receivers for personal use, such as police personal units could be made both light and small in size by their application. A photograph of one of the new British tubes is shown here.

All-Wave Switching Scheme

- IN A recent issue of Funk-Technische Monatshefte, a German magazine published in Berlin, a novel arrangement for switching from one waveband to another was described. While this scheme is not entirely new, it is probably novel to many readers of this column.

- As most of the short-wave broadcasting stations operate within a certain frequency band, most of these can be covered by one set of well-designed coils. It is well known that the switches used in all-wave sets introduce some loss, especially if numerous sections and circuits are changed to accommodate four or five wave bands.

- The small size of these diminutive triodes is evident. Note 230 at the left.

The Octode Tube

- IN A recent issue of Toutte Le Radio, a newswoman in the French Radio publishing field, an interesting tube was described. This tube is called the "octode" because of the number of elements (8) contained within its glass envelope.

- The octode is similar in purpose to those friends of American short-wave "fans"—the 6A7 and 2A3. In other words it is an electron-coupled converter tube. However, it differs in one important respect from these two tubes. It contains one more grid which is internally connected to the cathode, and acts as a suppressor for the screen-grid section of the tube, thus making it an R.F. pentode.

- From the short-wave angle, this is most important, as the pentagrid converter tubes are not particularly effective on very high frequencies. The new French tube is efficient on frequencies as high as 43,000 kc. (7 meters.)
An Australian Single-Signal Set

Perhaps one of the greatest problems of amateur radio today is that of interference. The narrow channels allotted to amateurs have complicated the situation considerably and have necessitated large improvements in transmitter and receiver design.

In C.W. reception with an Audion type receiver, identical beat notes are obtained from two signals of different frequency, one beat note frequency higher than the local oscillator and the other beat note lower. It can be seen that a considerable amount of interference can take place from other undesired signals that may be several kilocycles away from the desired signal frequency. This type of interference is eliminated, together with quite a lot of noise and other interference, by the use of a single-signal superhet. This receiver is similar to the usual superhet, but has the addition of either a piezo-electric quartz filter or regeneration in the I.F. amplifier to give high selectivity. The separate band oscillator gives an audio beat note for C.W. reception; it being tuned to a frequency suitably different from the intermediate frequency.

In a recent issue of Australian Radio News, an interesting receiver of the above type was described. It is much simpler in construction and design than previous types.

Pentagrid Converter Data

A copy of World Radio lately, we noticed some notes on the use of pentagrid converter tubes for short-wave use. One of the outstanding facts presented was a means of compensating for the loss of oscillation on the smallest coil. This is an effect that has been noticed by many fans who find this type of tube otherwise superior to the use of a separate oscillator and first detector. (The 2A7 and 6A7 are the American tube numbers.)

Apparently the European fans have encountered a similar trouble with their pentagrid tubes.

The solution to the problem was found in the addition of a triode tube connected in parallel with the triode section of the converter tube, but with a switch in the filament circuit of the external tube so that it could be turned on or off at will. Then by the addition of a separate section on the variable switch, or by manual control, this tube can be tuned on for the highest frequency coil. The external triode tube increases the mutual conductance of the triode portion of the converter tube which increases the tendency to oscillate.

What Is 00.00 O’Clock?

The British Broadcasting Company, with several other commercial organizations in Europe, are adopting the twenty-four-hour method of time notation. For the benefit of American readers, we are illustrating a twenty-four-hour clock and a suitable time-conversion table, which will enable the American Short-Wave "Fan" to thoroughly familiarize himself with the new

The triode VI, permits oscillation on high frequencies.

The circuit of the Australian single-signal superhet.

The layout of parts for the set. Note the neat arrangement of the parts; also the carefully designed shielding: a very important feature in such a complicated set as this.

NEW 24 HOUR CLOCK

New double-numbered English clock dial which enables one to read the time by the 12 or 24-hour system.
Short Wave Scout News

Report from Official Listening Post of Heinie Johnson, Big Springs, Texas

(Winner of 1st Short Wave Scout Trophy)

- PERHAPS you are tiring of tuning for a certain station at a certain hour because that station is listed and you find that station listed as being on the air at that certain hour. After tuning awhile you decide either you have lost it or that you are tuned to someone's "list," (it's an unpleasant feeling and doesn't help make a good short-wave "fan" of you, and it would be much better for you try to turn your attention to a study of "world" time-tables and figure out what peculiarities of distance between set and location of the station you are trying to hear is in darkness and what prevent interesting light, as well as which of the space in question is in daylight. Then consider the fact that signals between 19 and 25 meters are fading at the world easily providing daylight is encountered all along the route, while those from 50 to 50 meters will do the same thing under a condition of fading which allows darkness to be heard even along the path of the carrier. And don't forget the fact that people of all nationalities sleep at night, and must therefore either be tuned to the early evening hours, their time. The exceptions are those big stations which put on special short-wave programs (100-watt purpose). Study of the above rules will reveal that you and I who listen "here in America" should hear European stations on 19 meters (9:30 C.S.T), to 9:00 a.m. and at which hour signal strength is as is ever possible during the 24-hour-day and this will prove true. We will, at that hour, have no trouble hearing DX, GSF, and FUA— all good.

In Europe, GSF is the best signal, while FUA will be the weakest. It will require a big map and some study to show you why, but in which I shall not be able to due to the above mentioned rules.

Here in Texas, and I don't see why it wouldn't be true anywhere on this continent during the summer, the best hour to hear the Japanese signal on 38 meters is now 3:20 a.m. EST. This is a signal very clear at that time and is good until around 5 a.m. C.S.T. or 6 a.m., E.S.T.

On the other hand, it begins to weaken here at about 1 a.m. and listeners in central states will do well to drop off listening then and try for the big Chinese station on 40 or 50 meters.

This signal, when working, which is ir-regularly and very loud for a long time until the time of sunrise at your location. Their programs are well arranged and very interesting, indeed, which makes them well worth tuning for, over a period of several mornings— if necessary.

Six months ago V2ME was best early Sunday morning—say 6 a.m., C.S.T. Now they are best from 12:30 to 1:30 a.m. I have heard them, at this season, better at the above mentioned time than at any hour in any other place.

The League of Nations station on 38 meters is neatly fine right now. This signal can probably be heard Saturday afternoons at 4:50 to 5:50 at this location.

I believe they come on the air a little earlier in C.S.T., but, we have no luck until that time—then they come with a bang. They only operate on Saturday.

All Mexican stations on 40-meter signals are carrying below the noise level—very poor listening is the result and will continue until late fall. This is also true of the Santo Domingo signals.

Notable exceptions are HJ1AIAB, HIX, and H2AIAB which are on 20 meters and nearly YV3RC, but they have recently changed call letters.

One in the L. J. and D. J. in Sao Paulo, Brazil, operating on 36 meters around 5 p.m., C.S.T., is, of course, about perfect right now for central states listeners.

DLC on 49 meters is heard almost every evening after 8:30, C.S.T.

GMX, Winnipeg, Can., Saturday 26, 10 p.m., 25,521 (11-45 p.m.) and 48,755 meters.

We have veri from XKB, Mexico City, Mex. They do not set the tone on air or wave-lengths, I heard them on 49,755 meters (approx many times) report sent around May 10; best between 5 and 10:30 p.m., E.S.T.

I think I have cornered ZTJ (Johannes- burg, South Africa, 49,602 kc), but I am afraid for waiting for my veri. my time as here given is all E.S.T. (Eastern Standard Time). I am not going on using that 200 feet fast low (15-50 ft, high) aerial outside. I also have a 20 ft, inside—25 ft. outside aerial. May 20, 2900 p.m. Transmission from U.S.S. California on 43 meters (about) sending fine programs to New York. Also testing from Rocky Point L. I. R9, OSAM later Rocky Point and U.S.S. Saratoga testing and testing: 43 meters also.

U.S.S. California was shown southeast of New York, just near Cape Hatteras.

FH1 is good 16.5 meters. Mornings also GSG—GSG fine around noon; France, Germany, England, very good evenings on 45 meters. I expect more veris soon but next report will be sent about June 27.

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

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have plenty of harmonies here. I am "gun-
ning" for Norway and other elusive S.W.
stations. GSH is grand after midnight-
5MF, also—31.250 meters.

(We are working on a list of the chime
and bell signals used by the various Short-
wave "broadcasting" stations and hope to pre-
vent this in the next issue—Editor)

News from Chas. Guadagnino's
Spots, Detroit, Mich.

(Winner of 3rd Scout "Funky")

RECEPTION on short-wave for May is
then been fair, with some fading. Heard the
following:

LIS, Buenos Aires—on 15.5 meters, test-
ing between 10-60 and 3:00 p.m., E.S.T. This
is a new station in Argentina.

PSK, Rio de Janeiro, on 36.5 meters, is
still relaying programs of PR.33. This sta-
tion is irregular.

TDJ, Zeessen, Germany—10.7 meters—
6:30 to 7:00 p.m.

TDJ, Zeessen, Germany—25.5 meters—
8:00 to 11:00 p.m.

DS—Zeessen, Germany—49.8 meters—
8:00 to 11:00 p.m.

1RM—Rome, Italy—30.5 meters—3:00 p.m.
to 4:00 p.m., E.S.T. This station has been re-
laying 12IO.

EAF—Madrid, Spain—30.4 meters—5:10 p.m.
to 7:00 p.m., E.S.T. This station has been re-
laying 12IO.

JVT—Japan—10.9 meters—6:00 p.m.; JYK—
Japan—22 meters—6:00 p.m. Testing with
"broadcasting" signals. These Japanese sta-
tions are "new" ones.

HJ2AI—Ceuta, Colombia—50.2 meters
On daily from 6:00 a.m. to 9:00 p.m., E.S.T.

HJ1AIAB—Barranquilla, Colombia—45.5
meters on daily from 6:00 a.m. to 9:00 p.m.,
E.S.T.

VK3MF—Melbourne, Australia—31.5
meters. Wed., 5:00 a.m. to 6:30 a.m., Satu-
day, 7:00 a.m. to 7:30 a.m. Very good late-
ly E to 8.

GSE on 25.2 meters—8:45 a.m. to 11:00
a.m.

GSD on 25.5 meters—1:00 p.m. to 5:30
p.m.

GHR on 31.5 meters—1:00 p.m. to 5:30
p.m.

This is my "listening post" report for May 15 days of May.

Hope to have a better report of "foreign" sta-
tions next month.

Report from Fred Bente, Brook-
lyn, N. Y.

(Winner of 4th Scout "Frohpy")

Report for this season is nil as I have
taken up summer residence and have not
used the set regularly this month. In re-
sponse to my "request" for弥米 stations.
I cannot give the scale notes used just yet, only the type or kind of

German station is unknown.
The notes are a few bars taken from an old German folk tune, as played by the chimes of the
Garrison Church at Potsdam, in which lies
the tomb of Frederick the Great.

England uses the chimes of "Big Ben":

lines.

With this, regards.

4—VY3BU, Venezuela. Plays bells on the
5—PSK, Brazil. Plays chimes when

5H4AIAB, Meole, Colombia. Plays
bells.

7—G3X, Guatemala. Plays a two-tone
high frequency signal.

8—Station in Ecuador. Plays chimes
throughout the whole program.

Hub City S.W. League
At last we are getting the equipment to
build a S.W. receiver for the club, so as we
are now going to have to circuit we intend to
use, I will not go into the receiver until
next report.

We have a good "club library" now. I can
assure you that I will try and do my
best to send reports in once a month.

M. E. PIFF
Secretary, Hub City S.W. League,
521 Ninth Street.
Saskatoon, Sask., Canada.
Sixth "Trophy Cup" Winner—Edward M. Heiser, Brecksville, Ohio

MORE honors for the "home-built" short-wave receivers—Edward M. Heiser, the winner of the Sixth Trophy in the Contest ending June 1, rolled up his high winning score of 78 short-wave stations with the required number of verifications, all on a "home-built" set. Mr. Heiser used the hook-up of the Tetradyne H-2. We take pleasure in congratulating Mr. Heiser on his very fine list of 78 short-wave stations heard over a thirty day period, and also wish to compliment him especially for the very neat style in which he prepared his list of stations.

We are still receiving quite a number of inquiries from readers asking if the list of stations submitted in the contest has to be for the 30-day period immediately preceding the closing date. As we have clearly explained several times in the past, the list of stations submitted may be for any 30-day period, which gives the contestant plenty of opportunity to obtain his verification cards from the foreign stations. Another point the judges wish to mention is that in any case, it is always the best practice to submit the verification cards, together with the list of stations, oath, and letter, etc., all at the same time and not to attempt sending in a list of stations with various bunches of "veris" stringing out along over a month or so. The editors are too busy to keep track of all of these "veris" sent in such spasmodic fashion, and it would require the services of a special clerk to take care of them. Another question that has been asked many times recently is whether or not "old veris" can be submitted; it should be evident that the "veris" submitted should, of course, be those obtained after writing to the stations heard during the 30 day period over which the list is being compiled. Other queries are concerned with the point that the matter of the 30 day period, whether they can run from the first to the last of the month, or if they can run from the 15th of one month to the 15th of the next, etc. This is OK, and the judges do not care what dates the 30 day period is for, and in any case the opening and closing dates of the 30 day listening period should be stated at the head of the list of stations; also arrange the verified and unverified stations in separate lists.

Mr. Heiser's Letter Accompanying His List of Stations Submitted in May Contest

Editor, SHORT WAVE SCOUT AWARD:
Enclosed find my list of stations, together with the verifications and notarized statement. There are many verifications which I have not received yet as it takes a long time to receive a reply from some stations. The set I am using is the Tetradyne H-2 which was described in Radio-Craft. I have made several changes in the set and it has working fine.

I am using a 4-wedge wire aerial, 30 feet long, strung in the attic with a 30-foot drop to the set for the lead-in.

I wrote a letter to Radio-Craft describing the results I had with it (which was published in Radio-Craft).

I am now able to tune down to 16 meters.

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

Verified Short-Wave Log—This is Given as Eastern Standard
EAX—24:05: Radio Difusora Artistica, A. P. O. Box 951, Peliago, 2 Madrid, Spain. Steadfast on air.

Short Wave Craft

HONORABLE MENTION AWARDS

Samuel J. Emerson, 1097 Galewood Drive, N. E., Cleveland, Ohio. 608; 37V.
R. Alea Valbuena, Laceret baja 55, Santiago de Cuba. 488; 29V.
Albert E. Emerson, 1049 E. 147th St., Cleveland, Ohio. 288; 14V.
L. O. Lindbergh, 1221 Mountain St., Montréal, P. Q., Canada. 368; 19V.

S—Total number of stations submitted.
V—Total number of verifications submitted.

For his contribution toward the advancement of the art of Radio

HJII—46:35: La Voix de Barranquilla, E. J. Peltier, P. O. Box 715, Barranquilla, Colombia, S. A. Coffee of the tropics.
YV3HC—35:78: Radio Difusora, Venezuela, Caracas, Venezuela, S. A.
HC2RL—5:00: Station HC2RL, P. O. Box 709, Guayaquil, Ecuador.
S—On Lake Granada.
PSK—36:65: Radio Club of Brazil, Rio de Janeiro, Brazil, S. A.
Y89PL—4:92: Cuban Tel. & Telegraph Co., P. O. Box 98, Havana, Cuba. Give call in English.

(Continued on page 243)
A Real High-Powered “Ham” Station

"Prize-winning" station photo awarded one-year's subscription to SHORT WAVE CRAFT.

Chauncey R. Moore, W3DJ, of Oneonta, N. Y., is the proud owner of this particularly fine transmitting and receiving station. The transmitter is rated at approximately one kilowatt and the receiving equipment includes a National FBXA receiver.

- 80 rectifier, a 500 volt supply on the 24G doubler and buffer stages using 2SI's as rectifiers, on the W.E. 212-A buffer stage is an 800 volt supply using 2-86G's as rectifiers and on the S22 buffer and final stage there is a 5 k.w. 2300 volt supply, using four 86G-A's in bridge rectification. G.E. oil tank filter condensers are used throughout for filters except on the oscillator stage. The frequencies mostly used are 3,530, 3,630 and 7,060 kc. We will be "working" on the 40 meter band mostly this summer but are planning to work on 15 meter phone the coming Fall and Winter.

WSDJ is a member of the ARRL, and TSNR and an ORS. We are always glad to QSP, and "chew the rag."

The bottom shelf contains the high-voltage power supply, the second shelf the 247 crystal oscillator, 246 doubler, 246 buffer and power supply for the oscillator and buffer; the third shelf contains the W.E. 242-A buffer and S52 buffer and power-supply for the 242 and the last shelf the two 204-A in push-pull as the final. On the top of the rack is the antenna tuning condenser and harmonic suppressors. All of the parts of the receivers and typewriter are the two receivers and typewriter.

Chauncey R. Moore, W3DJ, 11 Hazel St., Oneonta, N. Y.

(Hotchk! Chauncey—what a “ham” station! With a powerful "set-up" like yours, one could have an elegant time any rainy Sunday, calling up "the rest of the world." —Editor)

A "Hot" SWL Station

Editor, SHORT WAVE CRAFT:

I have wanted to answer your request for pictures for quite a while, so I finally decided to send you a picture of my listening station here.

The receiver is a Pilot Universal Super Wasp, with which you may be more or less familiar and it operates through a nine-inch dynamic speaker which is set in a tapestry covered Celotex baffle, which may be seen at the end of the receiver nearest the windows.

Many short-wave broadcast and amateur stations, both home and abroad, are heard very well from all parts of the world with this receiver. My antenna is a Lynch "Doublit" type antenna, with the regular tuned-in lead-in, and it is strung from two 20 foot steel masts, one on each end of the roof of the house. I have built several of the receivers described in your magazine, one of them the "A.C. Band-Spreader 2" by George W. Stuart in the February, 1933 issue, which gave me excellent results prior to my purchasing my present receiver. Many countries are represented in my QSL collection, some of which may be seen in the picture. I will appreciate any correspondence from amateurs or SWL's from any QRA, and I will glad to send you a copy of the "rig" here with anyone who wishes to do so.

I will now say 73 and may SHORT WAVE CRAFT enjoy future success.

Emile A. Bérube, 51 West St., Lawrence, Mass.

(Congratulations, Emile, on your success in building and operating the "A.C. Band-Spreader 2" and also on your excellent log established with the Pilot receiver.—Editor)
Long Raves...

Our Sets “Work”!

Editor, Short Wave Craft:

I have been a reader of Short Wave Craft for some time and have promised myself I would send a photograph for publication. So here it is.

I can’t do any brazing about the layout—but boy! does it work! Well, I’ll tell the world!

On the right, built on top of a “II” eliminator in your 10-meter rig, using one No. 10 tube, which was described in one of your recent issues: a single button carbon microphone.

On the left, is your “station inhaler,” known as the “Globe Trotter” receiver. I have heard stations all over the United States, Canada, Europe, all of Europe and I can say that’s something! Hi! On the top of the “Globe Trotter” receiver is a small oscillator described by your magazine in another issue. Best 75, and give us some more articles such as we have been getting.

Edgar S. Butcher, Box 54, North Windham, Conn.

(Well, you certainly have been busy, Edgar, and we are glad to know that you have found the sets described in our articles satisfactory.—Editor)

Oh! Lookie! Here’s “Ham’s Heaven”!

For the love of Mike—will you look at this station, W1IAD, way up in Skowhegan, Maine! Who couldn’t enjoy themselves in such a station! The proud owner and operator is Howard E. Cook.

Oliver Amlie—A Well-Known “DX-er”

Oliver Amlie, well-known to readers of this magazine as the designer of a popular 4-tube receiver, used the “Amite DX-er,” Oliver “wirles” the dials and Boy! Do those “DX” stations roll in!

Switches which throw from one set to the other; in this way I just need one storage battery for both sets. I have used this method also for the Amite DX-er which was published in the May issue, 1932, of Short Wave Craft. When the set is used, the charger is off; when the set is not used, the charger goes to work. Only twice a year do I have to replace storage battery with water.

I have received 33 S.W. stations on a test of 12 days, 23 of them “Foreign” stations. Here’s what we do; where I am seen sitting in the photo, we tune a good program of orchestra music at 7:30 P.M. from GSA; at 1:00 P.M. we hear a concert program from GAC; at 6 to 8 P.M. we hear a good

Program on GSA; of course we cannot miss BIG BEN and the news at 7:45 P.M. Signal strength is perfect from 7:30 A.M. up to closing down of the British programs at 8 P.M. All reception is heard like “sound” on this receiver, I personally invite any reader of Short Wave Craft to come up and hear this world-beater; when I “double-batch” the R.F. tube on this receiver, you should just hear it.

(Continued on page 233)
The 4-Tube Short-Wave “Space-Explorer”  
By H. G. CISIN, M. E.

Here is a very attractive and economical loud-speaker set which uses but four tubes, including a 2SZ5 rectifier. The circuit comprises a tuned regenerative detector and two audio stages. The detector is a 6C6, the first audio tube, a type 37, and the A.F. output tube a 43. This set is designed for use on 110 volt A.C. or D.C. circuit. It is complete and needs no separate plate or “B” supply.

The Space-Explorer is a very sensitive short-wave set, capable of bringing in foreign stations with full loud speaker volume. In its initial tests, this set brought in Rome at about 10 A.M., London at 6 P.M. and Germany at 9 P.M., from a poor location in New York City. It employs standard four-prong plug-in coils, four being used to cover the band from 15 to 200 meters.

The Circuit

The circuit employed consists of a tuned regenerative detector stage and two audio stages. The new 6C6 tube makes a marvelous detector. A 37 tube serves as the first audio tube, while a 43 tube is used in the output stage. This combination seems to be just right for good short wave reception. The “hard-to-get” signals detected by the 6C6 tube, are amplified by the two audio stages to room volume.

The variable tuning condenser is a .00014 mf. Regeneration is controlled by the potentiometer at (7). The trimmer condenser at (1) gives antenna control to provide for varying length aerials and also is useful in helping to tune in weak signals. Another feature of the circuit is the use of a plate impedance at (11) in place of the usual resistor. This results in higher plate voltage and added sensitivity.

A.C. or D.C. 110 Vts. Can Be Used

The popular A.C.-D.C. circuit simplifies the construction by eliminating the power transformer. Furthermore, it makes the set more flexible, permitting operation interchangeably on alternating or direct current.

A 2SZ5 rectifier is used. The filaments of all four tubes are connected in series with a wire-wound resistor, which serves the purpose of bringing the voltage down to the correct values required by the tubes.

It will be noted that the filtering is more than adequate. The importance of this feature is immediately apparent to anyone who has tried to tune in a weak signal, only to lose it on account of hum from the power supply. The Space-Explorer is inexpensive, but nevertheless it brings in the distant stations as well as the higher priced short wave sets.

The Space-Explorer is easy to build, first because the circuit is simple, few parts being used; second because plenty of room is provided to mount the various components.

Construction Hints

The five sockets are mounted first, fastening the shield base at (6). Next, the twin binding posts are mounted on the rear chassis wall. The variable condenser (3) is mounted on top of the chassis at the right front. It need not be insulated from the chassis. The speaker is mounted on a wood panel, which also serves as a baffle. Of course, a hole is cut in the wood, slightly smaller in diameter than the cone of the speaker. Three ply veneer is suggested, with the wood stained oak or walnut. The combination potentiometer-switch may be mounted on a bracket or it may be fastened to the panel. The panel should not be fastened to the chassis until all the assembling and most of the wiring has been completed.

Parts (1), (11) and (27) are mounted on top of the chassis in the positions indicated on the top view. Then the chassis is turned upside down and resistor (29) is fastened to the inside rear chassis wall. The r.f. choke (10) and the electrolytic condensers (25) and (26) are fastened to the underside of the chassis; also the metal case condenser (4). The other small fixed resistors and condensers are soldered in place during the wiring process. For best and nearest results, push-back hookup wire should be used. The filament circuits should be wired first. Grids are wired next, then plates, cathodes, by-pass condensers, antenna circuit, etc. The ground binding post may be grounded to the chassis, but the chassis should not be depended upon for negative returns.

If trouble is experienced due to local interference, a noise-eliminating aerial lead-in system such as the Lynch will get rid of this trouble and permit the set to reach out and bring in plenty of foreign stations.
A 12-Tube S-W Receiver
By J. C. KELLEY

The trend of radio receiver design today is toward a larger number of tubes, greater selectivity and sensitivity, greater volume and the use of special purpose tubes, and last, but by no means least, complete control of sensitivity, volume control, and also tone control. During tests the receiver performed

(Continued on page 246)
The short-wave apparatus here shown has been carefully selected for description by the editors after a rigid investigation of its merits.

**What's New In Short-Wave Apparatus**

A Really Good "All-Wave" Midget That "Gets" Europe!

The new DeWald short and broadcast wave receiver, which on actual test by the editors, brought in English and other "foreign" musical and vocal programs in the heart of New York City, and in a steel frame building with only a short aerial. (No. 186.)

- A REALLY beautiful addition to any home is this modern 5-tube superheterodyne receiver, which has a frequency range from 540 to 1,000 kc. in order to cover the general broadcast band, and another range from 4,500 to 20,000 kc. to include all the prominent short-wave broadcast (music and speech) bands. It is housed in a beautiful two-toned cabinet of burled walnut and dark maple with marquetry inlay on the front panel. The special European type dial is so designed that a traveling light illuminates the particular numbers which indicate the setting of the condenser, and is arranged so that when the switch is thrown to the position which receives broadcast (200-550 meter) band stations, the light appears only in the top half of the dial. When thrown to the short-wave portion, the connected light only appears on the lower half of the scale.

- The tubes used in the receiver are: a 2A7 pentagrid converter, a 5A high gain intermediate frequency stage, a 57 second detector, and a 2A5 pentode audio amplifier, with a 280 as a full-wave rectifier to furnish the plate voltage for the various tubes. A full-sized dynamic speaker furnishes excellent tone quality with sufficient volume for the average home.

The schematic diagram shows the simple but very efficient, circuit used in this set and for those who are interested, the values of the various parts are given. The rear and front view photographs clearly show the general design of the set and its beautiful cabinet.

New National Cathode-Ray Oscilloscope

- THE cathode ray tube recently made available to the general public is one of the most interesting of the latest radio developments. This tube properly used will provide visual reproduction of the radiosignals. It is in this role that it is used in the National Cathode Ray Oscilloscope. When properly adjusted and coupled to some sort of receiver, the Oscilloscope will reproduce visually all sounds picked up by the receiver. In this way it is possible to cause percentages of modulation in phone transmitters and see whether or not your carrier is free from A.C. modulation due to imperfect power supplies, and numerous other interesting examinations of radio signals can be made.

- The cathode ray tube used in this instrument is an RCA-906 with the 1,000 volts being supplied by the 250 rectifier in the half-wave circuit. The tube elements of the cathode ray tube must be thoroughly shielded and a cylindrical electrostatic shield is provided and is mounted at the tube socket. The life of these tubes can safely be rated the same as ordinary receiving tubes at approximately 1,000 hours of normal use. The life of the tube, of course, will depend to a great extent upon the type of service it is called upon to perform. If the tube is subjected to overloads or if operated at improper settings of the focusing and brilliancy controls, the life will be materially shortened.

- The two knobs on the front of the Oscilloscope unit are used to adjust the size and brilliancy of the spot: a properly speaking, the clarity and brilliancy of the pattern. Of the two knobs on the right hand side of the cabinet, the lower is a switch and the upper is a potentiometer. The switch controls the horizontal sweep circuit and has two positions. When the switch pointer is toward the front of the unit, the horizontal deflection plates are connected to the two binding posts directly above. When the pointer is turned toward the rear, the 60-volt A.C. sweep is connected to the horizontal deflection plates, the external sweep being disconnected. The two binding posts at the rear on the right-hand side are connected (continued on page 250)

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

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[www.americanradiohistory.com](http://www.americanradiohistory.com)
THE Universal Mascot-2, while really a 2-tube receiver, actually gives a performance equal to three tubes. This is done by using the now famous 19 twin-triode tube as two stages of resistance-coupled audio, following a type 32 screen-grid detector tube.

Two other interesting features of this receiver are the coils which are of the plug-in variety and are designed to plug-in through the front panel, which is quite a convenient arrangement and should find favor among short-wave "fans" who do not like the old arrangement of reaching behind the panel for plug-in coils. The other feature is, that band-spread is available at any point within the tuning range of the receiver. The method of band-spread is the old-familiar arrangement where a very low capacity condenser is connected in parallel with the main tuning condenser, the large condenser serving as a band-setter or band-fader.

A glance at the photograph (EN.123) shows the universal Mascot 2 receiver to be the simplest, yet one of the most unique receivers of its type. (No. 199)

Below, wiring diagram for Universal Mascot 2, (No. 196)
Postal Deluxe Super-Converter

By S. MILLER *

The essential difference between this "Deluxe Converter" and the conventional type is that it performs three important functions, all of which are prime requisites for short wave reception on broadcast receivers.

A brief review of these functions will clearly indicate why this efficient device, and not the broadcast receiver is the determining factor in the overall performance of the combination.

The fixed tuned I.F. stage (545 kc.) employed in the "Deluxe Converter" is a feature of paramount importance for the following reasons: first, because it adds an additional circuit gain stage to the receiving system and thereby increases its overall sensitivity; second, because a fixed tuned stage can readily be designed for maximum amplification and more effective suppression (rejection) of undesired adjacent frequencies; and third, because the use of a pre-tuned I.F. output stage will enable the user to easily "resonate" the input circuits of the set to the tuned output of the converter by tuning the broadcast receiver for "peak" volume.

The resonant circuit is thus established, maximum transfer of energy takes place from the converter to the receiver, and perfect tracking of the oscillator is assured for the entire series of short wave bands.

Coil-Changing System

Notwithstanding the fact that coil systems represent the heart of short wave equipment, it is perhaps unbelievable that such an important item should receive such scant attention. The two most popular systems in use today, simple plug-in coils or some switching arrangement, are both representative of the improvised methods used for band changing in the earlier days of radio receivers.

Simply because it has been customary to use either one of these systems for band changing it should not be assumed that better means cannot be found to accomplish the same objective with a decided improvement in performance and operating efficiency. From a standpoint of radical design.

(Continued on page 247)

New World-Wide All-Wave Receiver

Wiring diagram for the Postal Super-Converter.

Appearance of the Ace 2-tube short-wave receiver, which uses plug-in coils. (No. 189.)

WHAT appears to be a very inexpensive long and short wave receiver is being distributed by the Ace Radio Laboratories.

A new style of construction that utilizes a one-piece metal chassis and sloping panel affords extreme compactness and maximum shielding. The careful elimination of superfluous parts without impairing the remarkable efficiency results in a receiver of exceptional simplicity, both of construction and operation. It is admirably suited for portable use.

Two models are available. A one-tube version for even the headphone reception and a two-tube set with a stage of audio amplification. Storage battery or the new economical dry cell tubes may be used. A special non-microphonic tube to operate on only one dry cell gives excellent results. Only one "P" battery is needed, but two may be used. By virtue of the low current consumption the batteries last for months!

Having a tuning range of 15 to 600 meters these sets are capable of receiving short wave broadcasts from all parts of the world, and police, airplane, and amateur transmissions, as well as the regular local stations. Its unusual flexibility adapts it for use on any type of antenna having a length of 40 to 90 feet.

These sets may be obtained ready wired and tested, ready to operate, or in complete construction kits for those who desire to gain the experience of wiring their own. By their close adherence to basic fundamentals these kits clearly illustrate the working principles of radio and offer the ideal introduction to short waves for both the experimenter and the radio fan. Boy Scouts especially.
The Latest—A "DOUBLE-DOUBLET" Antenna

The "double-doublet" is a most efficient compromise in short-wave "noise-free" antennas; it actually comprises two separate doublet aerials designed to give maximum response on all bands, namely, toward 16 meters. The connection of both doublets, or the "double-doublet," to the transmission line, tends to give a smooth match throughout the short-wave broadcast band.

The proper lengths for each doublet made from the two continuous antenna wires each 40 feet long (40 allowed for each antenna strain insulator tie), is shown in the drawing. Connection of the transmission line should be made by red- or green-soldered joint, as indicated by the detail of Fig. 1. Note that the long and short antenna wires, which are connected together, are located on opposite sides of the center transmission line connection. Height above ground should be considered as the distance from the 100 feet horizontal sections to ground, the latter to be considered as earth ground, if the span is on top of a frame dwelling with ungrounded metal roof, or from a building to a nearby pole, tree, or another building. If the span is installed on top of a steel framework building, or any building with a grounded roof, the earth ground is usually considered at the roof. Clearance from wires and buildings is necessary so as to prevent these objects from casting radio shadows on the antennas system with consequent reduction in signal strength pick-up.

3-Tube 12,500 Mile Receiver Now A.C.-D.C.

The 12,500 mile short-wave receiver has heretofore been available in either the battery model or the A.C. model. Both of these types require an outside power source. The battery model is operated on dry cells, while the A.C. model uses a power-pack to supply A and B voltages. The New A.C.-D.C. model requires neither batteries nor an outside power-pack, but plugs in directly to the A.C. or D.C. house line. The line voltage can be anywhere from 165 to 125 volts and can be any frequency—25, 50 or 60 cycle.

This set is available in both kit form and also completely wired. It comes complete with all necessary parts and full detailed instructions and can be easily assembled and wired by anyone. As soon as it is wired and the tubes inserted in their sockets, the set is ready to plug in to the house line.

This set gives remarkably clear and hum-free reception. The use of full size, modern type tubes makes this set more powerful and more efficient.

Circuit connections for the 3-tube A.C.-D.C. receiver.

Front view of the A.C.-D.C. 12,500 mile receiver. (No. 194.)

(Continued on page 251)
Switching Those S-W Coils

First procure a piece of cardboard or tin (tin preferably) and cut out exact size as in Fig. 1; next drill a ½" hole at A and an ¼" hole at B. Now take one of your pieces of bakelite and cut out a circular piece 3½" in diameter. Drill a ½" hole in the center, and place your tin plate (Fig. 1) so that the ¼" holes match up; now mark and drill the hole at B. When this is done replace the tin plate and fasten to disc with a bolt; this will hold your tin plate in place while you drill the other holes.

How to Make

Now, move your tin plate one quarter way around on the disc and proceed as before. Care must be taken to have each setting exactly the same with the wire in place when operating the set, the disc when finished should look as in Fig. 2. Now insert your plug-in coils. Drill a hole in center of bottom through each coil and fasten to disc with a bolt.

Next make another circular disc three and one-half inches in diameter and lay off your pieces figures as in Fig. 3, with a ¾" hole in the center and collar attached to fasten to the ¾" shaft. Now insert the ¾" shaft and on the rear end fasten your tuning condenser; Fig. 4 gives you a good idea of the finished "plug-less" tuner.

The operation as you will notice is very simple. Push in on the large knob, turn to the desired coil and pull back into place; this gives you not only the coil that you want, but also the meter range of that particular coil. Only two coils are shown in the drawing. Fig. 5 is a front view, showing the two dial knobs, the opening in the panel giving you the meter reading of coil No. 2 also the tuning condenser for logging.—A. F. Kuenzle.

Two Useful S-W Wrinkles

This experiment worked in excellent fashion on the 40-meter band. A length of hose is secured, rubber hose for best results, about 15 feet at the least, and not more than fifty feet. It is a most difficult matter to get your antenna wire through a hose but a method I used worked fine. First pull terminal end of wire through the hose. Then get up on your roof or any high place and extend the hose straight down and let the weight draw the wire up through the hose. If there is a hole in the center, place your tin plate (Fig. 1) so that the ¼" holes match up; now mark and drill the hole at B. When this is done replace the tin plate and fasten to disc with a bolt; this will hold your tin plate in place while you drill the other holes.

Automatic Aerial Condenser

MR. Hugo Gernback in his March editorial requested an automatic adjustment of antenna condenser with each change of plug-in coils. I am here—(Continued on page 251)

The proper capacity antenna condenser is automatically taken care of for each plug-in coil, by using the stunts shown.
A Low Cost POWER UNIT For Receivers

By Leonard Victor

Many 2 to 5 tube S.W. receivers are described from time to time, but lack data on power-supply units. Constructional data on an excellent power-supply is here presented.

ONE of the most common bugaboos that the set builder runs across is hum in receivers. Peculiarly enough most constructors never give the power source much consideration. Yet, it is the life-supply for the set, the power-plant that supplies the "juice" to make the wheels go round! Most packs that I have seen were hay-wire affairs thrust off on the floor or the bottom shelf of a table, with leads running every which way from them.

The little pack shown and described is one that I made up for testing purposes around the "shack," and although it did not cost eight dollars in its entirety, still up to 300 volts of pristine pure, direct current at 60 mils is available when needed, and likewise 2-1/2 volts at any current up to ten amperes. The layout of the pack can be clearly seen from the picture and schematic diagram.

There is nothing unconventional in any part of the pack circuit. A midget power transformer provides the high voltage, rectifier filament voltage, and the 2-1/2 volt winding for filament supply on the unit with which the pack is used. A 280 is used as a conventional full-wave rectifier, followed by a two section filter system and a bleeder resistor. The "B" and filament currents are connected to a five-foot cable which is used for connection to sets. The filter system consists of three 8 mf electrolytics and two 30 henry, 100 M.A. chokes. The following are general truths that can always be followed in choosing apparatus for power supplies.

Transformers

When purchasing a power transformer for a receiver, make sure that it will supply enough current for all the tubes in the receiver. For instance, if the set is a four tüber, with a 47 in the output, it will draw about forty milliamperes. Hence the rating of the high voltage winding should be at least 50 mils (M.A.), at the required voltage (300). For short-wave work, the best type of transformer is one that has an electrostatic shield. This is a winding between the primary and high-voltage winding, which is connected to the core of the transformer and grounded; this shield frequently eliminates annoying hums. Likewise be sure that the filament winding on the transformer will supply sufficient amperage for the set. Even thru cheapest of transformers will stand some overloading, but it is good practice, and eliminates quite a few "headaches" if all apparatus is run underloaded. If the transformer is to be used, reused, and then once more reused, (as in most experimental shacks), get one with soldering lugs, as the type with wire leads will perhaps cause trouble in some instances, due to too short a lead or frayed and sloppy connections.

The Rectifier

A 280 is the most common choice for the rectifier, but if there is to be a heavy drain and the transformer is built to give a 3-ampere, 8-volt winding, a 523 should be used. The 523 is the big brother to the 280, and will give more current, with lower voltage drop in the tube. Never use mercury vapor tubes, such as the 82 and the 83, as this is only courting trouble from various types of hums.

(Continued on page 248)
Transmitter that WON FRENCH
Amateur Station F8YG Wins Award for “Telephony

By P. DAUGNET, ENGINEER

The oscillator
ductance sockets, on a torartical properties, contributes therefore preferable and successfully communicated over tremendous distances with less than 5 watts.

The prime cause for such success is because of the following reasons:
1. Highest insulation of the R. F. (radio frequency) part of the oscillator.
2. The clearance (isolation or freedom from nearby absorbing materials) of the antenna and its insulation.

While in installations for medium and long wavelengths, hard rubber, glass, porcelain and bakelite insulation gives good results—but when it comes to short waves the French prefer quartz, which, on account of its physical and electrical properties, contributes greatly to the maximum power gain of an R. F. generator. The use of quartz is therefore recommended where the R. F. generator has a rating of a few watts only.

We have observed that among the licensed French amateur stations, the F8YG set, winner of the “Telephony with Little Power” contest organized in September, 1932, by the “Réseau des Émetteurs Francais.” R. E. F. (Network of French transmitters), seemed to be the best from the point of simplicity and efficiency, and offers a model set for the beginner, who wants to be initiated into the art of the radio amateur and whose purse is often of “low power.”

The combination transmitter-receiver is shown on the photographs and has the following external dimensions: 16"x16"x10".

The Transmitter

The circuit used is a symmetric self-controlled oscillator of the Mesny type. There are three R. F. coil windings: namely, antenna, plate and grid. The plate and grid coils have a tap exactly in their middle and are mounted on a quartz rod 12" long and 3/8" in diameter. Two tube sockets, insulated with quartz, are attached to the ends of the quartz rod in order to reduce the length of the connections, thus securing a higher efficiency. These inductance coils are made of silvered wire and allow the oscillator to cover a range of 20-60 meters, when a .0005

Front panel of the prize-winning combination short-wave trans-receiver built by F8YG, France.
CONTEST
With Little Power"

It should be remarked, that this system of modulation is not adapted for retransmission from a pick-up; the assistance of a tube amplifier would be required.

Manipulation (Keying)

A key opens the H. T. (plate voltage) circuit and a 400 ohm resistor is connected across the contacts of the key in order to avoid sparking. A relay is often used for keying in the antenna, but we are not going to tangle out this here, as the use of relay is somewhat complicated for the beginner.

Before keying, pull out the plug from the jack on the left side, thus disconnecting the microphone and insert it in the jack of the key.

With an antenna well insulated and rigidly mounted, over 200 ma. can be read on the thermometer, when a wavelength of 40 meters is used. As far as possible the keying should be done on another table than that, which carries the transmitter in order to avoid vibrations (shocks). Otherwise, at least a pad of sponge rubber should be used.

The Antenna

In this installation an antenna of the Zeppelin type is used and is formed of a horizontal wire ½ wave length long and two feeders ¼ wave length each. It is taken in consideration that the allowed bands are 20.80-21.40 m., 41.42 m. and 75-80 (we omit the bands of 5, 10, and 100 meters, which cannot be worked with the described arrangement.

It is possible to install an antenna tuning up to 41.42 meters, which will work as a pseudo-Zeppelin on 80 meters. To work on 20 meters it is preferable to install a special antenna tuned up to that wavelength.

The ends of the radiating antenna should be well cleared from any mass and given a maximum insulation by the use of quartz (isolantite) insulators. The feeders should be 8 inches apart and spaced approximately six and one-half feet with quartz rods. One of the feeders must be insulated from the horizontal wire. The crossing through walls or any other separating media shall be arranged at points nearest to the base of isolantite used here mostly) tubing should be used. Avoid sharp curves; the entire system shall be tightly stretched in order to prevent a lack of stability of the carrier. This may occur if the wind can swing the antenna and the feeders. It is good practice, when possible, to make the free end of the antenna slightly higher. One has to remember that the total length of ¼ wave length for each feeder is counted, starting from the antenna coil of the transmitter.

Adjustment

When mounted as explained the adjustment is quite easy; let us suppose that the antenna is tuned up to the 40 meter band (7000 kc.). Take from the antenna coil only 2 turns and watch the thermomenter needle. If two maxima are observed, reduce the coupling to 1½ turns. With the 80 meter band the coupling will require three turns, while the 20 meter band will use no more than half a turn. The stability of this transmitter is remarkable and allows a fair modulation of the carrier.

We publish this article of the French transmitter, which happens to be the one that recently won a French contest for the set that transmitted the greatest distance with the least power, and our principal purpose in illustrating and describing this set is to show our American readers what a neat job one of our French cousins made of his combination phone transmitter and receiver. Incidentally all of the insulation is of quartz which is reputed to have a very high insulating value for high frequency currents. Possibly we shall be using quartz insulators in this country before long.

Receiver

The receiver is of the classical Schnell type followed by two ordinary A. F. stages and uses quartz as insulating material when it concerns the detector stage. The inductance coils are wound on quartz forms and cover a range of 15-90 meters. We (Continued on page 237)
USE FOR KNOBS AND CLEATS

Efficient and economical insulators for supporting transmitting and receiving coils can be made with ordinary split bolts used in electrical wiring. These bolts are usually sold for 3 for 10 cents and can be purchased at any electrical supply or Radio and Television Store. The coil is secured to a common metal machine screw of sufficient length to be inserted in the knob. The knob may be used as an insulator for supporting the transmitting or receiving coils. The wing nut is fastened down to the knob, which in turn is binding post to a grid wire. There should be used any considerable length of a small coaxial cable. The方法 are described in detail by Arthur H. Shires.

COUPLING METHODS

Some authors give a simple guide to the general use of a three-plate condenser, especially with the "wax-in- metal" primary coil. Having tried both the two methods, and filling each of them, my personal choice is using the above given method. When the antenna is connected to one plate and the switch is closed, the primary coupling is in use. When the antenna is connected to both plates and the switch is opened, the secondary coupling is in use. The antenna has a frequency of seven or eight Hertz. It is a-e, s-w, and is slipped over the top of the various rings, including the wiring of the grid-wire. Some interesting experiments may be done using the coupling methods at the above given time. However, Arthur H. Shires.

USE FOR OLD RAZOR BLADES

I have found that by shortening the brass plates of a home-made aerial condenser and making a "Giblet" type works

AUTOMATIC CONDENSER SWITCH

The idea is to have a slide on the top plate of a variable condenser so that in the condenser plate can be moved in or at the plate connection. The remainder of the grid-wire to the plate becomes "shorted" to the plate. This is done by using a ferrite rod in a resonant circuit. With the rod of C1 coming to 95977 the antenna unit can be driven in the voice bands, but not on each side. Nor, when holding a set I no longer worry about "shorted" plates and poorly soldered connections. The switch is only used when using a pair of pilots and a grid-driven detector. In this manner it will not be important how the grid-wire is connected, because of the very good soldered connection. Another feature is that all the parts of the antenna are easily removed. Every lead is made of thin wire and all soldered joints are excellent. This method is practically nothing, yet it saves many hours of tedious soldering. —Herbert L. Brown.

AUDIO SELECTIVITY

I believe that most of you fellows have been very kind and the other wish you had no other fellow's signal when the B.B.R.M. was asked if there is something else you wish to do. A wire or a cable is a simple way to do it. As a matter of fact, it is nothing but a time control such as we have in the automobile industry. However, I would like to express the effectiveness. It can be attached to any type of radio and is a very easy to use. The values of the two unities, at

DRILLING TIPS

This is a very useful tool that makes it easy to transfer screw-hole locations to the panels or chassis for components and other similar parts. The template consists of three pointed aluminum strips, one inch wide by seven inches, with a slot in the middle of each component hole. The hole is not filled with a narrow slotted screwdriver, but should be roughly 0.015 inch, then a screwdriver with a slot in the top of the screwdriver can be easily and accurately placed and then screwed together in position. —Joe Green.

TUNING IN LONG WAVES

Lately, I have been interested in reception above 500 meters, and have experimented with several wave-length coils, the coils for the broadcast cast band were used. These .0005 mfd. variable condensers or fixed condensers, preferably variable, are mounted in parallel across the grid-winding of the broadest coil. After this the high wave-length circuits come in easily. The set on which this was tried was a Double-Tube D.C. receiver and has been used in every circuit. —Robert F. V. Mather.

2-WAY CODE PRACTICE

The best way to learn the code is to practice transmitting and receiving. With the code letters written in a lettered circuit was attended as shown. The frequency of the code letters is 200. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. (In tests No. 200 on continuous code transmission until unable to send. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire. For key 1 to sender, key 2 to receiver. The line may be any wire, wire.

www.americanradiohistory.com
DON'T FORGET TO VOTE!  
• PLEASE NOTE that we have set up the list of short wave stations and call letters this month in the old (June, etc.) style, with the stations arranged in order by "frequencies." It is up to you as to which style you prefer, the one we used last month (alphabetically by call letters), or the present one. Please mail us a post-card and simply state thereon—"I prefer No. 1 (June style), or No. 2 (July style) for S-W Station List." Address your cards to the Editor.

Around-the-Clock Listening Guide

Although short wave reception is notorious for its irregularity and seeming inconsistency (wherein lies its greatest appeal, the special listener), it is a good idea to follow a general schedule as far as wavelength in relation to the time of the day is concerned. The observance of a few simple rules will save the short wave fan a lot of otherwise wasted time. From daybreak to 3 p.m., and particularly during bright daylight, listen between 13 and 25 meters (21,040 to 13,000 kc.). To the east of the listener, from about noon to 10:00 p.m., the 20-35 meter will be found very productive. To the west of the listener this same band is best from about Nine P.M. until shortly after daybreak. After dark, results above 35 meters are usually much better than during daylight. These general rules hold for any location.

Don't forget to vote on the style of the station list. We're considering changing to a schedule that is more consistent with the time of day, rather than by wavelength. Here's a guide to help you make the most of your shortwave listening.

Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Station</th>
<th>Country</th>
<th>Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>21540 kc</td>
<td>W8XX</td>
<td>Pittsburgh</td>
<td>7 a.m. to 2 p.m.</td>
<td>experimental</td>
</tr>
<tr>
<td>19820 kc</td>
<td>KWK</td>
<td>Wakefield, N.J.</td>
<td>1-4:01 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>21600 kc</td>
<td>KWA</td>
<td>Lawrenceville, N.J.</td>
<td>1-3:25 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>20700 kc</td>
<td>LSY</td>
<td>Buenos Aires</td>
<td>1-4:40 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>20380 kc</td>
<td>GAA</td>
<td>Buenos Aires</td>
<td>1-4:72 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19900 kc</td>
<td>LSG</td>
<td>Buenos Aires, Argentina</td>
<td>1-1:05 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19820 kc</td>
<td>WKN</td>
<td>Lawrenceville, N.J.</td>
<td>2:13 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19650 kc</td>
<td>LSN5</td>
<td>Buenos Aires, Argentina</td>
<td>2:13 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19600 kc</td>
<td>LSF</td>
<td>Buenos Aires, Argentina</td>
<td>2:13 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19380 kc</td>
<td>WOP</td>
<td>Ocean Gate, N.J.</td>
<td>2:45 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19355 kc</td>
<td>FTM</td>
<td>St. Aissie, France</td>
<td>2:50 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19220 kc</td>
<td>WKF</td>
<td>Lawrenceville, N.J.</td>
<td>3:00 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>19160 kc</td>
<td>GAP</td>
<td>Rugby, England</td>
<td>3:05 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18970 kc</td>
<td>GAQ</td>
<td>Rugby, England</td>
<td>3:10 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18830 kc</td>
<td>PLE</td>
<td>Buenos Aires, Argentina</td>
<td>3:15 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18680 kc</td>
<td>GAX</td>
<td>Buenos Aires, Argentina</td>
<td>3:20 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18620 kc</td>
<td>GAO</td>
<td>Buenos Aires, Argentina</td>
<td>3:25 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18370 kc</td>
<td>PMC</td>
<td>Bandeong, Java</td>
<td>3:30 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18345 kc</td>
<td>FZS</td>
<td>Indonesia</td>
<td>3:35 meters</td>
<td>experimental</td>
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<tr>
<td>18340 kc</td>
<td>WLA</td>
<td>Lawrenceville, N.J.</td>
<td>3:40 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18310 kc</td>
<td>GAR</td>
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<tr>
<td>18240 kc</td>
<td>FRO,FRE</td>
<td>St. Aissie, France</td>
<td>4:00 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>18200 kc</td>
<td>GAW</td>
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<td>4:05 meters</td>
<td>experimental</td>
</tr>
<tr>
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<td>WOY</td>
<td>Lawrenceville, N.J.</td>
<td>4:10 meters</td>
<td>experimental</td>
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<tr>
<td>17080 kc</td>
<td>GBC</td>
<td>Rugby, England</td>
<td>4:15 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>16720 kc</td>
<td>WLG</td>
<td>Lawrenceville, N.J.</td>
<td>4:20 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>16270 kc</td>
<td>WOG</td>
<td>Ocean Gate, N.J.</td>
<td>4:25 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>16233 kc</td>
<td>FZR</td>
<td>Saigon, Indochina</td>
<td>4:30 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>15880 kc</td>
<td>FTK</td>
<td>Saigon, Indochina</td>
<td>4:35 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>15810 kc</td>
<td>LSL</td>
<td>Buenos Aires, Argentina</td>
<td>4:40 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>15760 kc</td>
<td>JYT</td>
<td>Jakarta</td>
<td>4:45 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>15330 kc</td>
<td>W2XAD</td>
<td>W2XAD</td>
<td>10:05 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>15300 kc</td>
<td>CP7</td>
<td>W2XAD</td>
<td>10:10 meters</td>
<td>experimental</td>
</tr>
<tr>
<td>14980 kc</td>
<td>EAY</td>
<td>Manila, Philippines</td>
<td>10:15 meters</td>
<td>experimental</td>
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<td>WMN</td>
<td>Lawrenceville, N.J.</td>
<td>10:20 meters</td>
<td>experimental</td>
</tr>
</tbody>
</table>

(Time given is Eastern Standard Time)
Editor, Short Wave Craft:

I have been reading the arguments on the NO CODE test below 6 meters for a long time, and wish to state my opinion on same.

In this letter I will give an outline of the condition that exists, and tell of some of the operating on the other amateur bands; let's hope that the 5-meter band shows more intelligent operating.

Mr. J. M. Worcest, W2MAU, has written the most sensible letter ever published in Short Wave Craft, on the "NO CODE" argument; his letter and map should be printed on a large sheet, framed and—every short wave fan should have a copy on his wall; also a copy should be sent to every licensed amateur in the United States. His letter states the facts, and nothing but the facts!

Commercial interests have started to demand territory in the 5-meter band, and there is plenty of equipment being built by the big companies for commercial use in this band (if you don't believe that, do a little investigating).

The next International Radio Conference, to be held in 1932, believe it would make these short-sighted boys see light.

Little by little our bands have been cut down until now, take a look; yes, take a good long look at what we have left. Are we going to let the same thing happen to the 5-meter band? I hope not, but we can not hold it, unless we get it occupied, and there is not enough licensed amateurs in the United States at the present time to hold all of this band, and there will not be enough of us for a long, long time to come, at least not before the biggest part of this band is given to the commercial interests.

The only way we can hold this band is to get it occupied, and the only way to get it occupied, is to abolish the code test below 6 meters.

Let's do this selfishness (for that's one of the things that's wrong with you guys) and try to hold on to our 5-meter band.

The next radio conference will be held at Cairo, Egypt, in 1932, just a little less than four years from now, and at that conference, what will happen to our 5-meter band? Plenty has happened to our bands in the years gone by, and plenty will happen in the years to come.

The fellows that are hammering for code test all the time, undoubtedly know very little about amateur radio, and less about the equipment that they are using.

I wonder, if they know, that there are hundreds of fellows that knows hundreds of times as much about radio as they do, and at the same time, these fellows (that know radio) don't know the code and don't care to learn it, as it would be of no use to them.

It seems that there are quite a number that can learn the code for some reason (in fact some are personal friends of mine), that have worked on code for two and three years and more, trying to get the code good enough to get out of the class called the "lids." Some of them had xmitters on the air, on a temporary basis, but after they gave up amateur radio in disgust, as they were called "lids" and every other kind of a name that one can think of; they were told to get off the air time and time again (if you don't believe that fellows that are not good at code are called names, listen in—you will find out). The same men were told that they did not have brains enough to learn the code. I must say that each and every one of these men are very intelligent, and have B.S. degrees in radio and electrical engineering, and these men were unable to learn the code after two and three years of hard practice.

It's only "lids," the weak-minded, the short-sighted boys, that write letters and say that men of this caliber can learn the code. Anyway of what use would code have been to these men, as their interest lay in giving up all telephone communication—a field that requires far more intelligence than the "code fiend" will probably ever have.

I have had several C.W. men, code operators, that are on the air, speak to me, about the band that is trying to get the code test eliminated from the 5-meter band; they call the fellows that are trying to get the code eliminated the "harmless gang," the "nit-wits," and every other kind of a name that they can think of.

One of these fellows (one of those making the biggest fuss), can't even build a C.W. transmitter that will work! The fact is that he can't even tune up a three-tube C.W. Xmitter, but sends it away to amateurs in other towns to have it "tuned up," and when he gets it back he soon has it out of tune again, and he operates with it out of tune for a long time, then sends it back again. Now he is talking about a phone rig, and he knows nothing about a C.W. Xmitter, except how to move a key up and down. I say that he really does know how to do that, and is exceptionally good at sending and receiving code; if this were the only amateur on the air with such a little knowledge of radio, I would not have mentioned him, but there are hundreds more on the air just like him, who know very little about radio, but (Continued on page 250)
MODULATOR FOR 5-METER PIGMY
A Ham, L. I., N. Y.
(Q) I built the 5 meter transmitter using the 53 tube but could not get it to work and I followed instruction with no result, could you please print in your column in Short Wave Craft, a modulator to modulate the 53 tube, say a 247 tube or what you think best and also how to connect to oscillator.
(A) Many of our readers have built the 5 meter Pigmy Transmitter using the 53 tube and are obtaining excellent results with it. The adjustment of the grid coil is very critical and if not properly adjusted modulation cannot be obtained without the use of a separate modulator. Above is the diagram for the two tube modulator using a 95 and 47.

LOW POWER TRANSMITTER
W. B. James, Jr., Harrisonburg, Va.
(Q) Can you give me some indication of the cost of the necessary parts and blue prints for the assembly of a transmitter which would be capable of working a distance of about 1,000 miles?
(A) We have had many requests for diagrams and information regarding transmitting apparatus. However, in most cases, we are reluctant to give information unless we are sure that the inquirer has an operator's license or has intentions of obtaining one before building and operating a transmitter. As you know, it is absolutely necessary that a license be obtained before any transmitter can be operated. We advise that you get a copy of our book, HOW TO BECOME AN AMATEUR RADIO OPERATOR.

3-TUBE BATTERY RECEIVER
(Q) Please publish a diagram of a battery operated receiver using a 30 detector, 30 first stage of audio and 33 audio amplifier.
(A) A set using two 239's and a 33 makes a very fine battery operated short-wave receiver and we are pleased to furnish the diagram.

4-TUBE DOERLE DIAGRAM
R. V. O., Sioux City, Ia.
(Q) I would be greatly pleased if you would print a diagram of a 4-Tube Doerle A.C. with a pentode audio amplifier of the 2A5 type added, thus making it a four tube A.C. Doerle. I wish to use 58, 57, 56, and 2A5 tubes. This set is to push an R.C.A. magnetic loud speaker.
(A) The diagram showing how to add another tube to the 3-tube Electrolysed Doerle Receiver is herewith presented. This is a worthwhile improvement and should give full speaker volume on any short-wave station.

CLASS B TRANSFORMERS
E. P. Abrams, Los Angeles, Calif.
(Q) I have a 53 that I wish to use as a modulator for a pair of 6C6 in a push-pull 10 meter oscillator. Could this tube be used in Class B with Class A transformers? What would be the results? Also would two 56's in parallel swing the grids of the 53? If what I have outlined will not work, please give me some idea how I might assemble the above mentioned equipment to get the most power output.
(A) In order to use a 53 in Class B you must have especially designed transformers for the work. Class A transformers are absolutely useless. A 56 will drive a 53 in Class B providing sufficient excitation is available for the 56.
Short Wave Stations of the World

(WWMJ Buffalo, N. Y. 2422 kc.
WMO Highland Park, Mich. 2414 kc.
WMP Framingham, Mass. 1066 kc.
WPDA Tulear, Cal. 2414 kc.
WPDB Chicago, III. 1712 kc.
WPDC Chicago, III. 1712 kc.
WPDD Chicago, III. 1712 kc.
WPDE Chicago, Ill. 2422 kc.
WPDE Flint, Mich. 2466 kc.
WPDG Youngstown, Ohio 2458 kc.
WPDR Richmond, Ind. 2442 kc.
WPDL Columbus, Ohio 2430 kc.
WPDR Milwaukee, Wis. 2510 kc.
WPDL Lansing, Mich. 2442 kc.
WPDM Dayton, Ohio 2430 kc.
WPDN Auburn, N. Y. 2382 kc.
WPDO Akron, Ohio 2468 kc.
WPDR Rochester, N. Y. 2382 kc.
WPDS Cleveland, Ohio 2390 kc.
WPDT Kokomo, Ind. 2490 kc.
WPDU Pittsburgh, Pa. 1712 kc.
WPDV Charlotte, N. C. 2458 kc.
WPDW Washington, D. C. 2422 kc.
WPDX Detroit, Mich. 2414 kc.
WPDY Atlanta, Ga. 2414 kc.
WPDZ Fort Wayne, Ind. 2490 kc.
WPEA Syracuse, N. Y. 2382 kc.

WPED Grand Rapids, Mich. 2442 kc.
WPEC Memphis, Tenn. 2466 kc.
WPED A. llington, Mass. 1712 kc.
WPPE New York, N. Y. 2450 kc.
WPPE New York, N. Y. 2450 kc.
WPEH Somerville, Mass. 1712 kc.
WPEI E. Providence, R. I. 1712 kc.
WPPI New Orleans, La. 2430 kc.
WPMD Middleboro, Mass. 1666 kc.
WPME Indianapolis, Ind. 2466 kc.
WPME Atlanta, Mass. 1712 kc.
WPPI Saginaw, Mich. 2442 kc.
WPET Lexington, Ky. 1706 kc.
WPFW Northampton, Mass. 1666 kc.
WPFN Newton, Mass. 1712 kc.
WPFC Muskegon, Mich. 2442 kc.
WPFD Highland Park, Ill. 2490 kc.
WPFE Reading, Pa. 2442 kc.
WPFG Jacksonville, Fla. 2442 kc.
WPHC Baltimore, Md. 2414 kc.
WPCL Columbus, Ga. 2414 kc.
WPFO Hammond, Ind. 1712 kc.
WPFE Hackensack, N. J. 2490 kc.
WPFL Gary, Ind. 2470 kc.
WPFX Birmingham, Ala. 2382 kc.

WPFN Fairhaven, Mass. 1712 kc.
WPFQ Knoxville, Tenn. 2474 kc.
WPPP Clarksburg, W. Va. 2490 kc.
WPPB Swathmore, Pa. 2474 kc.
WPPR Johnson City, Tenn. 2470 kc.
WPFU Portland, Me. 2422 kc.
WPVQ Pawtucket, R. I. 2466 kc.
WPFX Palm Beach, Fla. 2442 kc.
WPFE Miami, Fla. 2442 kc.
WPGB Bay City, Mich. 2466 kc.
WPGR Port Huron, Mich. 2466 kc.
WPSC Schenevuctdy, N. Y. 1568 kc.
WPGR Rockford, Ill. 2458 kc.
WPQF Providence, R. I. 1712 kc.
WPQG Findlay, Ohio 1682 kc.
WPQI Fort Worth, Ohio 2430 kc.
WPQJ Utica, N. Y. 2414 kc.
WPQK Cranston, R. I. 2466 kc.
WPQJ Binghamton, N. Y. 2442 kc.
WPQN South Bend, Ind. 2490 kc.
WPQO Huntington, N. Y. 2490 kc.
WPQS Mineola, N. Y. 2490 kc.
WRBH Cleveland, Ohio 2458 kc.
WRDL Toledo, Ohio 2474 kc.

London Plans Radio Cars

Scotland Yard recently issued an appeal for public cooperation in combating a crime wave in London and particularly "smash and grab" motor thieves. After many experiments the authorities have decided to extend the use of radio to fight crime.

A system of patrolling by short-wave radio police cars such as are used in New York and other American cities will be introduced in the metropolitan district of 700 square miles, which has been divided into fifty-two areas, in each of which at least one radio-equipped car will operate both day and night.

One purpose of the Scotland Yard appeal is to encourage greater use by the public of the police telephone boxes provided in most London districts.

British to Investigate Television

An inquiry into the feasibility of television, with which the British Broadcasting Corporation has been conducting experiments during the last few years, will be undertaken shortly under the direction of the British Postmaster-General. A special technical committee will comprise the chief engineer of the B. B. C. and technicians from the Post Office Department, Army and Navy, film industry and radio manufacturers.
Dr. DeForest Wins
(Continued from page 199)
relation with the input circuit. "A high whistling or squealing note resulted in the household of Dr. De Forest and his wife," wrote a letter. "On another date," he continues, "I chanced to place the output transformer in a location which caused it to open the telephone relay action. We immediately recognized that was transpiring and found that the coil in the telephone transformer terminals, that the pitch of the whistle could be varied throughout the range of the telephone.

"Shortly thereafter, I described these circuits and effects to John Stone Newell in New York. He phoned the telephone company, and, in the following spring, again in Palo Alto, I set up the first feedback circuit for obtaining heterodyne signals from the South San Francisco 'arc' transmitter. All of these facts and dates were established as evidence in the early days of the litigation, and largely upon this testimony were the various court trials decided."

This states Dr. De Forest, "Palo Alto was the birthplace, not only of the first actual audio-amplifier, single, and radio. It was all of the oscillating and feedback circuits."

**World-wide Applications of "Feedback" Circuit**
The tremendous applications of the feedback circuit are found in the three main vacuum tubes that have taken place in the ensuing twenty-two years stagger the imagination. At first, Dr. Lee de Forest, for without the three-electrode tube and the feedback and oscillator circuit arrangements, conceived and invented by Dr. Forest, the hundreds of amateurs, as well as commercial vacuum tube receivers and transmitters, and in use today would be impossible.

By the Supreme Court decision handed down on May 21 by Judge Cardozo, the Radio Corporation of America won a victory over the Radio Engineering Laboratories, and by the same decision, this opinion stated in effect that Dr. Lee de Forest, and not Edwin H. Armstrong, was the original inventor of the "feedback" circuit and vacuum tube circuits.

Details of the De Forest-Van Etten experiments already cited were mentioned in the decision written by Justice Cardozo who continued—"that on April 17, 1913, these two workers arrived at another clear note—the true heterodyne best note from the radio signals at San Francisco Beach, with the aid of the amplifier."

In the editor's humble opinion, one of the strongest judicial decisions ever given by any judge was that of Justice Cardozo when, referring to explanations that Dr. de Forest gave in 1913 for not perfecting his invention quickly or divulging promptly for a patent, the Justice wrote:

"These explanations, even if not wholly convincing, are not so manifestly incredible as to make it hard to say that the conception of the oscillator as a generator of radio frequencies has been proved in any clear or certain way to have been received and adopted by Armstrong before it was born in De Forest's mind."

The crown for discovering radio's regeneration circuit, frequently referred to as the oscillating audio circuit, has been passed back and forth to Dr. Lee de Forest and Dr. De Forest, as decided by various court decisions since 1922. The decision by the Supreme Court is considered in racy detail by Dr. de Forest in his book, the famous book to Dr. de Forest although in August, 1933, Major Armstrong was the recipient of considerable compensation for the discovery and control of the famous circuit by the United...
LEOTONE NEW JIFFY “3” SHORT WAVE SET

W worldwide Earphone Reception for Fans!

Three tube self-containing bakelite base resistance coupled throughout so that it can be assembled in a jiffy. Almost no wiring required. Wonder set for amateurs and experimenters. Kiln dried, 2"x2"x6"; the tube compartment has both regeneration and detection. Smooth, clear, quiet performance assured. Offered complete HAND-STRIPED SEWING and LOW CURRNT drain.

KIT including 4 short wave coils, 3, 4, 5, 6, 7, 5 tubes extra, $1.50

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From Beginning To End

55 PAGES 20 HOOK-UPS 500 ILLUSTRATIONS

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Our famous Treatise is exclusively short-wave from beginning to end. Packed between its covers is a wealth of information covering the entire short-wave field. Every word is in use.

The Treatise contains 55 solid pages of useful short-wave information, diagrams, illustrations and real live short-wave radio merchandising. It contains real live "meat"—that radio information many text books on the subject, special attention have been given to the short-wave beginner. Numerous articles have been devoted entirely to this small audience. Yet, we have not left out the "meat"-takers. There is plenty of real "meat" for the serious ones.

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Chapter 2—Equipment for Short-Wave

Chapter 3—How to Build and Operate a Short-Wave Receiver

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Chapter 55—How to Make and Operate a Simple Short-Wave Receiver

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A High Quality AUDIO-AMPLIFIER and POWER SUPPLY

By Eugene V. Cyrus

In the NEXT ISSUE!
Start the wiring before any other part is fastened in place with the possible exception of the aerial and ground posts and the phone clips. Wire the heater circuits of the two tubes first then the filter circuit next. This prevents a short of the long wires and the dual 8 mf electrolytic condenser that would otherwise be in the way when wiring the phone plate and run the 37 tube tie in together, and are run to one side of the line cord, the same side of the line is the one in which the filament dropping resistor is connected. The other side of the line cord is the ground side and connects directly to the switch on the regeneration control. From the second terminal of the switch a lead is run to all negative points of the circuit, with the exception which is the filter condenser and the panel. These are grounded to the common point through a 1 mf electrolytic condenser. Hooking up the ground side in this manner enables us to use an external ground directly on the panel without fear of breaking the phone lines.

The “R” plus is taken from the cathode connection of the 37 tube and filtered by the use of the thirty heavy choke and the dual 8 mf electrolytic condenser. With the exception of the condenser and the panel. These are grounded to the common point through a 1 mf electrolytic condenser. This is the end of the tickler winding farthest from the grid coil. The “I” plus is taken from the plate connection of the 37 tube and filtered by the use of the 1325 mf by-pass condenser, the other end of which is grounded through the 479 ohm grid resistor. This is the end of the tickler winding nearest to the grid coil. The top side of the tickler winding is connected to the plate of the 37 tube by the grid resistor to the plate by the 0.001 mf, grid capacitor which is 0.001 mf at grade costs and by means of a 1.5 ohm grid leak; this connects the grid to the plate. The other end of the plate is connected to the center terminal of the grid coil, thereby connecting the grid, plate, and tickler windings together. The bottom side of the tickler winding is connected to the grid of the 37 tube by means of the plate coil and the tickler winding is connected to the common ground.

Now for the triode portion of the tube: The grid of this unit is coupled to the plate of the tune coil by the .01 mf, plate condenser and to the R.F. choke and the 100,000 ohm resistor which supplies plate voltage to the tube. The .01 mf condenser to the R.F. choke and the 100,000 ohm resistor which supplies plate voltage to the tube. The .01 mf condenser to the R.F. choke and the 100,000 ohm resistor which supplies plate voltage to the tube.

The triode portion is a .5 microhm, .5 watt carbon resistor. The plate of the triode connects directly to the phone clip. The remaining clip is run to the “I” plus terminal. Bias for the tube is obtained through the use of the 1,500 ohm, .5 watt resistor. This is shunted by a .1 mf tubular condenser for by-pass. The “I” plus voltage for the screen grid is obtained through the use of the 1,500 ohm, .5 watt carbon resistor to the high side of the regeneration control.

The opposite side of the condenser connects to the common ground. Now the only thing left to do is to place the tubes in their respective sockets and make a test. After wiring all connections, plug the line cord into any house-lighting circuit, either A.C. or D.C., and turn on the switch (you may have to reverse the plug to make the set work properly). The tubes should light up but they should not sound. If they do sound, plug the line cord into any house-lighting circuit, either A.C. or D.C., and turn on the switch (you may have to reverse the plug to make the set work properly). The tubes should light up and they should not sound. If they do sound, plug the line cord into any house-lighting circuit, either A.C. or D.C., and turn on the switch (you may have to reverse the plug to make the set work properly). The tubes should light up and they should not sound. 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frequency. This trimmer should be varied on every station to get the most out of your set. A little practice and even the beginner can tune in short wave stations from all over the world with little or no trouble.

The writer, when testing this set, listened to England and Germany in the first ten minutes of the test. The volume was such that the phones could be pushed away from the ears and the program heard just as clearly as with the phones in the proper position. If care is taken in the selection of parts any constructor can well expect to duplicate the results obtained with the original receiver.

Parts List

1 .0001 mf. Mica Condenser.
1 .0005 mf. Mica Condenser.
1 .01 mf. Tubular Condenser, 200 volts.
1 .1 mf. Tubular Condenser, 200 volts.
1 .4 mf. Tubular Condenser, 200 volts.
1 Dual 8 mf. Electrolytic Condenser, 200 volts (Find-All).
1 1.000 ohm /4 watt Carbon Resistor.
1 100.000 ohm 2/3 watt Carbon Resistor.
1 15.000 ohm 1/2 watt Carbon Resistor.
1 .4 microhm 1/4 watt Carbon Resistor.
1 .5 microhm 1/4 watt Carbon Resistor.
1 .0005 mf. Filter Choke, 21/2 mh. (Find-All).
1 Filter Choke, 30 henry, 200 ohm (Find-All).
1 320 ohm Line Cord (Find-All).
1 100,000 ohm Potentiometer with Switch.
1 4-prong Moulded Socket (Na-Ald).
1 5-prong Moulded Socket (Na-Ald).
1 Small 1-prong Moulded Socket (Na-Ald).
1 Piece of Aluminum for panel, 6" x 8".
1 x 6" x 8" Baseboard.
1 Dial.
1 Antenna and Ground Post.
1 1/8" for Phone.
1 Set of 4-prong S.W. Plug-in Coils (Find-All).

The "Mono-Coil 2"

(Continued from page 206)

International broadcast (program, music, speeches, etc.) bands with only a three-prong switch. The capacity of the tuning condenser being only 25 mmf, provides an optimum L/C ratio, resulting in a "high-gain" tuning circuit, and last but by no means least, the crowded broadcast bands were not forced into two or three points on the dial—the spread being from ten to fifteen degrees, depending on the width of the particular broadcast band used. The "Mono-Coil 2" microwave had to be reduced these several factors against the old plug-in proves that we have really accomplished something.

Solving the Regeneration Problem

Regeneration was next tackled and right here the old "cut and try" method proved to be the only successful method of attack. For a properly designed coil the feed-back must be adjusted to produce maximum efficiency and smoothness of control of the highest frequency that will be used. Therefore the plate feed-back method was used and the tickler coil was placed between the two windings 1.1 and 1.2 to provide efficient feed-back from 16 to 35 meters bands covered by 1.1 and 1.2 controlled by taps 1 and 2. The tube was now adjusted to give the lowest noise level on the lower frequency of tap 3. This was with three turns in the tickler coil. It was believed that the number of turns could be increased slightly to produce oscillation on the 49 meter band. This was done but due to the tickler being coupled to the grid-end of the coil, the larger number of turns effected too great coupling on the high frequency end of the tuning range and in order to control the feedback the 'screen' voltage had to be reduced to a point where the sensitivity was ruined entirely—three turns was unquestionably the
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No other radio gives you all these vital.

- Laboratory precision built throughout.
- Range 13 to 560 meters (250-1400 kc.) on all bands.
- Fisher model DE.
- World's latest type tubes—35 tuned r.f. stages on all bands.
- Set built-in oscillator.
- Nine tuned circuits on all bands.
- Automatic volume control that actually eliminates fading.
- Audio beat oscillator for quick tuning of SW stations and code reception.
- Dual dial range of two stages.
- Positive, long life six-section coil switch selecting different low loss coils and sixteen capacities at the turn of a knob.
- Toned r.f. stage on all four bands.

MCMURDO SILVER, INC., 3356 N. Paulina Street, Chicago, III.

WRITE NAME AND ADDRESS IN MARGIN

 proper number; some other method had to be used to obtain oscillation on the lower frequencies without affecting the efficiency of the circuit to the other frequencies.

As is usually the case with mortals, the two things are not thought of first and many complicated arrangements were tried without success. Then came the pleasant surprise—no tuning coil, and it sure "did the trick."

Now let's see just how the whole thing operates. When the switch is set on contact N-4, the entire grid coil is in use with the three-turn plate tickler and the one-turn cathode coil providing just the proper amount of feedback. The grids are in series and the tube is set for maximum sensitivity. Set on point N-2, the switch shorts out L-3, the cathode coil now becoming less or more inactive, which is just what we want. The plate coil is then left to work with L-1 and L-2. The range of each tap of the coil is of course affected by the adjustment of the antenna condenser. The approximate tuning range is as follows: tap-1, 16 to 24 meters; tap-2, 25 to 35 meters and tap-3, 45 to 55 meters. The drawing clearly shows the construction of the coil and the number of turns. For best results follow the specifications exactly.

The rest of the set is orthodox and needs but little mention. A 2A5 and pentode are used as a resistance-coupled amplifier and has an output choke and condenser-filter which keeps the plate current of the tube from going through the earphones. Follow the instructions carefully and you will find that it is at last possible to build a short-wave receiver which we can operate with the same ease that we now operate our regular broadcast (200-500 meter) receivers. All the foreign broadcast stations are received on this receiver with far more volume than a receiver using the same type tubes and plug-in coils—and that is not just "idle chatter" either. This set is honestly so good that the author is building two more sets using "Mono-Collis"; one is a tuned R.F. set and the other is a super-heterodyne; both will be described in coming issues of Short Wave CRAFT. The latter is going to find its place in the "shack" as a regular "Hamb" receiver at W2AMN. So it is dead, Long live the King.

List of Parts for "Mono-Coil-2"
1-Chassis 5"x8"x1", Blau
1-Panel 7"x9
1-Mono-Coil—see test
1-4 pt. single pole switch, Blau
1-25 mmf. Var. Antenna condenser
1-25 mmf. condenser: tuning 270 degrees. National
1-0001 mmf. fixed condenser (mica)
1-1 mf. -1 mf. (paper)
1-0005 mf. fixed (mica)
2-1 fixed (paper)
1-20 mf. 25 volts (electrolytic)
1-3 meg. resistor (1/2 watt), Lynch
1-1/2 meg. (1/2 watt), Lynch
1-1 meg. (1/2 watt), Lynch
1-500 ohms 3 watt
1-50,000 potentiometer Acmet
1-1350 H, mid-tical choke (iron core)
2-6 prong sockets, Na-Add
1-Antenna ground terminal strip, Na-Add
1-Phone terminal strip, Na-Add
1-37 or 66 tube, RCA Radiotron. (Aro)
1-2A5 or 4 tube, RCA Radiotron. (Aro)

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With Excellent Band Spread.

Uses 6A7 and 3255 tubes. With its four plug-in coils, covers from 15 to 200 meters. Will operate on A.C. or D.C. Has power supply built in. Merely connect to Antenna post of broadcast set and plug in cable to wall socket. This Converter pulls in police stations all over the country, aircraft reports, foreign broadcast short wave stations, England, France, Germany, Italy, Spain and South America.

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Complete kit, including coils, cabinet; less tubes $6.05
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Canada and foreign countries 25c extra. We accept money order, check, stamps or cash.

SHORT WAVE CRAFT
9-101 HUDSON STREET NEW YORK, N. Y.

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S-W League
(Continued from page 225)
are good on code. An amateur told me the other day that he learned the code "plenty easy"—but the technical side of short wave radio had him "down!"
These men are mentioned as examples: do we want fellows like these on the 5-meter band? I'll say we don't!
And now, these weak-minded code fees that can't look to the future, are trying to keep men that really know radio from operating phone stations on the 5-meter band.
They are sure to see that if there is a stiff technical examination imposed on those that work this band, only those that know radio will be operating Xmitters on the 5-meter band, and only on this band, for the 5-meter no-code license will be good only for the 5-meter band, and none of the other amateur bands can be operated in with a 5-meter no-code license.
How many of you fellows that are opposing the no-code license examination on 5 meters, have ever listened in on the 5-meter band?
I doubt if you think the commercials will be stopped if we rule this band unoccupied like that?
How many of you fellows that are making such a story about codeless license on 5 meters can build an Xmitter that will work on this band, at least some of you operat- ing on the other bands don't show it.
These jelly-fish nit-wits that haven't got the brains to look to the future in amateur radio and see what will happen in a few more years, shouldn't have licenses of any kind.
Nearly all of the letters opposing the codeless license are written by chaps that don't know what they are talking about.
Some of them don't even know how to figure kilocycles for wave length, or they could see how large the 5-meter band is, and they could see how large it is, and figure out how many could occupy that band without undue crowding, I am sure that they would conclude that the best thing to do would be to get as many in the 5-meter band as possible, and as soon as possible, before commercial interests get too strong a hold.
Now fellows lets get together on this, there is room for 40,000,000 of us on the 5-meter band, with no more congestion than we now have on 50 meters. How long do you think it will take to get that many stations operating on this band? WELL, IT WILL TAKE 20,000 YEARS at the present rate of issuing licenses to get 40,000,000 stations operating on this band.
If the code test is abolished below 6 meters, thousands of technical men, radio engineers, and other technically qualified and interested in the higher art of radio phone communication, will build Xmitters and receivers for operating on this band, and then it will be thousands of years before this band has as much demand as now exists on the 80-meter band!
I can copy and send code with the best of them, and I am for the codeless license on 5 meters.
The sooner we get together for the codeless license the better it will be for us, as we can wait too long.
In closing may I ask that each and every one of you read W2GAU's letter on page of the April SHORT WAVE CRAFT through, not just one, but several times, and keep it handy for reference all the time. It has given you a very good outline of the 5-meter band.
I hope that you fellows get busy and do something before it is too late, and it will be too late if we keep putting off what we ought to do today.
SHORT WAVE CRAFT is a very "fine busi- ness" magazine and I wish it many years of success.

PAUL LOMASTER.
Bentonville, Arkansas.
Transmitter That Won French Contest

(Continued from page 223)

have here, beside a code receiver also a
good CW and telephony receiver and un-
der favorable conditions of transmission
most of the stations of the entire world are
received without forgetting steamships and
airplanes. The diagram and photograph
will help to clearly show the arrangement
used in constructing this transmitter.

(A modulated oscillator is outlawed in
the United States on all amateur bands ex-
cept on the 5 and 10 meter bands where
the new regulations permit its use.)

General List of Parts for F8YG
Trans-Receiver

Transmitter
1 set of aerial parts complete.
1 high frequency coil to suit band in use.
1 variable condenser CV .0005 mf.
2 tuning posts (ant.).
1 20 ohm rheostat.
2 milliammeters 0-100 ma.
1 milliammeter (Thermo) 0-250 ma.
1 key.
1 microphone.
1 variable resistor 16,000 ohms.
1 microphone transformer, 1 to 60 ratio.
2 transmitter tubes (approximately cor-
responding to American 45 or 210 types).
2 jacks.
1 resistance 400 ohms.

Receiver
1 support shelf.

1 set of 3 coils for 20, 40, and 80 meters.
2 variable condensers .0005 and .00015
mf. respectively.
1 condenser .0001 mf.
2 tube sockets.
1 R.F. choke (30-85 mh.)
1 fixed condenser .002 mf.
1 fixed condenser .005 mf.

Fig. 1. Circuit diagram for the Meony transmitter used by F8YG. The variable
resistance in the grid circuit is 16,000 ohms.

Fig. 2. Calibration curve for the trans-
mitter, with condenser graduations plotted
as abscissae and wavelength plotted as
ordinates.

Fig. 6. Diagram of the Schnell receiver used at F8YG. C2, C3, variable condensers
of .0005 and .00015 mf.; C1, .0001 to .00025 mf. to suit antenna; C4, .0001 mf.
Introducing...

2 NEW POWERTONE RECEIVERS

DUO-AMPLIDYNE S.W. RECEIVER

"SCOUT" PORTABLE 2-TUBE A.C.-D.C.

FOR the Short-Wave enthusiast with a limited budget. Radically new—two-tube results with the now '19 2-volt series tube. Covers from 15 to 550 meters. Complete kit of parts... $4.95

Wired (extra) $1.00, RCA licensed tube... $.80

Set of Headphones... $.50

Broadcast Coil (200-15000 cycles)... $.29

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SHORT WAVE CRAFT

NEW YORK, N.Y.

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If you do not specify copies we will use our own judgment in sending assorted numbers to fill your order. Note we cannot exchange the copies for ones that have been sent to you.

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SHORT WAVE CRAFT

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FREED'S RADIO CO.

(Dept. C)

5053 Baltimore Ave., Philadelphia, Penna.

NEW! 5 and 10 Meter Transceiver complete with both sets of coils. Used and proven by leading amateurs. Listed for portable work. Total weight 6 pounds.

3 sets using 30 and 65 volt tubes, less than $15.00.

5 sets using 350 volt tubes, less than $15.00.

10% sales tax in California.

FIG. 3

Leonard Transceiver

A. L. L.IED RADIO LABS

25 Warren Street
New York, N.Y.

Fig. 3. Transmitting antenna used at F8YG.

Fig. 7. Calibration curve of the F8YG receiver showing wavelengths for the different coils.

DR. W. MÖLLER

Describes in the NEXT ISSUE

A "3-METER TRANSMITTER AND RECEIVER"
SHORT WAVES CRAFT for AUGUST, 1934

239

Short Waves and Long Raves

(Continued from page 213)

50th City Line Ave.,
Overbrook,
Philadelphia, Penn.

(Glad to hear from you again, Oliver,-Editor.)

LIKE THE 3-TUBE DOERLE

Editor, Short Wave Craft:

I have used the hook-up for the 3-tube
Doerle receiver. The set works perfectly
and I have had no difficulty in obtaining
"Jiffy" reception a 100 miles away, such as
Silberia and Argentina, DJA, DMJ, and
plenty of English stations. I get perfect
reception and all these stations can
usually be received any time during
the day and as late as 8:00 o'clock in
the morning. I have followed the hook-up
throughout, except that I added a 14 power
tube after the 5A6, and I am using a
dynamic speaker and have plenty
of volume.

KENNETH R. SCHOFER,
629 N. Jefferson St.,
Allentown, Pa.

(Well, you now have one added to the
table of "Jiffy-like" receivers. We get so
hot up reading of the wonderful results you
boast of with the "Doerle" family of receivers-
I'll have to go back and try one your-
selfs again.-Editor.)

FREE GLOBES

Do you wish to get one of the beautiful
globes, as shown on inside
back cover, absolutely free of
charge?

Do you wish to get the
OFFICIAL SHORT WAVE
RADIO MANUAL, shown on page
196, absolutely free of charge?

Do you wish to get a World
Time Clock of the World
showing you what time it is in every part
of the world, absolutely free of charge?

Please let me show you how.

Send immediately for my new
down with the "Bloopers!"

Editor, Short Wave Craft:

About twelve years ago, I, with the rest
of the boys, was buying my own "oomp-
meat boxes. I still have around some of the
old crystals and "visiting cards" we
used in those days. After a few months of
experimenting with these "advanced"
pieces of apparatus, I reached a
stage in my efforts to get 198 tubes, that is, when
I could spare a week's salary to buy one or
two.

After six months of that, I sadly put
the set on the shelf. The night air was so
full of "Bloopers" that the apparatus
was not adequate for the "Bloopers" that satisfac-
tory reception was impossible. Now, of course,
the development of commercial sets has done
away with all that.

However, I am afraid that the same
situation is going to arise in the short-wave
sphere. A very large number of the cir-
cuits you publish, and a great many of the
earliest experimental sets advertised, are
regenerative without any radio frequency
tube to block the oscillations from the
aerial. And now, I find that quite fre-
quent reception of some program is
marred by squeals and howls from some
receiver. Would it not be well to
use your influence against the construc-
tion of such sets? With the increasing
trend toward high-gain receivers, the
condition is bound to get worse.

Although I am but a "screw driver" elec-
trician, as far as my experience goes, myself,
I was led about three years ago by
your magazine to start experimenting in
short waves. Since, I have gotten led to
another, and I now have a nine-tube super-
heter which is a composite of every
good feature I have ever heard of, or could think of.

Of course, I don't pretend to land the
earth with the same of these "tuners" do; and,
I have known the RCA and NBC to fall down
more than once on "foreign" reception. But
if it's on the air and can be gotten, I can
get it!

ALLEN R. HALLOCK,
502 Summer Ave.,
Newark, N. J.

(That's the spirit, Allen, "if it's on the
air... I can get it." In the same breath,
it is apparent that you've checked all
the stages in your receiver, until they are
working with "peanut" efficiency. Some oper-
ators use 12 tubes in poorly designed stages
and consequently all they hear is "locals." I
often think the "Bloopers" -well the world is
looking for a genius who will roll the
"bloop" out but still leave the "high pain"
for the "Doerle" family of receivers.
A stage of R.F. ahead of the detector
will prevent radiation of the "squeal," but
there must be a cheaper and simpler meth-
ood.-Editor.)

MARCONI VERSUS TESLA'S
WAVE THEORIES

Editor, Short Wave Craft:

I read with great interest the article
"Marconi's Ideas on Wave Propagation.
With due respect to both he and Dr. Nikola
Tesla, I feel that both are wrong. I leave
it to you whether the following facts and
theories are enough to justify disbelief:

According to Dr. Tesla, radio waves
tavel via the ground. How then, can the
operation of airplane-to-ground systems be
explained? Some say this is explained by
the fact that the carbide of silicon has a
capacity to the earth and the two form a condenser.
Did you ever stop to think just how minute the
capacity of such a condenser would be,
just how few micro-micro-ferarads, with
an airplane say 2 miles above the earth?
Did you ever stop to think of the immensity
of the dielectric losses in such a condenser?
The transfer of energy would be too
minute for consideration.

Static radio interference produced by
lightnings is another proof of the ground-
wave theory. There is no connection be-
tween the earth and the discharge in such
an action.

Now Senator Marconi, and thousands of
other radio men, believe that radio waves
tavel through the earth. How then, could
submarine establish communication? A
radio wave would have as much chance
of getting through salt water and breaking
space into an oil-burner sailorman would
have in Florida.

In view of the above remarks, I can't see
how either medium could carry the
radio waves. Neither of the mediums are
used to result there is no need for any
medium, for after we are dealing with
radio waves they are negligible with
a form of energy (in electricity) rather
than material objects, and it is not so
important that the Liquids try to make one follow
the laws of the others.

JOHN A. KIRK, W3CRB,
(REFRESHING OUTLOOK, TO SAY THE LEAST, JOHN. IT WOULD SEEM THAT BOTH THEORIES ARE RIGHT, TO SAY THE SPACE WAVE THEORY AND THE ELECTRO-MAGNETICALLY RELATED TO THE GROUND WAVE. IF WE BLEN THE TWO THEORIES THE PHENOMENA OF THE GROUND WAVE COMMUNICATION BECOME MUCH CLEVER. WHAT HAPPENS WITH THE CASE OF ULTRA SHORT WAVES REQUIRE A LOT MORE STUDY.-EDITOR.)

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ing performance. These features include: Automatic Select-o-Tone, Simplified Automatic Volume Control, 16 New-Style Tubes, Balanced Unit Superhetodyne Circuit, Automatic Tone Compensation, 16 Tuned Cir-
cuits, R/C Settterity, etc. Write for Free catalog.

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SHORT WAVE CRAFT for AUGUST, 1934

5-Meter "Bear-Cat" Up-To-Date
(Continued from page 203)
adds to the overall efficiency and "gain" of the receiver, but its main purpose is to
blank the entire receiver and maintain a constant load between the output tube and
the 56 detector and speaker frequency tube, thus resulting in greater stability with less
radio-frequency appearing in the plate of the audio stage and less body-capacity
effect when using earphones.
Arrangement of the Parts
Looking at the front of the receiver, one
sees the main tuning rotor, regeneration con-
trol, insulated phone jack conveniently
placed for ear-phone operation (or to be fed
with a separate oscillator through an audio
frequency amplifier for further gain, if re-
quired). On the rear side of the box one
finds the antenna which is of the high
quality, glazed-porcelain type, and the four
prong socket which conducts the filament
and plate voltages from the power supply
whether it be batteries or some type of A.C.
power supply unit.
While this receiver was originally de-
signed for use with 56 type tubes, which are
of the most popular variety, very satisfactory
operation was obtained by using 37's on a
6-volt storage battery. A plate voltage of
100 is still necessary for smooth operation,
the same as for the 56 type tubes and no dis-
culty was encountered with any antenna when using either type of tubes.
Placement of the parts of this oversize
aluminum case provides the minimum loss
effect from the shielding with the highest
efficiency possible. The wood, which is
made of well dried wood, holds the sockets
above the ground plane and "leak" and the
main tuning condenser with its flexible drive
coupling and bakelite shaft, while the 25/2
m.h. R.F. choke and all other associated
by-pass condensers and A.C. coupling resis-
tors and bias resistors, are placed under-
neath the main portion of the case, so that
the 25/2 meter frequency choke be placed at
right angles to the main tuning inductance.
A study of the parts list shows just how
each part should be placed.
The operation of this receiver is sim-
pleity itself. Connect an antenna to the
antenna post; connect a 2 1/2 volt or 6 volt
filament source, depending upon whether
you are using the tubes or the 56 type tubes
and between ground and B+ connect the
battery or "B" eliminator capable of sup-
plying voltages between 120 and 250. If the
1 megohm potentiometer until the familiar
superregenerative "rush or hiss" is heard and
note that while the frequency slowly until sig-
111l is tuned in. Readjust the antenna drive-
coupling condenser if the receiver does not
oscil-
late by decreasing the coupling. It may be
that the antenna is too long, or there are
other absorption factors entering into the
antenna system which would prevent the
detector tube from functioning satisfac-
tory.
If changes in the condenser do not ma-
terially affect the condition of the regenera-
tion and oscillation, advance the plate volt-
age until such point is reached where
full control can be obtained. In general it
would not be necessary to have a voltage
higher than 100 volts at any time.
Parts List for Denton 5-Meter Receiver
1—(approximately) 10 mmf, grid vari-
dable condenser.
1—000 plf, mica condenser.
1—mf by-pass condenser.
5—top plate 56 phone sockets.
2—mehom grid leak.
1—megohm fixed resistor.
1—10,000 ohm wave chokes.
1—000 ohm wave potentiometer.
1—special inductance (homemade)—see
text.
2-Type 56 RCA Radiotron tubes.
1—6 * 106 x 7 x chassis. Bias: Insulate.

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For the first time, it is now possible for the experiment-
er and short wave enthusi-
ast to obtain the most exhaustive
data on short wave coil winding
information that has ever ap-
peared in print.
As every experimenter who has
ever tried to build a short wave set
knows only 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 pres-
tant 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. It is the modern
"dope" has been published here.
No duplication. Illustrations gal-
erge, and a quiz covering coil
winding only full instruc-
tions how to wind coils, but dimen-
sions, sizes of wire, curves, how
to plot them, and means of which
coil for any particular short wave
set can be figured in advance, as to
number of turns, size of wire, spac-
ing, etc.
There has never been such data
published in such easily accessible
form as this.
Take advantage of the special
offer we are making, as the rev-
to increasing costs, there is no ques-
tion that the price will increase
soon.

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City and State
amplification of around 20 in this manner. Of course, the absolute value of amplification cannot be determined by the lead connected across terminals 3 and 4, but in any case it is much better to use the type T. No. 563, built in a nine-tube type circuit, which is one of the many triode type tubes available on the market, which are of the lower Mu type.

The rectifier and condenser C-9 is necessary to prevent regenerative action, and also aids in hum filtering. The height of the plate voltage is very well maintained and works out very well as a half wave rectifier; notice the arrangement of the filaments. Starting at the filament of the T2Z and continuing on, going over to the first R.F. stage, then going back over to the first audio stage and placing the filament of the 77 high-gain detector at the lowest potential end, being negative, as indicated in the schematic diagram, we may obtain the most satisfactory filament position in respect to hum and balance and it works out very satisfactorily.

Condenser C-13 is a very important unit and takes out any traces of hum which might exist in receivers of this kind. C-13 in many instances can be very small in value, viz., 100 mmf, but in this particular case it has a larger size condenser available, and as it worked out very satisfactorily, we used the 400 mmf. type.

The filtering is accomplished by two 5,000 ohm resistors and condensers C-10, C-11, C-12. The output circuit of the 77 audio tube connects to the first section of this resistance-capacity filter network and the output circuit of the 77 R.F. stage connects to the output of the entire filter. This works out very satisfactorily, and smooth operation is obtained on all bands.

Operating Hints

There are a few wrinkles in this receiver which should be mentioned. When plugging into the A.C. line in one direction you will notice a very severe ripple. Reversal of the power plug will throw the ground on the proper side and give satisfactory operation and by satisfactory is meant absolutely quiet operation when speaking at the loud. Of course if phones are used with this receiver there will be a certain amount of noise due to the high gain of the 77 detector and the 77 audio stages.

The receiver offers no real problems to the amateur and all wires can be assembled quickly. The B negative line must be insulated from the chassis and condenser C-2 must also be insulated from the chassis, as the plate voltage of the 78 tube flows to the secondary winding of L. C-3 being connected across the secondary of L will be necessary to connect the ground or rotor plate of the condenser to the B- end of the coil. An alternative way of working this out would be to ground the rotor plate and connect Condenser C-15 between the B- and the B+ end of the grid winding of coil L.

All Wave 15-2,000 Meters

**Parts List**

1- Na-Ald 704HS Coil Kit (1).  
2- Na-Ald 704WHS Coil Kit (1).  
3- Na-Ald 704H,WS Coll Kit (1).  
4- Na-Ald Coll Selectors, Type 700.  
5- 127 V, 2.2 mw. Radio Frequency Choke (RFC).  
6- Na-Ald Antenna-Ground Strip, Type 300 (1, 2).  
7- Na-Ald Insulated Screen-Grid Clips, Type 91L.  
8- Hammarlund Tuning Condenser, 0.005 mf. (C3).  
9- Isolatite, 6-prong Sockets-Hammarlund (4).  
10- Speaker Twin Post (3, 4).  
11- Acratest 4-prong Wafer Socket (1223).  
12- 400-volt Electrolytic Condensers (C11, C12).  
13- 1 mf., 400-volt Tubular Condensers (C16, C17).  
14- Electrolytic Condenser, cardboard type, 10 mf. 400 volts (C10).  
15- Tubular Condenser, 01 mf., 400 volts (C2).

16- 25 mf., 30-volt Electrolytic Condenser (C9).  
17- Type GR By-Pass Condenser, 5 mf., 200 volts (C7).  
18- Tubular Condenser, 0.0025 mf., 400 volts (C8).  
19- Acratest Mica Condensers, 0.0005 mf. (C13).  
20- 1,000 ohm Potentiometer, Type 6151 (R5).  
21- Acratest 6.000 ohm, 0.5 watt Resistor (R11).  
22- 300 ohm, 0.5 watt Resistor (R12).  
23- 75,000 ohm, 0.5 watt Resistors (R3, R6).  
24- Acratest 2 ohm, 0.5 watt Resistor (R14).  
25- Acratest 250,000 ohm, 0.5 watt Resistor (R7).  
26- Acratest 1 meg., 0.5 watt Resistor (R8).  
27- Acratest 2,000 ohm, 0.5 watt Resistor (R9).  
28- Acratest 5,000 ohm, 1 watt Resistors (R10, R11).  
29- Acratest Resistor Power Cord, Type 8226 (R12).  
30- Power Switch (S).  
31- Suppressor Condenser (Korol).  
32- Acratest Dial, Type 7770 and 4043 Echocyn.  
33- 0.1 mf. Grid Coupling Unit (Harm).  
34- Flexible Coupling Unit, Hammarlund (National).  
35- Tube Shields (Acratest).  
36- Set of Insulating Washers for Potentiometer.  
37- Baffle Knobs.  
38- Rubber Bushing.

**Table of Values**

<table>
<thead>
<tr>
<th>Channel</th>
<th>Type</th>
<th>Plate</th>
<th>R.F.</th>
<th>VOLUME</th>
<th>TUNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Type 77 Pentodes, R.C.A. Radiotron (Aro).</td>
<td></td>
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</tbody>
</table>

**BAND-SPREAD COILS**

- Alden 704S WB (Amateur Bands).
- Alden 704S WBC (Short-wave Broadcast Bands).

---

The three volumes of this Library cover the entire field of building, repairing and "trouble-shooting" on modern tube radio receivers. The Library is up-to-the-minute in every respect and is based on the very latest developments in design and construction. The rapidly-growing interest in short-wave and television reception is thoroughly covered in a complete section which deals with the construction of this type of apparatus.

---

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**Short Wave Craft for August, 1934**

**15 to 2,000 Meters on this Receiver**

(Continued from page 200)

building, testing and repairing all kinds of radio receivers!

---

**www.americanradiohistory.com**
An Ultra Short-Wave Transmitter

(Continued from page 203)

ultra-short wave experimenters. The principle of push-pull is probably known to every amateur and the advantages derived from such a circuit are quite evident. The construction of this receiver which uses 2 output power tubes (the same type as in the previous circuit) is shown in Fig. 8. The variable gang condenser which has two plates on each rotor and each plate in one stator is one of the simple adjustments. The grid coil of this coil is about 16 cm. (63/4 inches). The grid coil, which consists of four turn, 4 cm. (1.6 inch) in diameter is placed between the two tubes.

The most favorable conditions of operation can be found by pulling out or by compression together the turns of this coil. At the rear end are located the three chokes, each having 18 turns wound on a tube 27 mm. (1 inch) in diameter. The choke coil in the middle is connected to the oscillator coil by a flexible lead with a slip at the end. The displacement of the slider enables you to balance out the circuit in case the tubes are not absolutely identical.

The circuit shown in Fig. 4 is very simple and should not give the amateur any headaches. A series of repeated measurements of the wavelengths of this transmitter in Louisville the Lechler wire system showed that the differences between the separate measurements were very small, a fact which should be attributed rather to the accuracy of the measuring method, than to the variations of the wavelengths.

Without the use of an antenna and under the most unfavorable conditions we were able to transmit in the city regularly and without fading effects over a distance of one-half of the kilometer (1,640 ft.). It is worthwhile to note, as we learned from our experience, that for experimenting with ultra-short waves the receiver (see page 586 of the February issue) is generally the weakest point and that its construction has been completely neglected. For our tests we had to design a special ultra-short-wave receiver using 10 volts on a tube 27 mm. (1 inch) in diameter. The coil is connected to the oscillator coil by a flexible lead with a slip at the end. The displacement of the slider enables you to balance out the circuit in case the tubes are not absolutely identical.

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Short Wave Scouts
(Continued from page 211)

W9HX—40.10; Maritime Broadcasting Co., Ltd., Halifax, Nova Scotia, Canada, broadcast English National Annotations.

CJ2—23.13; Canadian Marconi Co., Drummondville, Ont., Canada. Phone number.

C5G4—61.11; Canadian Marconi Co., Drummondville, Ont., Canada. Phone number.

WXKX—27.27; Westhinghouse Elec. & Mfg. Co., Pittsburgh, Pa., U. S. Relays TCAU.

WXKX—48.86; Westhinghouse Elec. & Mfg. Co., Pittsburgh, Pa., U. S. Relays TCAU.

WXAX—14.50; Crosley Radio Corp., Cincinnati, Ohio, U. S. Relays WJL.

WX31E—28.29; WCAU Broadcasting Corp., Newton Square, Pa., U. S. Relays WJL.

WXAX—14.50; WCAU Broadcasting Corp., Newton Square, Pa., U. S. Relays WJL.

WXAX—48.56; Isle of Dreams Broadcasting Corp., Miami, Florida, U. S. Relays WJL. (Continued)

KJKW—21.77; R. C. A., Holman, Cal., U. S. Relays long Distance Broadcasting System.

WXAX—24.30; National Electric Co., One River Road, Schenectady, N. Y., U. S. Relays WJL.

WX4BY—14.15; National Broadcasting Co., Downer's Grove, Ill., Chicago, Ill., U. S. Relays WNBR.


WX4BY—19.92; American Tel. & Telegraph Co., Harrison, Fla., U. S. Works N.A.

WX4BY—40.02; Atlantic Broadcasting Corp., Wayne, N. J., U. S. Relays WJL.

WX4BY—27.36; Atlantic Broadcasting Corp., Wayne, N. J., U. S. Relays WJL.

WX4BY—35.59; British Broadcasting Corp., Daventry, England, U. S. Relays WJL.


WX31E—19.92; General Electric Co., One River Road, Schenectady, N. Y., U. S. Relays WJL.

GCH—32.33; English Post Office Dept., Rugby, Warwickshire, England, Phone to New York.

WX144—72.21; American Tel. & Telegraph Co., Holmen, Wis., U. S. Works South America, U. R. S. C.


DJA—31.38; Reichs-Rundfunk-Gesellschaft, Berlin—Charlottenburg 9, Germany, Chimes interspersed.

WX144—29.15; Boston, Mass., U. S. Works WEEI.

FE—59.57; Hamilton, Bermuda. Heard testing.


KKP—18.25; Honolulu, Hawaii. Works KK and KEQ.

PPM—25.06; Rio de Janeiro, Brazil. S. A. Tests correspond with New York.

JHG—20.08; Bogota, Columbia, S. A. Works WNC.

HPT—26.08; Panama, Panama, C. A. Works Manilla.

*Last month verification.

Trophy Contest Entry Rules
• The rules for entries in the Short Wave Scout Trophy Contest have been amended and only 50 per cent of your list of stations submitted need be verified. If, for example, you send in a list of 100 stations with 50 verification cards, you will receive credit for the other 50 per cent or 100 stations total. The trophy will be awarded to the station Scout who has logged the greatest number of shortwave stations during any 30 day period. The contest has run for 50 per cent of the time, so there is no pressing need for the immediate month preceding the closing date. The complete list is reproduced in the last issue of this magazine.

In the event of a tie between two or more contestants, the number of stations (each accompanied by the required 50 per cent verifications) will be chosen. The judges will then select the contestant in the contest on a single station basis, an easier contest to keep up with.

Each list of stations heard and submitted in the contest must be sworn to before a Notary Public and testify to the fact that the list of stations heard were "logged" over a given 30 day period, that reception was verified and that the contestant personally listened to the station announcements as given in the list.

www.americanradiohistory.com
Only commercial "phone" stations should be entered in your list, no "amateur" transmitters or "commercial call" stations. The contest will close every month on the first day of the month, by which time all entries must have been mailed to the post office in New York City. Entries received after this date will be held over for the next month's contest. The next contest will close in New York City, August 1.

The judges of the contest will be the editors of SHORT WAVE CRAFT, and their findings will be final. Trophy awards will be made every month, at which time the trophy will be turned over to the winner.

The proceeds of the contesting Scouts not winning a trophy will be listed in \textit{Honoroble Mention} column. Each contest question are exclusive of all employees and their families of Short Wave Craft magazine. Address all entries to Short Wave Scout Award, 90-101 Hudson Street, New York City.

\section*{Short-Wave Interval Signals}

All stations taking the N.R.C. program—such as the Saxonburg, Schenectady, Round Rock, and MILLS Development—transmit at the same three telephone-like notes: you will also pick them up through W9NAA (Chillicothe) and WXNAX (Downer's Grove), and WXNAX (Mason).

Some of the Canadian studios have adapted a similar idea. VE2AH has a call MFD: 20-25.8-50 meters, which takes its broadcasts from CICW, Fleming (Sask.), sometimes opens up for QSO with VE2AH, and between dates strikes a gong four times: VE2AHX on 40.07 meters, relaying CHNS, Halifax, Fifteen seconds later a call four seconds, on a similar instrument. VE3CSX, on 49.30 meters, as the long-wave mouthpiece of CFCV, Vancouver, uses two bells for the same purpose.

Of late the South American studios, whose broadcasts are also transmitted on short waves, have offered us a number of diverse signals. HCBJ, Quito (Ecuador), on 53 meters, gives its calls in Spanish and English, punctuating them with a two-tone chime: HKC, Tecnogalpa (Honduras), when working on 49.30 meters, emits a cuckoo call, three times, somewhat similar to that from Ljubljana on medium waves; YAVH, in Quito, on 49.30 meters, strikes a gong before announcing and YV1AC, Caracas (49.06 meters), knocks three bells before fixing two minutes.

A whole line has been adopted by HKC, Bogota (Colombia), on 48.83 meters; and from the Radio Club of Brazil for its transmission on 36.45 meters you will hear three bells.

Finally, VK2ME, Sydney (31.28 meters), is easily identified by the peculiar cery of the cockaburra bird, or laughing jackass; sometimes when distorted it might be taken for the bark of a small dog: VK3ME, Melbourne, opens its broadcast by relaying clock chimes.

As an example of care to tune in to PMQ or PLF. Band smooch, on responding 10.56 and 16.81 meters, you will pick up, previously mentioned, the "call" of a radio station, the sound of notes somewhat reminiscent of a melodious three-note motorhorn (E, G, Bb).

In the same way the FW group of transmitters at St. Assise (France) working together, Bony, Lebada (Morocco), Bonny Aires (Argentine), present the transmission with a Morse letter F, followed at intervals by three "shorts"—e.g., KNY. For Bonny Aires, will be found to give on 16.55, 16.70 meters and 14.45 meters four notes (E, G, Bb, Sharp G), as if played on a vibraphone.

DBF, Nauen (Germany) in daily touch with Marlow and Bonny Aires (Argentina) on 17.12 meters, announces itself by a three-tone whistle (D, C, Bb).

PHI, Huizen, uses a metronome; Moscow gives you the Internationale at beginning and end of broadcast.

\section*{The Short-Wave Fan's Bible}

\textbf{OFFICIAL SHORT WAVE \textit{LOG AND CALL MAGAZINE}}

\textbf{NEARLY 9,000 WORLD WIDE SHORT WAVE STATIONS Listed in this Book!}

\section*{PARTIAL CONTENTS}

This magazine contains the latest list of short-wave stations ever published; for sections give you dial set dials, times, date, call letters, location and other in-formation; over 10,000 signed and dated pages on which you can fill in frequency surveys; World Air-ears on charts showing various stations in the world; \textit{ interstate} line changes on charts showing various stations in the world; \textit{Hertzian} line changes on charts showing various stations in the world.

\section*{FREE OFFER}

For sale on all large newsstands—look for the yellow cover.

\section*{25c a Copy}
How To Build A Simple R.F. Booster

(Continued from page 296)

build an R.F. amplifier do not fail to incorporate in it a volume control. Without it nearly all the short-wave broadcast stations would be invisible to the receiver and the result would be a very poor quality sound or music. Regular short-wave plug-in coils are used and are connected in series with the antenna.

There are two types of sets that this booster will probably be used on: one having a built-in antenna condenser which couples the antenna directly to the grid of the detector tube and another where the antenna is connected inductively to the coil through a small winding, such as that used in the booster. These sets are usually thought of as having one or two stages. For any type of set there will be a different method used to couple the booster to the input. In some cases, when the antenna condenser is an amplifier trimmer it is a very easy matter to merely clip the out-put wire of the booster stage on the moving post of the input stage so that a small amount of coupling will be had. The output lead can also be connected to the antenna post, but better results will be obtained if the amplifier is connected directly to the grid of the first tube. This is done by inserting a small flexible coupling, or heart-shaped coupling, in series with the lead directly at the grid terminal of the tube of coil. This capacity should not be greater than is necessary, otherwise it may increase the input resistance (254,000 ohms), thus keeping the drain on the B battery very small. A three-point snap switch is used for cutting off both A and B supplies simultaneously, in conjunction with a ten-ohm rheostat, R5. Note carefully the wiring of the H—wire of this switch. If this lead were taken permanently to A, the meter would continuously consume current from the B battery; whether the set were in use or not. This current would add on to a fraction of a milliampere, it is well worth saving. The three-point switch is used to shut off.

Antenna, ground and headphone connections are made through the back of the end of the chassis as given in the text. The various resistors and condensers are as follows:

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The condenser C1 consists of the usual two pieces of insulated wire twisted together to form the required capacity. The two wires are connected between the two bonding posts of the back of the case, one of the binding posts (A2) being connected directly to the grid end of the tuning coil on the receiver chassis. The potential of R6 will have to be adjusted to mount on insulating washers if the spindle is in direct contact with the moving arm. You may have to adjust the exact centre whilst in others the spider and the moving arm are in direct contact.

Now for some results! The writer, using this receiver on the northwest coast of England, has heard most of the usual short wave stations on the receiver and when conditions are at all favorable, most of the prominent American short wave stations can be tuned in with a simple aerial.

When a new A battery is first wired, the rheostat should be turned only just on, that is, with as much resistance wire in circuit as possible (provided the meter is used), it can then be left in this position until the battery voltage drops sufficiently to cause oscillations to stop, the snap switch being used for switching on and off. This will ensure the best tube life.

My Idea Of A Good Battery All-Wave Portable

(Continued from page 207)

to positive A supply, the regeneration control was smooth on the lower wave-lengths but above about 20 meters was inclined to be somewhat plonk-and-plunk and in this condition did not provide easy reception of the weaker stations. When the moving leg was used, this fault was absolutely cured and a smoother regeneration control could not be imagined. This 35 mmf. was designed to be of a very high resistance (254,000 ohms), thus keeping the drain on the B battery very small. A three-point snap switch is used for cutting off both A and B supplies simultaneously, in conjunction with a ten-ohm rheostat, R5. Note carefully the wiring of the H—wire of this switch. If this lead were taken permanently to A, the meter would continuously consume current from the B battery; whether the set were in use or not. This current would add on to a fraction of a milliampere, it is well worth saving. The three-point switch is used to shut off.

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The Handy Hammarlund R. F. Choke

THERE are so many restricted spaces where an R.F. Choke would improve the operation of a circuit, these new Hammarlund Models are the answer to the radio constructor’s prayer. They are so small, compact and light, they are amply supported by their tinnel copper legs. And so inexpensive they may be used generously wherever R.F. filtering is desirable.

Five universal-wound plugs on Isolinite core, Inductance, 2.1 mh. 10C. resistance, 15 ohms. Distributed capacity, 1 mfd. Length across caps., 15/8”. Diameter, .32”. Current, 125 milliamperes.

Whatever your radio needs may be, consult the Hammarlund Catalog first.

Write first, SW-8 for Complete 1944 Catalog.
very well. Amateurs in each district of the United States were tuned-in in the course of an evening, as well as amateurs in Canada. EAQ on 30.4 meters was received with more than ample room volume; GSB, GSA, GUN, and GSN, in Way-ey, England, are received regularly and the programs are thoroughly enjoyable.

The oscillator tube is a 56 triode, the plate circuit of which is tuned by one of the 2091141 muf. condensers. The detector (first) is a 57 pentode, the grid circuit of which is tuned by the remaining 140 muf. section of the two-gang condenser. The only coupling existing between the heater detector and the oscillator is through the coupling of the oscillator and detector coils by utilizing one coil form for both circuits. These coils and tuning condensers are completely shielded for maximum efficiency.

The intermediate frequency amplifier, which is peaked at 45 kc, employs three type 5N variable mu. R.F., pentodes, providing maximum gain, selectivity and sensitivity. The sensitivity of this I.F. amplifier is controlled by varying the cathode resistor. This sensitivity control is a great aid in eliminating noisy reception in districts where static is especially troublesome. This I.F. amplifier is completely shielded and all oscillation is prevented by the use of adequate chokes and condensers in the by-passing of the various circuits.

A type 55 duplex-diode triode is used as second-detector, automatic volume control and audio amplifier. The use of the 55 eliminates the necessity of using a separate tube to obtain the same results.

The A.F. amplifier is resistance coupled as far as the output stage, thus insures good quality of reproduction from the 2A3's in the push-pull out put stage insure good volume even on the weaker signals. The first A.F. stage is a type which is usually troublesome. This I.F. amplifier is completely shielded and all oscillation is prevented by the use of adequate chokes and condensers in the by-passing of the various circuits.

The speaker used with this receiver is 11½ inches diameter, and can handle a continuous output of ten watts.

Parts List—Kelley Circuit

| CC—140 muf. Hammond Lund Dual Cond. | Mids. |
| C3—1.0 mf. Condenser. | |
| C4—0.004 mf. Condenser. | |
| C5—2.0 mf. Dual Condenser. | |
| C6—4.0 mf. Dual Condenser. | |
| C7—2.0 mf. Dual Condenser. | |
| C8—2.0 mf. Single Condenser. | |
| C9—0.005 mf. | |
| C10—250 mf. | |
| C11—25 mf. | |
| C12—25 mf. | |
| C13—25 mf. | |
| C14—1 mf. | |
| C15—1 mf. | |
| C16—0.01 mf. | |
| C17—1 mf. | |
| C18—3 mf. | |
| C19—8 mf. | |
| C20—8 mf. | |
| C21—4 mf. | |
| C22—250 mf. | |
| C23—0.004 mf. | |
| C24—0.001 mf. | |
| C25—26.27—1 mf. | |

A 12-Tube S—W Receiver

(Continued from page 215)

The All-Electric 3 SHORT WAVE RECEIVER

Greatest! 3 Tube Value on the Market For 67¢. (2 inches in length) and 14 tubes as screen grid, and a relay and complete built-in power supply. No batteries needed. No terrific cost. From 100 watt A.C. or D.C. Directly from a 110-volt A.C. or D.C. house, or battery-operated, good volume, and free from hum. Range 16-200 meters (Canadian and Foreign stations). Mounted on heavy, crackle finish chassis and painted and branded. Comes in a simple instructions furnished. Foreign Reception Guaranteed. Circular sent on request.

Kit assembled ................................ $5.55
Wired and tested, extra ........................ 1.25
Boxes, tubes, extra .............................. 0.50

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As a child, you understood spoken English long before you could read or write. You learned by HEARING, (OHM is the same way.) Why make it hard for yourself trying to learn with old-fashioned printed lessons alone? TELEPLEX as you see, and learn half in half the time, with The New Master Teleplex. This wonderful invention renews your memories of your -days spent back to you through headphones! The natural method: beginners learn faster, ops spend up their WPM amazingly. Used by C. S. Army and Navy, R.C.A. A. T. & T. and others. Write the New Master Teleplex Company, 67 Cortlandt Street, New York City, N. Y. for a free sample lesson...all under money-back guarantee. 30-80 words in 30 days. TELEPLEX COMPANY

76 Cortlandt Street New York, N. Y.

SOUND MEANS See page 251 PROFITS

ALLIED RADIO

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NEW YORK, N. Y.
we feel that the coil changing system employed in the Postal Deluxe Converter has many notable and dependable features.

Tuning Circuit Features

The difficulty of tuning in short wave stations has been effectively eliminated by careful, complete, capacitative and inductive relationship of tuning system.

In order to produce a high R.F. voltage on the first detector intermediate frequency the lowest detector a high LC ratio is employed, is that, a large inductance and small capacity is used in preference to a small high, large capacity. This favorable condition is brought about by using space wound coils utilizing solid enameled core wire, together with a two gang tuning condenser rated at 140 mfd.

In order to further increase the voltage on the grid of the detector tube, the input antenna "loading" is kept unusually low.

Loose inductive coupling is used in preference to capacitative coupling so as to eliminate the introduction of any capacitative losses in the detector grid circuit.

Four coil are employed to cover the short wave spectrum in the following steps:

* Coil A from 35 to 30 meters (23,000 to 9,966 kc.)
* Coil B from 60 meters to 50 meters (5,250 to 4,166 kc.)
* Coil C from 120 meters to 100 meters (1,080 to 916 kc.)
* Coil D from 220 meters to 200 meters (450 to 375 kc.)

It will be noted that each coil has an approximate frequency ratio of 2:1, which provides for broad separation in the bands so as to greatly simplify the process of tuning as well as the problem of accurate oscillator tracking over the entire tuning range.

The Circuit

The circuit of this converter is shown in Fig. 1B. It will be noted that it is appreciably different from the usual run of converter circuits, particularly in respect to the use of separate oscillator and tetrad detector as well as the inclusion of high gain I.F. stage.

Good engineering principles were adhered to when it was decided to use two separate tubes for the first detector and high frequency oscillator, particularly because separating the two jobs provides for a greater oscillator stability. In most pentagrid converter circuits, particularly those using one multi-purpose tube for frequency inversion and detector, the oscillator efficiency of the tube rapidly diminishes the frequency increases due to decrease of capacitative reactance of the input circuit. The employment of a separate oscillator and a separate grid tuned mixer (first detector), provides for an unusual efficient form of frequency inversion. In fact continuous and dependable reception can be maintained on the 14 meter band (20兆周). The antenna feeds into the primary of the 1st detector coil L (Fig. 3) the secondary of which is connected to the tuned mixer 77 (TT). A blu resistor of 3,000 ohms is used in the cathode lead of the rube provides suitable bias. The biasing resistor is shunted with a 300 uf. condenser (C1). The screen is given a lower positive potential than the plate, the voltage being reduced by a 300,000 ohm resistor (R1). A bypass condenser of .1 mf. (C9) is connected across the voltage reducing resistor in order to insure freedom from signal fluctuations of the screen potential.

For short wave coverage, however, a high selectivity intermediate frequency is always preferable in order to avoid interlocking between the carrier frequency and the oscillator frequency. The Deluxe converter employs a 545 kc. because of the following reasons: first, because it is the lowest frequency bordering the broadcast band; second, because there is danger of any broadcast police signal forcing its way into I.F. amplifier and amplitude modulation; third, because a more stable gain is possible at this frequency than at any other broadcast frequency; third, because a better selectivity is available at this frequency as compared with 50 kc. selectivity at the opposite end of the broadcast band (1500 kc.).

Power Supply System

The Deluxe Converter is completely self-powered. The standard model operates from 110-v. A.C. house line and consumes less than 25 watts. Its operation, however, is not restricted to 32 or 110 volts D.C. or from two volt at cells as well as six volt storage batteries.

Universal Antenna Provision

Another notable feature of great importance in the Deluxe Converter is the provision for use of any type of antenna and fac- doublet, transmission line, shielded systems and special noise reducing antenna. The Deluxe Converter isolates the antenna primary from the chassis by bringing both leads out to two insulated binding posts B1 and B2. A third post, B13, is connected to the chassis.

When transmission lines are used the line leads are connected to B1 and B2. A single wire antenna is connected to B1 and B2 is used. If special noise reducing antenna with coupling transformers is employed, the output of the transformers may be used as either a transmission line or single wire aerial depending upon the signal results obtained from comparative tests. It can therefore be seen that the Deluxe Converter will operate efficiently with any existing type of aerial without necessitating any internal changes.

Simplicity of Operation

All tuning is accomplished with one full vision illuminated vernier aeroplane dial. Both the oscillator and mixer tuning condensers are "ganged" to this one control—no additional external compensators or trimmers are employed. Perfect tracking is made possible by the use of precision coiled and factory aligned circuits wherein due compensation is given any discrimination over any portion of the tuning range.

Postal DeLuxe Super Converter

(Continued from page 218)

R17—50,000 ohms, 75 watts.
R18—25 meegohms.

Plan layout of 12-tube S.W. receiver.

RCA SPECIAL NOISE-REDUCING ANTENNA

The greatest advance in the development of short-wave antennas for RCA engineers have perfected a new all-wave double-doublet antenna system that gives greater signal pick-up and reduces man-made noise to a minimum. Higher efficiency because parts are scientifically matched. Also improved performance in broadcast reception. Easy to install. No bulky transposition blocks. "Unquestionably superior to anything we've tried so far," said Martin Gosh, Radio Columnist of New York Post Syndicate Newspapers. Kit of essential parts, List Price $9.50 can only be obtained from service engineer make a Certified Installation.
A Low Cost Power Tube For Receivers

(Continued from page 221)

Filter System

The filter system consists usually of condensers across the positive and negative output of the transformer—rectifier system, with chokes in series to prevent the negative or positive lead. Electrolytic condensers are the most compact type, and being generally made with a very low internal resistance will usually be good enough for any receiver power supply. One caution though. Always be sure to get good quality, reputable make of condenser. I had one of the surprises of my life when I saw several cheap brands of so-called m.f. electrolytics put across a capacity meter, while in operation. Their capacities much, A little series with the filament transformer. Likewise, cheap condensers usually have short life, and after a few years or so will have to be yanked out and replaced. Chokes should be 30 henry units capable of carrying the current needed. This pack is to supply 60 m.f.s. (M.) a choke with a 100 m.f. rating at thirty henries should be used. Actually with the condensers, do not buy cheap chokes.

Bleeder Resistor

For a pack up to 350 volts, a 25,000, 50 watt resistor is the correct bleeder. Sliders on the resistor will provide any desired voltage between high and ground. Remember to bypass every tap to ground through a condenser, even if it by-passed in the set. Should it be desired to by-pass the "C" bias point of the pack, it is only necessary to use some point above ground as "B" minus and the remaining connections to the pack to the negative point on pack will be at minus potential. This is shown in an accompanying diagram. The resistor is bypassed by a high capacity, low voltage condenser, generally 5 or 10 m.f. rated at 50 volts. The circuit for this is shown in the diagram, for a power tube such as a '45 or a '47, a resistor is put in series with the filament center-tap. This resistor is bypassed by a high capacity, low voltage condenser, generally 5 or 10 m.f. rated at 50 volts. This resistor should be 1500 ohms for a 47, 450 ohms. These resistors should be of 5 watt rating, wire-wound.

Tunable Hums

One annoyance sometimes encountered with home built sets is the so-called tunable hum, a hum appearing at certain frequencies, particularly when the set is oscillating. This hum is caused by the air gap in the core caused by the motion of the core. It consists simply of by-passing the elements of the rectifier tube with 002 m.f. mica condenser. The capacity is not critical and 0.01 m.f. may be used just as well. The little rf. choke between the rectifier tube and the first filter condenser is also a "hum-killing" gadget.

Remember to always use a good ground, and be sure that all chokes and transformers are grounded to the chassis. Likewise always to ground the center-tap of all filament windings, even in the relay circuits, as these are not being used on the set.

Parts List—Victor Power Supply

1—Chassis—American Sales Co.
2—Power transformer 225-0-225 V., 70 ma, 25 volts, 5 volts, R. Co.
2—25 heater filter chokes, 3 m.a., American Sales Co.
6—M.f. electrolytic condensers (500 V.)
1—D.C. power supply rectifier, 2 m.f. series with the filament transformer. (With slider.)
2—D.202 m.f. electrolytic condensers.
1—R.P. choke, 2.5 M.H. Hammerlund (I.C.A.)
2—3 prong waffer socket.
2—"O'N"-"O'N" (I.C.A.)
1—type 80 or 525 RCA1 Radiotron (Arco)
2—Chicago Radiotron Dist
1225 S. Michigan, Dept. 51-C, Chicago

Short Wave Craft for August, 1934

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Log 24.25 = 4
40.6% of 14.3 ft.
1.614-1 1.0 = 1.85 ft.

Solve easily all the theorems and of other math:
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NOT JUST ANOTHER CATALOG

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PARTIAL LIST OF CONTENTS


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CHICAGO TRADING CO.
101A Hudson Street New York City

CRAFT tests your intuition with its unique questions. Would you consider it a "bridge" or a "pier"?"
Universal Mascot 2 (Continued from page 217)

grid detector on the left-hand side of the chassis behind the tuning dial. The 10 on the right-hand side of the chassis behind the band-spread tuning condenser. The biasing point is made with the Fohsine clips, which the various battery leads are attached to, are mounted on a strip across the rear of chassis. The tubes are ten in all. Looking at the rear edge of the chassis, the antenna trimmer condenser is mounted at the right of this strip and the phone tip terminals are mounted on the left-hand side.

The circuit is more or less orthodox, the 22 detector being connected in a regular grid-leak detection circuit. The regeneration control is connected in series with the detector plate by-pass condenser. This affords extremely smooth control of regeneration.

The 12 tube, as mentioned above, is the audio amplifier. One section of the 10 resistance effectively consists of anode and tube, and the second triode unit of the 10 is resistance coupled to the first and the plate leads directly into the line. (Coil data for 3-coilings similar to those used in this set will be found in the "Questions Route, Department of the July issue."—Editor.)

The All-Electric Air Scout (Continued from page 217)

work as well on a.c. as d.c. It will operate on any voltage from 105 to 120 volts and when used on a.c. it will operate on any frequency from 12 to 14 cycles or even higher. The filaments of the two tubes are connected in series and then are connected to a 12 volt battery through a grid resistor which drops the voltage of the line down to the right value required for the tube filaments—5 volts for the set.

The set, when used on A.C., employs the 37 tube to replace the 12 A.C. for the plate supply. The filter system which removes the last vestige of hum and smooths out the pulsating effects of the 2000-mf. ohm resistor, by-passed at both ends by eight (8) electrolytic condensers. These are combined in a single compact cardboard container.

The voltage limiting resistor used in the filter system is 15,000 ohms, and is inserted in the line cord, thus saving space and at the same time distributing the heat away from the electrolytic and other delicate components of the set.

An antenna condenser in series with the antenna coil is used to be used with any length aerial. This adjustable condenser is also of great value in tuning in weak stations. The four prong plug in coils used have two windings. The longer winding is in the tuning circuit. A 0000515 uf. variable condenser is used, but accurate construction permits the set to be tuned smoothly over all bands from 10 to 50 meters. The shorter winding is used as a tickler winding. It is connected in the plate circuit of the 37 tube for very efficient regeneration which serves to "pop" up the circuit thus providing the necessary sensitivity for one-tubed receiver operation. The re-generative feature also aids the selectivity, so that even in localities where stations are congested, and the operator is not separated from them by difficulty. Control of regeneration is provided by a 75,000 ohm potentiometer mounted on the screen grid of the 68 S tube. This control handles very easily and is amazingly smooth. The usual fuss and bother generally associated with the tuning in of short wave stations is not present in this set. Grid-leak detection is employed instead of using a 5 mfd. grid-leak shunted by a 0001 mfd. micro condenser is conventional —but nevertheless the best design possible in this type, it will be noted that the tuned-grid circuit is by-passed by a good-sized (5.0 mfd.) fixed condenser.

The R.F. choke in the plate circuit in combination with the 00025 mfd. mica condenser, prevents R.F. currents from passing through the earphone.

Here is a new type of Radio Catalog—one which lists thousands of items of genuine interest to the amateur. A current demand throughout the Summer season! Why buy from an out-of-date catalog when Radio Headquarters brings you the latest, up-to-the-minute developments in this new, timely, low-priced supplement? You'll find A.C.-D.C. sets, portable phone-radio combinations, portable P.A., Marine Radio, and thousands of other summer selling items.

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SHORT WAVE CRAFT for AUGUST, 1934

249
New National Cathode-Ray Oscilloscope
(Continued from page 216)
**INTERNATIONAL 3**

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Sill Systems, COAST-To-COAST-RADIO-CORP.

99¢ built-in speaker; four in Greenwich

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waves

free

diagrams simplify construction

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**The Last Roundup**

No more when these are gone. The first and last advertisement of this GREATEST SET BUY IN AMERICA!

Famous Wright-Decoster 2-Volt Battery Set

If there ever was a greater value than this one offered before, we have yet to see it. The Wright-Decoster VII receiver, in its prime, several years back, cost upwards of $50 and tens of thousands of them were sold, yet now you can buy this same receiver at a fraction of that price, to be exact $10.95. Way below cost. Stuffed with every feature that makes the better set worth $25 or more. To say nothing of the beautiful cabinet. The Gold Hold, genuine Jewel meter alone, today, sells for more than $5.00.

But aside from all this, the set itself affects indescribable power. The selectivity and sensitivity, due to its 4-tuned stages are just as sharp as in a modern super- detector receiver. The circuit is of the tuned radio frequency type, which is the most efficient known arrangement. However, the current-operated V-O-T-A-M-ION circuit, which eliminates the usual tone control, permits the operator to cut anywhere convenient for the receiver. If taken out and set apart, it would not cost you more than $25.00; to say nothing of the beautiful cabinet. The Gold Hold, genuine Jewel meter alone, today, sells for more than $5.00.

**The Latest—A "Double-Doublit" Antenna**

(Continued from page 219)

vertical doublet, but, on the other hand, the horizontal doublet gives a better direct current signal-to-noise ratio. An advantage perhaps is that in some locations a vertical doublet of the type shown in Fig. 2 may be easier to install. Theoretically, the doublet should be arranged for the greatest angle of the wires, as shown in Fig. 2, in angle of 180 degrees with the other, for the best absorption. If this angle is reduced, the construction makes it possible to get in degrees signal strength will be decreased about 30 per cent from the signal received from the same antenna in its original form. Practically it receives best from stations located along the perpendicular and in the shade to the horizontal spanning.

The full 110 feet of lead-in cable supplied must always be used, regardless if the doublet has to be lengthened or shortened, as the foot, at the receiver end.

**Examples:**

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Line Number Length of Lead to Doubles</th>
<th>Used to be Coiled in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>110 feet</td>
<td>110 feet</td>
</tr>
<tr>
<td>550</td>
<td>20 feet</td>
<td>20 feet</td>
</tr>
<tr>
<td>300</td>
<td>3 feet</td>
<td>3 feet</td>
</tr>
<tr>
<td>500</td>
<td>6 feet</td>
<td>6 feet</td>
</tr>
</tbody>
</table>

*No coil necessary. Cut off unused portion*

Due to a most efficient match of the "double-double" to the receiver set for the shorter waves (3.5-5000 kcs.) to 20 megacycles, there would be an unavoidable loss introduced for the broadcasting police calls, etc., namely, 550 to 3500 kcs. A standard broadcast (STD) Short Wave (SW) switch is therefore provided on the receiver transformer for improving the reception of the stations operating on the frequencies between 350 and 3500 kcs.

The matching transformer is a specially developed unit designed to prevent the transmission line inductively to the receiver. The use of electrostatic shielding balances out the transmission to ground capacity. The transformer is designed to mount directly on the Antenna-Ground terminal box of RCA-Victor latest model All-Wave receivers, thereby insuring the shortest possible connection to the antenna and ground terminals. The installation of the transformer to a late-production RCA-Victor Model 140 is illustrated in Fig. 1. It is important to note that the length of the ground connection of the special transformer is critical. To insure maximum noise reduction, keep the connection as short as possible.

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SEXOLOGY, 95 Hudson Street, New York, N. Y.

**Gold Shield Products Co.**

96 PARK PLACE, NEW YORK
A Practical Line Filter For S-W Receivers

By A. D. Longe

**THIS filter proved it could absolutely eliminate every trace of line noise in the short-wave receiver between 11 and 200 meters.**

Dual-lateral or "honey-comb" coil with its low distributed capacity was found to be most effective. Incidentally, as the inductances must be able to carry the entire current drawn by the receiver, the heavy wire used in the "Fultest" dual-lateral coils makes them admirably suited for use in this filter.

The condensers should be of the mica type, moulded in bakelite, as they are non-inductive, have no leakage, and more insipid to atmospheric conditions. The value of the four fixed condensers used is 500 μf. The power cord between the filter may be substituted but the filter will not be as effective. The variable filter tuning condenser is a compensator type with a maximum capacity of 100 muf. (00001 μf.).

Five 100 turn coils are needed. Four are used between the coils by the fifth one (L1) is adjusted by the "cut and try" method until the tuned circuit (LT and CT) is peaked at the most efficient point. The coils are mounted on a bakelite, hard rubber, or wooden panel approximately 3½ x 7, using a small piece of bakelite ½ x 1½ x 1½ in place. A large piece is used to mount LT and CT is fastened on top of it.

The remaining equipment needed is a power cord with plug, an outlet receptacle, and a metal shield can approximately ⅜ x ⅞ high.

Hook-up of 110 Volt "Line" Filter.

Locate filter as near the receiver as possible, and the power cord between the filter and set should be shortened. The method of connection is clearly shown in the illustrations and needs no explanation. A good ground from a water pipe is connected to the ground post on the filter. Both power plugs should be reversed individually until the best combination is found.

To tune the filter we turn the volume control of the receiver up full and tune the receiver to the frequency at which the background noise is at its highest. Now vary CT from maximum to minimum, listening for a decrease in the noise. If none is noted remove approximately ten turns at a time from IT, varying CT as above until the point of minimum noise is found. The final size of LT may be small as ten turns as its size is determined by the frequency of maximum interference.

As a final touch the connections to the large coils may be reversed one at a time until the whole filter is functioning at peak efficiency.

Harrison Radio Co.

**Parts List**


Shield Can.

Telephone Sub-panel.

A.C. Cord and Plug.

OUTLET.

www.americanradiohistory.com
England Gives Us the Bird!

The bird in question is a nightingale. The Daventry stations have been relaying the song of the nightingale direct from the Berkshire Hills of England for the benefit of foreign listeners. The British Broadcasting Corp. has been doing this every summer for a number of years and undoubtedly many listeners in this country "got the bird" from England.

The Daventry stations, by the way, are operating as follows at present: Transmission 1-11:30 P.M., 12:30 A.M., and 6:30 A.M. on GSB and GSF, 12:30-1:30 A.M. on GSB and GSF, (After July 28th this transmission will be from 12:15-2:15 A.M.) Transmission 2-6:00-8:30 A.M., on GSB and GSF; Transmission 4-8:45 A.M., on GSB, GSF, and GSE (only 2 waves are used at one time, GSF and GSE for about the first 2 hours and GSF and GSE for about the last 2 hours); Transmission 5-1:00-5:30 P.M. on GSB and GSF (GSF may be used in place of GSB, listen for announcements from the station); Transmission 5-6:30 P.M. on GSB and GSE (2 stations will be used at a time, GSF and GSE will probably be used for the first hour and GSF and GSE for the second. However, there is a possibility that GSF won't be used at all).

Norway

LOL at J-doy is now working on 31.41 meters (9,550 kc.) the call is apparently LKJ1. This station replaces LOL on 24.92 meters.

Caracas

From YYB1B at Caracas, Venezuela, comes the information that hereafter this station will be called X2BC and the long wave station which it relays will be called YVIR.

Moscow

RNE, 25 meters, has decided to transmit in the late afternoon so that American listeners will have an opportunity to listen to it. It will be on Monday, Wednesday and Friday from 4-5 P.M. in addition to their old schedule on Saturday and Sunday morning.

Winnipeg

Winnipeg, Canada, has been heard frequently of late on 478 meters, by New Jersey, and has been heard on 105 meters by New York City. The wave is believed to be CHZ, which has been in frequency for almost 2 years. CHZ/XBI, 25-47 meters, is now reported to be on only about 2 nights a week. The operators of both stations are James Richardson & Sons, Ltd., Royal Alexandra Hotel, Winnipeg, Canada. Thanks to N. P. Herren, San Francisco, Cal., and Oliver Amsley of International Amateur & W-S Fan Society, New York, for information on this station.

Berlin

The German stations now alter their schedules somewhat on the first of every month and as far as we can now receive the information in time we cannot publish it. However, we are told by our correspondents that during the last month, the recent hurricane, the latest at hand, is printed in the Station List on page 225.

Our Station List—Did You Vote?

Do not forget to let us know whether you like the new style in the station list as published last month better than the old style (appearing in this issue). Your votes will determine which style becomes the official one. Next month we will again publish the new style for comparison.

Sydney

VK2ME operates on the following schedule: 2 A.M.-1:30 P.M., 3:30-5:30 P.M., 9:30-11:30 P.M., 1:30-3:30 P.M., and 7:30-9:30 P.M. During August the schedule will be 2 A.M.-1:30 P.M., and 7:30-9:30 P.M., which will take place from 10:30 A.M.-11:30 P.M. every Sunday instead of 11:30-1:30.

Looking Forward

By the end of the year France hopes to have her new high-power S-W station operating in conjunction with the old Radio Coloniale. The power of the station will be 25-100 kw., depending on the wave-lengths being used. Waves have been assigned to this station in the 13, 16, 19, 25, and 31 meter broadcast bands, VK3LR Melbourne on the 31.31 meter, has also in project transmitters broadcasting in the 13, 16, 25, and 31 meter bands. These transmitters will gradually be brought into service within the next two years. It is hoped to have several in operation by this fall. Chl is also working on a transmitter with 18.5 kw. power to operate in the 13, 16, 25, and 31 meter bands. The station for the future will be Shangai and the calls will be XGBA, XGBB, XGBC, and XGBC.

Argentina is planning a S-W broadcaster also. It will operate in the 19, 25, 31, and 49 meter bands. Reports say that it will start operations some time this year if all runs smoothly. We have no definite information, however. Listeners won't lack entertain-
Short Wave Craft for August, 1934

The 4 ESSENTIAL SHORT WAVE BOOKS

ROUND THE WORLD FANS USE THESE GREAT SHORT WAVE BOOKS

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

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

This new volume is a revelation to those who wish to build their own short wave receivers. The editors of SHORT WAVE CRAFT have selected ten outstanding short wave receivers and these are described in detail. Each receiver is illustrated with a layout, pictorial representation, photograph of the set, circuit diagram, and building and operating instructions. There are detailed tables of the important specifications. Complete lists of parts are given to make each set complete. You are shown how to operate your short wave receiver to its maximum efficiency.

CONTENTS
The Denver 2-Tube Receiver That Beats the 1500 Time Mark, by Walter C. Deering.
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How to Build and Operate Short Wave Receivers

How to Become an Amateur Radio Operator

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

The Short Wave Beginner's Book

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

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

It abounds with many illustrations, photographs, simple charts and diagrams. All in simple language. It also gives you a tremendous amount of very important information about long wave that you can use in your own listening sets. There are important illustrations and explanations on all phases of short wave work, such as time conversions, tubes, all about meters, noise elimination, how to test the tubes, etc. There are also important parts of other subjects.

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How to Become an Amateur Radio Operator

We choose here, Marve P. Eddy to write this book, because he is an expert experimenter, author and editor of many short wave books. He is on the Field Staff of the Radio News. He was the first short wave experimenter on the West Coast. He has been a director of the California Short Wave Club, is a member of the International Radio Society, the American Radio Society, the American Association of Radio Experimters, also the Western Wireless Operators Club. He has written many articles on short wave in the national and local radio magazines. He knows more about short wave than any other man in the world. This book is written by a man who is an expert experimenter, editor and writer. It is written in such a way that anyone can understand it. It is full of short wave facts and figures. It is a book that will show you how to become an amateur radio operator.

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

The 4 ESSENTIAL SHORT WAVE BOOKS

SHORT WAVE CRAFT

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

CLIP—MAIL

COUPON TODAY!
Never in the history of short waves has there been produced short-wave receivers which have taken the entire country by storm as much as the 2-tube 12,500-Mile receiver, in the December-January, 1932, issue of Short Wave Craft. And you must have seen the many letters published in that magazine, lending this receiver to the skies, and for a good reason! It is a low-priced receiver, yet pulls in short-wave stations from all over the world—REGULARLY—in practically any location—not only in this country but anywhere. Thousands of experimenters have built material is used. We have done away with all losses. There is no "hand capacity." In THESE TWO SETS ONLY THE BEST CONDENSERS— AND THAT MEANS HAMMERSLUND—ARE USED. We could have produced the sets for considerably less if we used inferior parts (some Doerle imitators do this), but we refrained from doing so because then we could not guarantee results, as we now do. The sets are low in price, yet the quality is excellent considering the low price. Thus, for instance, we use Kurz Knack vernier dials, because we find them excellent for the purpose. Our chances are made of heavy-gauge metal, beautifully finished in black crystalline. These panels do away with "hand capacity." The four plug-in coils are of genuine molded bakelite for low losses. In short, despite the exceedingly low price, we have given our sets the very best possible price, not only not with their business-like appearance but with their exceptional performance as well.

The 2-tube 12,500-Mile Set is for 2-volt operation. Although it is designed for earphone reception, many local stations will come in with such volume that a loud speaker may be used. This receiver requires two type 30 tubes, two 15-volt "B" batteries, and two No. 6 dry cells for operation. The 2-tube A.C. Signal Gripper requires one No. 56, one 57 and one 58 tubes for operation; instead of batteries, it requires a power pack. Any good, well-filtered pack delivering 25 volts for the filaments, 250 volts for the plates and 25% volts for screen will work very nicely. The 3-tube is a great deal more powerful than the 2-tuber and will bring in a good many more stations on the loud speaker.

Official Doerle Receivers

WHAT DOERLE FANS SAY

WORLD GLOBES
FOR SHORT WAVE ENTHUSIASTS
AT UNPRECEDEDENTED LOW PRICES

These remarkable globes, executed in fourteen colors, are absolutely indispensable for short wave fans. Notable among the numerous features of these world globes, is that a damp cloth quickly removes all dust and water does not harm the surface. Short Wave fans are enabled to determine correct time in various centers of the world with the aid of these maps; distances from city to city can be accurately established.

There is a graduated "Meridian" scale of black enamel metal with the 0° and 180° globes. An additional feature is the movable hour scale found at the north pole—this facilitates determining the hour in any part of the world.

Only on a globe of this size is it possible to get an accurate picture of countries and their relative positions to each other. You will actually be amazed when you compare distances—from Nome to Moscow—from Cape Town to Tokyo; from Los Angeles to Rio de Janeiro, etc. A flat map is deceptive for measuring, but take a small string and stretch it across the globe, from city to city, and you have the correct distances. Here are globes that add dignity to home, office; study or laboratory—a globe that everyone would be proud to possess.

Each world globe contains a listing of over 7,500 cities in nations the world over—spellings conform to international geographic standards—all globes are of 1954 production. GET ONE OF THESE FINE WORLD GLOBES TODAY!

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9" Globe, equipped with sturdy, black metal base and full meridian. Same line as our No. 139 but reduced 1/4 in size and scale. Included with globe is newly printed World Globe Handbook FREE. Shipping weight 6 lbs.

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

( ) World Globe No. 99 @ $2.05
( ) World Globe No. 147 @ $4.15
( ) World Globe No. 139 @ $3.25

Name
Address
City

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

Gentlemen: I received the World Globe and am extremely well pleased with its com pliments, appearance and its usefulness. Short wave listening has become a hobby with me, and this Globe is a necessary accessory to my Short Wave listener or, for that matter, to any home.

P. C. Ellis, N.Y. Laboratory—19th and Campbell Streets, Kansas City, Mo.
Cap’n Henry pilots Mary Lou to finer radio reception

AND CHARTS A COURSE FOR EVERY RADIO LISTENER

OH, UNCLE HENRY, I’M SO DISAPPOINTED. LAST NIGHT I COULDN’T GET THAT SPECIAL BROADCAST LANNY WANTED ME TO LISTEN TO.

WHY, THAT’S TOO BAD, CHILD. JUST THE MINUTE I’M THROUGH SKIP-PERIN’ THIS REHEARSAL, WE’LL FIX IT UP WITH LANNY.

NOW, MY DEAR, TELL ME ALL ABOUT WHAT HAPPENED TO YOUR RADIO SET LAST NIGHT.

IT WASN’T ONLY LAST NIGHT, UNCLE HENRY. I USED TO BE ABLE TO GET ALL THE STATIONS, BUT LATELY I’VE BEEN GETTING FEWER AND FEWER.

DO YOU SUPPOSE I DID SOMETHING WRONG TO MY SET, UNCLE HENRY?

OF COURSE NOT, MY DEAR — HOLD ON A MINUTE. HAVE YOU HAD YOUR RADIO TUBES TESTED RECENTLY? BOTH OUR SETS ARE OVER A YEAR OLD, YOU KNOW... I PUT ALL NEW TUBES IN MINE A WHILE BACK. THAT’S WHY IT SOUNDS LIKE NEW.

THEN YOU TROT RIGHT OUT AFTER THIS REHEARSAL AND GET YOURSELF FIXED UP WITH THOSE NEW MICRO-SENSITIVE RCA RADIO TUBES. THEY’LL DO THE TRICK.

OH, UNCLE HENRY, THANK YOU SO MUCH FOR THAT SUGGESTION TO GET NEW MICRO-SENSITIVE TUBES. LANNY LISTENED WITH ME LAST NIGHT AND EVERY PROGRAM CAME IN JUST FINE.

THAT’S ONLY THE BEGINNING, MARY LOU. ONLY THE BEGINNING OF THE GOOD TIMES YOU’LL HAVE. IT’S LIKE BLOWIN’ TH’ WHISTLE AN’ STARTIN’ TH’ ENGINES — YOU’RE OFF TO A LOT OF JOY AND FUN WHEN YOU PUT NEW RCA TUBES IN YOUR SET.

FOR THE REAL JOY OF RADIO PUT IN NEW RCA MICRO-SENSITIVE RADIO TUBES

TO MAKE OLD RADIO SETS NEW AGAIN... TO GET ALL THE JOY THAT RADIO HAS IN STORE FOR YOU TODAY, REPLACE WORN TUBES WITH THESE NEW MICRO-SENSITIVE RCA RADIO TUBES. FOR TRUE-TO-LIFE RECEPTION A RADIO TUBE MUST BE SENSITIVE ENOUGH TO PICK UP A MICROSCOPIC ELECTRICAL IMPULSE — THE MILLIONTH PART OF A VOLT. IN RCA RADIO TUBES YOU WILL FIND SUCH "MICRO-SENSITIVE" ACCURACY. HAVE YOUR RCA RADIO TUBE AGENT TEST YOUR TUBES TODAY. REPLACE WORN TUBES WITH ONLY RADIO TUBES GUARANTEED BY RCA RADIOTRON CO., INC., TO GIVE THESE 5 BIG IMPROVEMENTS:

1. Quicker Start. 2. Quieter Operation. 3. Uniform Volume. 4. Uniform Performance. 5. Every Tube is Matched.