THE RADIO EXPERIMENTER'S MAGAZINE

November 1933

SHORT WAVE CRAFT

Edited by
HUGO GERNSBACK

NOW 25¢ IN CANADA 30¢

Cooking with Short Waves

See Page 394

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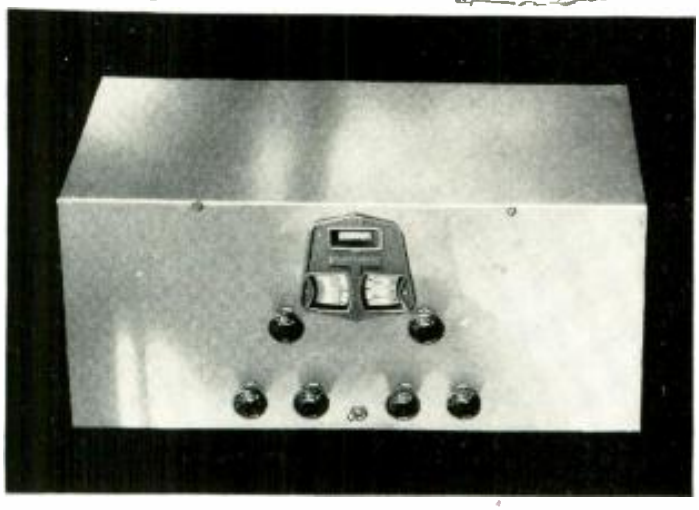
McMurdo Silver now presents

MASTERPIECE II

Designed especially for Admiral Byrd,



from specifications developed in collaboration with the research and engineering departments of Harvard and *another great eastern University.

Admiral Richard E. Byrd, U.S.N., asked Dr. McCaleb of Harvard University which radio receiver would be best for his next Antarctic expedition.

In substance, Dr. McCaleb replied, "McMurdo Silver's Masterpiece, with certain additions."

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The specifications of Masterpiece II, as you can readily see, promise a quality and extent of performance often dreamed of, but never seriously considered as either probable or possible of attainment. Yet, Masterpiece II actually meets them, to the letter, and its performance, very conclusively asserts the fact that an entirely new era of transoceanic radio reception has been born.

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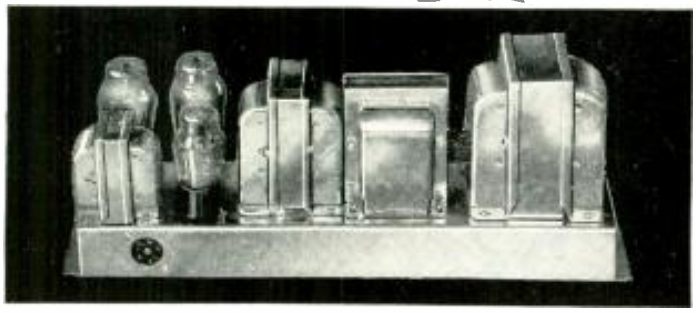

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Wave length Range 10 to 570 meters or 520 to 30,000 kc. Four position wave change switch.

(External unit extends range from 700 to 2000 meters.)

Tuned R. F. stage on both Broadcast and entire Short Wave range yet single dial tunes the receiver. Greatly improves signal-noise ratio on 12,000 mile reception.

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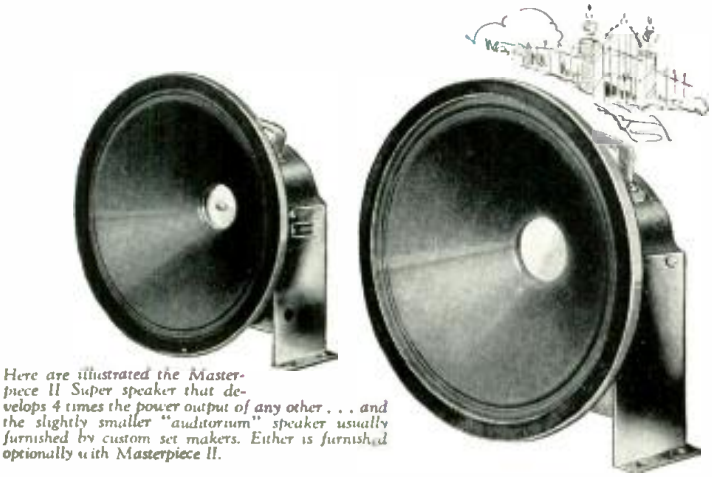

Here are illustrated the Masterpiece II Super speaker that develops 4 times the power output of any other . . . and the slightly smaller "auditorium" speaker usually furnished by custom set makers. Either is furnished optionally with Masterpiece II.

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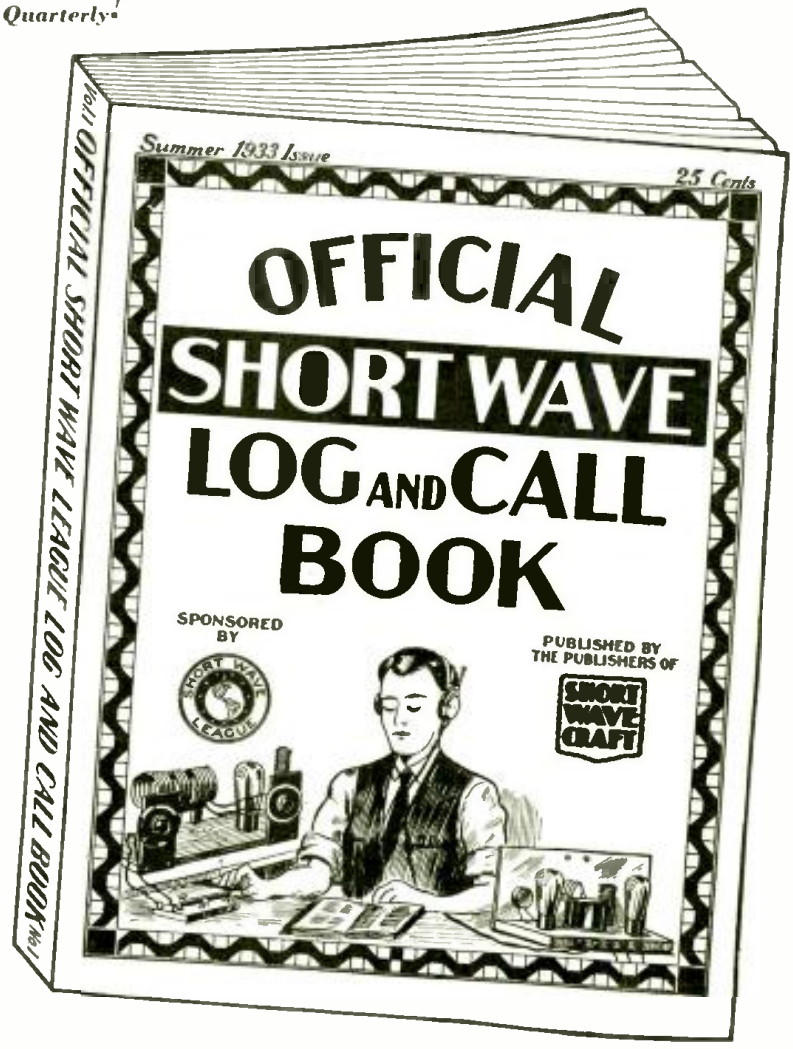
8500 SHORT WAVE STATIONS LISTED IN THIS BOOK!

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

Published Quarterly



PARTIAL CONTENTS

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

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

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

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

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

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

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

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

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

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

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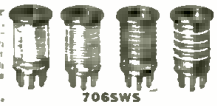
Precision wound coils with the convenient gripping-ring for easy insertion and removal from socket.

The famous set of four precision wound S-W coils as specified for dozens of receivers described in "S-W Craft." 10-200 meters with .00014 mfd. condenser. Coils have UX bases. **704SWS** List price **$2.00 set.**


704SWS

New! **706SWS** Set of four six-prong coils with Pri., sec., and tickler windings. Secondary precision matched with **704SWS** set, for perfect tracking. 10-200 meters with .00014 mfd. condenser. Uses standard six-contact tube socket. **706SWS** List price **$3.50 set.**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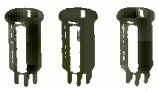
704BCS Set of two coils to cover 100 to 540 meters amateur, police and broadcast bands with .00014 mfd. condenser. Precision and matched wound with silk insulation for maximum efficiency. Use the **704BCS** to extend the tuning range of any S-W receiver using the **704SWS** coils. Coils have UX bases. **704BCS** List price **$1.50 set.**


704BCS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Use a postcard only. Never write a letter. Address postcard as follows: SWAPPERS, c/o SHORT WAVE CRAFT, 96-98 PARK PLACE, NEW YORK, N. Y.

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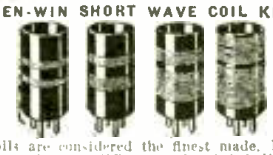

These coils are considered the finest made. Each coil is precision wound on a different colored bakelite form for quick identification of wave lengths. Used and highly recommended by all short wave experts. Range (16 to 225) meters, using a .00014 or .00015 mfd. condenser. Recommended for the following sets: "The Globe Trotter," "The Over-seas," "The Doerle 12,500 Mile Two Tube Receiver and Doerle Three Tube Signal Gripper," "The Megadyne."

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All Wave R. F. Coil..... 75c

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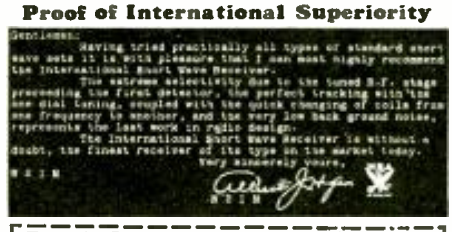

Gentlemen:
Having tried practically all types of standard short wave sets it is with pleasure that I can most highly recommend the International Short Wave Receiver.
The extreme selectivity due to the tuned R.F. stage preceding the first detector, the perfect tracking of the one dial tuning, coupled with the quick changing of coils from one frequency to another, and the very low back ground noise, represents the last word in radio design.
The International short wave receiver is without a doubt, the finest receiver of its type on the market today.
Very sincerely yours,

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Please send me special offer and free circular describing the INTERNATIONAL "PROFESSIONAL" 9 tube short wave superhet receiver that can be purchased in kit or laboratory constructed form.

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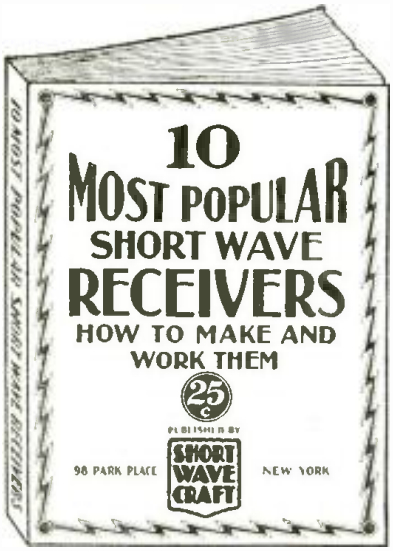
The 4 ESSENTIAL SHORT WAVE BOOKS

'ROUND THE WORLD, FANS USE THESE GREAT SHORT WAVE BOOKS

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

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

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



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

CONTENTS

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

2-R F Pentode sW Receiver having two stages of Tuned Radio Frequency, by Clifford E. Denton and H. W. Secor.

My de Luxe SW Receiver, by Edward G. Ingram.

The Bantam 2 Tube 12,000 Mile DX Receiver, by A. Bruening, Jr.

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

The Denton 2 Tube All Wave Receiver, by Clifford E. Denton.

The Denton "Stand By," by Clifford E. Denton.

The Stand By—Electrified.

The Short Wave MEGADYNE, by Hugo Gernsback.

A COAT POCKET Short Wave Receiver, by Hugo Gernsback and Clifford E. Denton.

Be the Boy Scout Icon on the One Tubert By C. E. Denton.

The S W PENTODE 4, by R. G. Gunn, M. E.

Louis Martinez Idea of A GOOD S W RECEIVER, by Louis Martinez.

40 PAGES
OVER 75 ILLUSTRATIONS

IMPORTANT

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

25c

The Short Wave Beginner's Book

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

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

It abounds with many illustrations, photographs, simple charts, hookups, etc., all in simple language. It also gives you a tremendous amount of very important information which you usually do not find in other books, such as tune conversion tables, all about aerials, noise elimination, how to get verification cards from foreign stations, all about radio tubes, data on coil winding and dozens of other subjects.

Partial List of Contents

Getting Started in Short Waves—the fundamentals of electricity. Symbols, the Short Hand of Radio—how to read short wave diagrams. Short Wave Coils—Various types and kinks in making them. Short Wave Aerials—the points that determine a good aerial—can it be improved one. The Improved Lead-in for reducing Man Made Static. The Beginner's Short Wave Receiver—a simple one tube set that anyone can build. The Beginner's Set Gets an Amplifier—how the beginner's set is improved by adding an amplifier.

How to Tune the Short Wave Set—telling the important points to get good results. Regeneration Control in Short Wave Receivers.

Audio Amplifiers for S. W. Receivers.

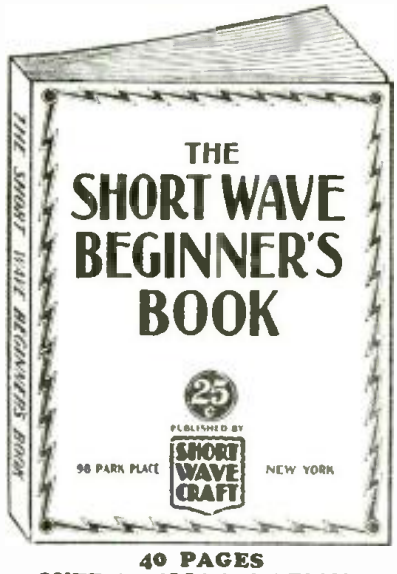
How to Couple the Speaker to the set.

Learning the Code—for greater enjoyment with the S.W. set.

Wave Length to Kilocycle Chart.

Wire Chart—to assist in the construction of coils.

Kinks in the construction of S.W. Receivers.



40 PAGES
OVER 75 ILLUSTRATIONS

25c

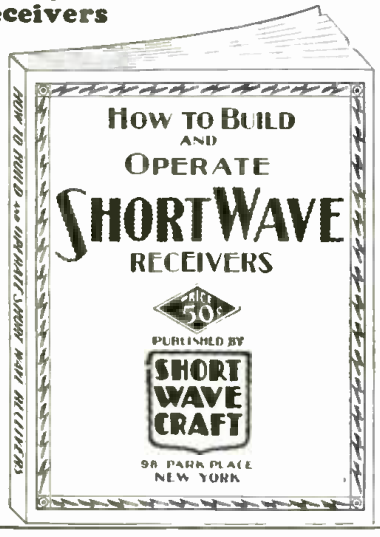
How to Build and Operate Short Wave Receivers

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

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

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

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



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72 Pages 7x10 Inches

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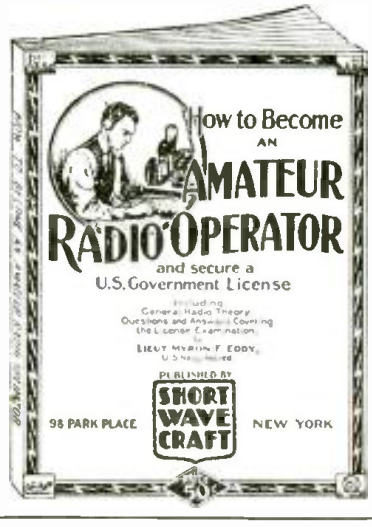
How to Become an Amateur Radio Operator



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

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

Partial List of Contents

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

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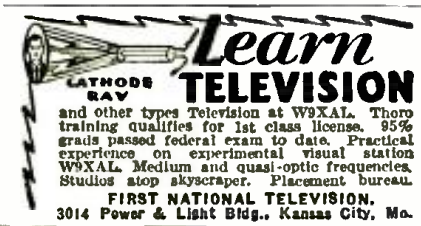

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5 & 10 Meter Gossip Conducted by "W2AMN"

● THE 5 meter band has been rather quiet in the last two months here in the Eastern parts of the United States, with only a few stations being heard from time to time in the evening. The new tubes coming on the market intended primarily for *ultra high frequency* operation should stimulate interest in the amateur returning to the band with the gusto prevalent last year, when at any time of the day or night stations could be heard.

* * *

5 meter receivers have taken quite a step forward in design and there should be a chance of working slightly greater distances than the usual "25 mile" DX of former days.

* * *

Activity on the 10 meter band has definitely increased within the last two months. A number of the boys have taken advantage of the F.R.C.'s decision allotting the use of the 28 to 28.5 megacycle portion of the band to radiophone transmission.

* * *

The use of modulated oscillators on this band is to be discouraged, unless the operator of such a station has a monitor to check the stations at all times, to make sure it is not being driven out of the band under modulation. In fact if there is any large degree of frequency modulation the readability of the signal is reduced to practically nil.

* * *

It is highly recommended that anyone attempting to use phone on 10 meters employ the master oscillator and power amplifier circuit, that is, a self-controlled master oscillator with a separate amplifier feeding the antenna. This arrangement can be worked out quite successfully if the oscillator has a fairly high ratio of capacity to inductance in the plate circuit. A push-pull oscillator is of course to be preferred.

* * *

The author has experimented with the new type 53 tube which is really two triodes contained in a single envelope. This tube oscillates very smoothly and has a fair power output at frequencies as high as 60 megacycles (5 meters). Plate voltages as high as 350 volts can be used on the tube without any ill effects. A good line-up would be a 53 push-pull oscillator, a 53 as a neutralized buffer and a pair of 46's as neutralized "class C" modulated power amplifier; incidentally none of these tubes need external "C" batteries as they are all of the high mu variety.

* * *

We had quite a surprise about a month ago when we tuned down to the neighborhood of 8.5 meters and heard the Englewood (New Jersey) Police radio station rolling in like a "ton of bricks" on a super-regenerative receiver.

Subdividing the Short Waves—

Marconi's recent experiments with the so-called "micro-waves" has caused American laymen to ponder the distinction between ordinary short wave-lengths and the electrical vibrations to which the inventor called attention.

It has been proposed that the 200 to 10 meter wave band be known as "short waves;" 10 to 1 meter as "meter waves;" 99.99 to 10 centimeters as "decimeter waves;" 9.99 centimeter to one centimeter as "centimeter waves;" and 9.99 millimeter to one millimeter as "millimeter waves."

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—AND:

"Received set O.K. . . . It sure proved all that you claimed it would and more. I tested it out right beside my Private 12-tube set and it outperformed the 12-tube set in every way. I shall order quite a few more in the near future."—M. A. Adkins, Montgomery, W. Va.

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Ham-Band "Pee-Wee" 2-Tuber

(Continued from page 401)

Those that have a *doublet* antenna or wish to try it, will find that it works very admirably on the "Pee-Wee." For "Ham" use the doublet should be cut for the lowest frequency "Ham band" on which there will be operation, and it will work very well on all the high frequency bands. The doublet may be connected the same as the regular aerial, or a small coupling coil connected to the leads of the doublet may be slipped over the grid coil. As with all antennas, a little experimentation will be necessary to achieve best results.

The physical dimensions of the "Pee-Wee" being only six and a half inches by four inches, it will be admitted that the job lives up to the requirement of minimum size. Yet this is accomplished without any real undue crowding of the parts. Likewise, although the set may appear a little complicated as to construction, it is really very simple and easy to wire, provided the diagrams and instructions are carefully followed.

Resistance controlled regeneration is employed and there is only a barely perceptible change in frequency of a signal when this control is changed.

Although there are four controls on the panel, only one is really used when the set is in regular operation. The upper left-hand dial is the "antenna tuning" control. This is usually put on the back of a set to avoid an extra control. But there is no real "Ham" that doesn't like extra knobs. Likewise, it is really a nuisance to have to move the set and go to a lot of trouble every time the coil is changed and the antenna tuning must be shifted. The lower left-hand knob operates the 100,000 ohm regeneration resistance. This is set once for each band and can then be left alone (provided you are only listening for "CW" stations). The center dial, which is a quiet, high-ratio vernier, is the main tuning, "band-spread" condenser. The knob on the upper right-hand side controls the band-setting condenser.

The phone jack is placed in the lower right-hand side of the panel. The jack is placed on the panel because frequently it is necessary to change the phones from the monitor to the receiver, and it is a nuisance to have to go around behind the set every time you wish to check the note in the monitor. Both the jack and the antenna series condenser should be carefully insulated from the panel.

1 Audio Stage Used

Only one audio stage is used, and that not a power tube, because the set was designed for quiet earphone operation and power tubes besides quickly wearing out the old "batts" usually raise the *noise level*. It is one thing to listen to a ten thousand watt "commercial" in England—and quite another to try and pick up his little "Ham" brother, using only ten to twenty watts.

The actual results with this set have fulfilled all expectations. In fifteen minutes one morning, three Australian and one New Zealand station were "logged" on the forty meter band. Down on twenty meters this set matches up with the best of 'em. Due to the very low *noise level* it is possible to hear stations that usually will not push through, even on much bigger sets.

On the short-wave broadcast channels, all the European stations were picked up consistently over a period of two weeks. Frequently the German and English stations were so loud that it was possible to put the phones on the table and hear them all over the room.

The back plate of the sub-panel holds a four prong socket that receives the power-supply plug. Also the antenna and ground binding post strip are mounted on the back, at the left side. Wiring the set is a very easy task, and can be accomplished in less than an hour, if the party wiring it is in an energetic mood. If the diagram is carefully followed, and care is taken in the winding of the coils, no difficulty should be experienced in getting the set "percolating." All connections should be soldered, with only pure resin core solder. Use a hot, well-tinned iron. When the wiring job is done, check all leads by tracing them, to make certain no error has occurred. Those who do not wish to go to the trouble of building or buying a metal panel, and sub-panel, can build the receiver on a wood baseboard, and with a plain aluminum or bakelite panel, without any loss of efficiency.

The coils are wound on standard forms with No. 20 cotton-covered wire spaced 16 turns to the inch and are tapped one-third of the way up from the *ground* end.

Well, fellows, and, we hope, ladies, here is all the dope, and both Mr. Mitchell and myself hope you have as good luck with this set as we did.

PARTS LIST

C1-1—.000025 mf. variable midget condenser.
C2-1—.0001 mf. variable midget condenser.
C3-1—.000015 mf. variable (cut down 3-plate unit).
C4, C6—.0001 mf. fixed mica condenser.
C5, C8—.5 mf.-250 volt bypass (paper).
C7-1—.01 mf. bypass condenser.
R1-1—100,000 ohm potentiometer; Acratest.
R2-1—150,000 ohm, 1 watt carbon resistor, Lynch.
R3, R4—1 meg., 1 watt carbon resistor.
R5-1—100,000 ohm, 1 watt carbon resistor.
R6-1—2500 ohm, 1 watt carbon resistor.
RFC—Radio frequency choke, 30 to 85 millihenry. Hammarlund or National.
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1—5-prong socket, Eby (Na-ald, Hammarlund, National).
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Short-Wave Aerial Coupling

(Continued from page 415)

Even when a reasonably large aerial is in use, there is no need for this condenser to be of microscopic capacity—remembering that as long as smooth regeneration can be obtained, the larger the aerial "de-loading" condenser, the stronger the signal. A variable condenser is desirable in order that this maximum usable capacity may be used on different wavelengths, and also to assist in avoiding "blind spots" in tuning. The writer uses a well designed variable condenser of 70 mmf. maximum capacity.

A final point is the method of aerial coupling actually used by the writer, and is shown at C. Here the aerial lead is taken via the "de-loading" condenser direct to the grid of the detector tube and on the wrong side of the grid condenser. This would seem to be all wrong in theory, but on the writer's two tube short-wave set, it gives appreciably greater strength of signals than the more usual connection, and is certainly worth trying.

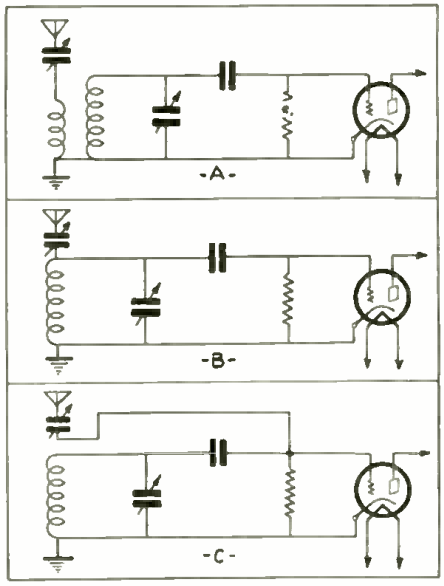

Fig. A—Semi-Aperiodic aerial coupling system. Fig. B—Alternative method which reduces aerial load damping. Fig. C—A suggested aerial coupling method which results in greater signal strength.

Marconi Hears Ultra Short Waves Through Mountains

(Continued from page 397)

as to what television set owners of tomorrow would do if the signals were to be transmitted on these very short waves, and where they happened to live in a steel frame building located in one of these dead spot zones. In other words radio experts up until now have rather gained the opinion, based on previous tests with ultra short waves, that for any kind of worthwhile and regular communication, the transmitter would have to be located within optical sight of the receiving antenna or approximately so, but these latest results obtained by Signor Marconi in Italy seem to put fresh blood into the argument for the adoption of ultra short waves for regular communication over distances of possibly 200 miles and more.

More on "5 and 10" Meter Sets in the Next Issues!

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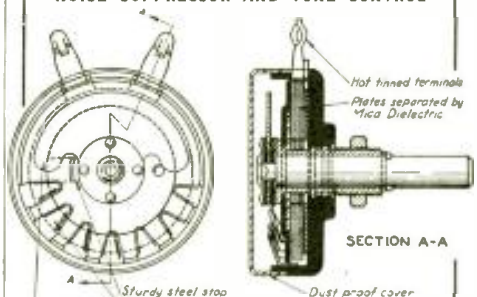

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2A3	112A	33
2A5	120	34
523	22	35
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19	26	37
01A	27	38
1	30	39
10	31	40
WD12	32	41

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G. R. Type Standoff Insulators doz. 69c, 2 dozen for $1.25

DOLLAR SPECIALS

Relays—operate off dry cell—2 for $1.00
6 assorted 3" and 4" dials 1.00
12 assorted rheostats and potentiometers 1.00
12 UG-11/2 Navy 5 watt xmitting tubes 1.00

Best grade Brazilian quartz crystals—.1 of 1% accuracy—ground to your frequency—with free adjustable bakelite dustproof holder, only $3.75

TUBES

LATEST! 25-watt tube—made of Pyrex glass with newly designed thoriated fil. $4.75
866 tubes, 90-day guar., heavy duty, each 1.65
866 tubes, extra heavy duty, guar. 1000 hours uncond., each 3.50
210 tubes, 90-day guar., each 1.75
210 tubes, 1000-hr. uncond. guar., Pyrex glass and new thoriated filaments $2.50
Delco (General Motors Tubes. All firsts):
UX-202, each $.75 UY-227, each $.39
UX-231, each .65 UY-235, each .50

Supreme 333 set analyzers, SPECIAL $38.70
S1. Used Teleplex with three rolls of tape 11.75
S1. Used Omnigraph, 15-dial, each 11.95
New RCA Victor Automobile radios, complete 19.95
Gypsy 6-tube auto radio, less equipment and accessories 9.95
Latest Radio Amateur Callbook or Radio Amateur Handbook, sent to you prepaid, each 1.00
Double button model EL American microphone, SPECIAL 4.95
USED 204A's in excellent shape, each 25.00
WANTED: Used 852s, 204As, 203As. What have you to sell or trade?

All prices are subject to change without notice. Send for our confidential prices on National SW3, FB 7, and Hammarlund Comet Pro receivers. Write in for our free Ham Sheet. Cable Address—Uncledave.

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TELEVISION

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Send me "RADIO" for the next 4 months, also a free copy of the 1933 Wallace Short-Wave Manual.

Name.....

Address.....

The 2-Tube Pentaflex: 2 Tubes=4

(Continued from page 403)

is the region normally used for phones and broadcast reception. The setting of the potentiometer for maximum signal strength is not critical, and as a matter of fact a close approximation to a truly single control receiver is obtained.

Parts List—2 Tube Pentaflex

C_1, C_6—.5 mf. tubular by-pass condensers.
C_2, C_7—.01 mf. tubular by-pass condensers.
C_3—.005 mf. molded mica condenser.
C_4—.0001 mf. molded mica condenser.
C_5—.0005 mf. molded mica condenser.
C_8—Hammarlund midline midget variable condenser—140 mmf.—Type Mc-140-N.
L_1, L_2, L_3—One set Alden (Na-Ald) 3 winding 6 prong plug-in short wave coils, 15-200 meters. (See data, page 213, August issue.)
R_1—10,000 ohm metallized resistor, Lynch (International).
R_2—200 ohm wire-wound resistor, Lynch (International).
R_3, R_4, R_7, R_8—.25 meg. metallized resistor, Lynch (International).
R_5—50,000 ohm resistor, Lynch (International)
R_6—3 meg. resistor, Lynch (International).
R_9—50,000 ohm Potentiometer (Acratest)
1—S.P.S.T. switch.
2—Eby 7 prong (.75" pin circle diameter) wafer sockets (Alden).
1—National 6 prong Isolantite socket.
1—National Type "BM" Vernier dial.
2—National Grid Clips, Type 24.
1—Eby twin binding post strip (Laminated).
1—Eby twin speaker jack assembly (Laminated).
2—ft. battery cable, 5-conductor.
1—Roll hook-up wire.
2—2A7 or 6A7 tubes, Gold Seal, Arco, Van Dyke.
1—Aluminum panel 5" x 7".
1—Aluminum subpanel 7" x 7".

Ills Treated by Short Waves

● IN a dispatch to the N. Y. Times, a report from London states that cures for various ailments by the use of short radio waves were claimed by Dr. Erwin Schliephake, a German physician and scientist.

Writing in the *British Medical Journal* he described how he succeeded in treating deep-seated abscess in the human body by passing ultra-short wireless waves through the patient, who was not in immediate contact with any instrument. He found, he said, that various tissues exhibit different degrees of conductivity in the presence of these waves.

Dr. Schliephake declared he has used waves to treat pulmonary abscesses after pneumonia, in pleural empyema, pneumonic tuberculosis, in certain forms of peritonitis, in migraine and acute tonsilitis.

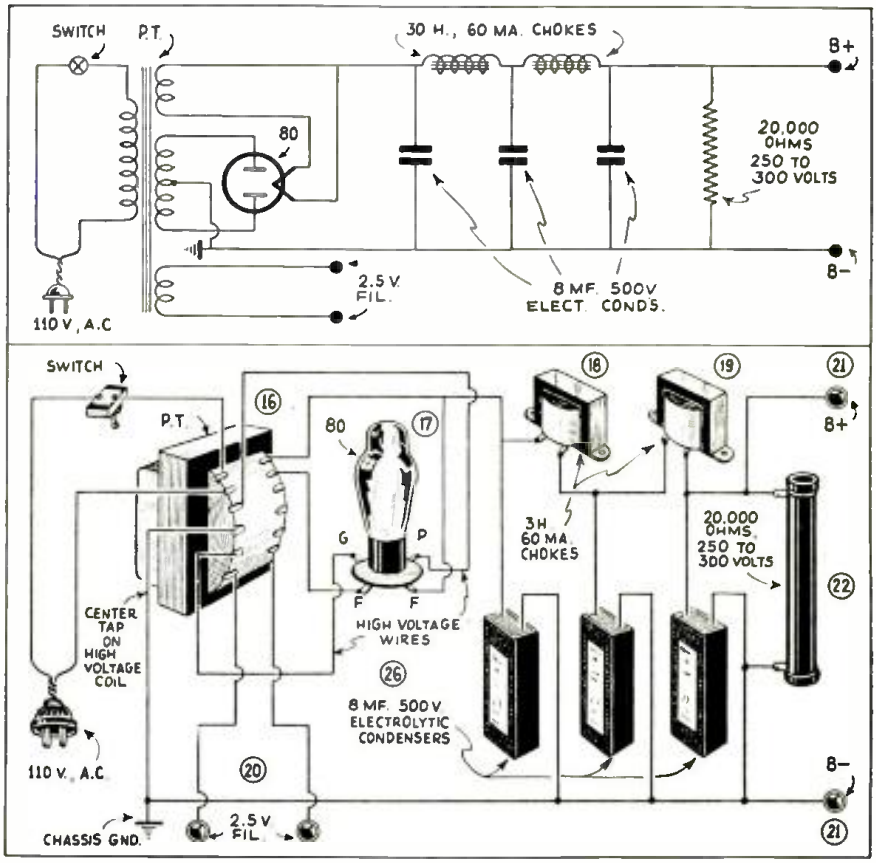
Dr. Willis R. Whitney, research director of the General Electric Company, revealed in April, 1930, that he had developed a radio type of apparatus for killing bacteria in the body.

(Editor's note: Our readers will recollect reading articles on short waves in medicine from Dr. Schliephake's pen, in previous issues of SHORT WAVE CRAFT.)

A 4-Tube "5 and 10" Meter Receiver

(Continued from page 431)

2—30 henry, 60 milliampere chokes; Acratest.
3—8 mf. 500 V. electrolytic filter condensers; Acratest.
1—20,000 ohm bleeder resistor (20 watts rating).
1—4-prong wafer socket, Eby (Na-ald).



Diagrams of Power Supply for 5 and 10 meter Receiver.

www.americanradiohistory.com

"Holy Smoke!"
is what everybody says when they read this letter

Federated Purchaser, Inc.
Radio and Electrical Jobbers
23-25 Park Place New York
June 7, 1933

Mr. Arthur H. Lynch,
Lynch Mfg. Co. Inc.
51 Vesey St., New York City.
Dear Mr. Lynch:

At a recent installation in one of the most difficult parts of New York City, of a transposed lead-in using Lynch transposition blocks, it would interest you to know that the distance from the antenna proper to the receiver is approximately 200 ft., and over 150 of the transposition blocks were used. This main feed line goes to one receiving station in a small room located on the main floor of the building. An additional feeder line runs from this point, a distance of another 75 feet, through the building, and down to a floor below street level. Actual reception from both receiver stations indicated no loss in signal nor increase in interference, at the receiving station located in the sub-basement.

This system is the only system which has given satisfactory results, and as a result of the excellent performance of the Lynch Antenna installation, we are recommending the use of similar equipment to all purchasers of Aeratest Short Wave Receivers.

Yours sincerely
(Signed) Clifford E. Denton.

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See page 385 of this issue for order blank. Take advantage of this opportunity to handle your LEAGUE correspondence in a business-like manner.

SHORT WAVE LEAGUE
98 Park Place New York, N. Y.

8 Meter Waves Help Police

(Continued from page 392)

mitting cars to radio headquarters, was developed by the engineers of the Radio Engineering Laboratories.

The headquarters stations located at both Bayonne, New Jersey, and Eastchester, New York, are 25 watt ultra high frequency transmitters. The master-oscillator, power-amplifier is placed in some advantageous position near the antenna, which is a metal tube held in a vertical position. This unit was made separately and built for outdoor use. A weather-proof cable (any length of 50 to 300 ft.) connects this to the modulator and control apparatus.

This control apparatus is constructed in panel-rack formation; the panels in order, beginning at the bottom, are: 1, filter panel; 2, ultra high frequency receiver; 3, control panel; 4, pre-amplifier; 5, meter panel; 6, modulator panel. The idea for this form of construction is to permit easy removal of any individual unit for repair, replacement or check-up. The loud speaker as well as the standard two button microphone is plugged in at the rear.

Motor-generator power supply is located in the cellar or some convenient out-of-the-way place and is remotely controlled. On the control panel the operation of the "home" station is extremely simple. The first step is to snap the three controlling switches to the "on" position, and for police work a lever switch was supplied to open apparatus for "transmitting" or "receiving" position. The reason for this is that during an eight hour shift the transmitter is used approximately 1½ to 2 hours, which incidentally conserves power. An infinitesimal time is required to change from "transmitting" to "receiving" position.

The mobile (automobile) stations are permanently (at the same time easily removable) mounted in any convenient location of the car. They are made up in four separate units and rated at 4.5 watts.

The oscillator is fitted into one separate compartment, made weather-proof so that should a particular model car require outside mounting, rain or snow would not affect its functioning.

The modulator and receiver is a compact unit, so designed that the complete unit is rubber cushioned, permitting the installer to bolt the compartment to any fixed solid unit of the car.

Power is supplied by a dynamotor driven by the car's ignition storage battery, and it draws less current than the two headlights.

The car control unit is a neatly designed case which can be mounted on the dashboard or the stearing post, contains a small dynamic speaker, one main switch (which when in use is always in the "on" position), a "send" and "receive" lever, a volume control (seldom used), and a microphone jack for a single button microphone.

The permanent portion of the transmitting and receiving tubing (antenna) goes to the level of the top of the car and the second section to complete the quarter wave radiator, slides down through the permanent tubing and in either case is held in position by two wing bolts.

All units were designed for ease of accessibility; tube replacements take but a fraction of time.

When operating, the receiver at headquarters, as well as all cruising receivers are kept in "working" condition or in the "on" position, ready to receive orders from headquarters (or headquarters ready to receive reports from the cruisers).

All transmitters and receivers are on the one and same frequency and "locked" in position on the given wavelength. Receivers in cruising cars are not tunable by the operator at the control point, and after five months' use at the town of Eastchester as well as at Bayonne, no change has been made, which is an indication of the absolute frequency stability which the engineers have accomplished.

During the recent severe rain storm which swept the Atlantic Coast, both installations operated 100% efficient.

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After years of daily service MAYO microphones stand the test of hard use and abuse. Their scientific design, careful test and adjustment by experienced engineers insures lasting quality under any and all conditions. YOU WILL FIND THAT RESULTS ARE BETTER WITH MAYO MICROPHONES.

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$5.00
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At your distributor or sent postpaid on receipt of remittance

Here is the biggest value ever offered in commercial type microphones. Large two button rugged constructed microphones designed for broadcasting, short wave work, public address systems, recording, etc. Has frequency response 30 to 5000 cycles, pure gold contacts throughout size 2¼ in. thick by 3½ in. dia. Furnished either 100 or 200 ohms per button. weight 1¾ lbs. Polished chromium finish. A microphone that you will be proud to own.

Your distributor carries this microphone, if not, it will be sent postpaid on receipt of your remittance or C. O. D. plus charges. If you are not thoroughly satisfied return same within 5 days and we will make refund.

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The MAYO microphone repair dept. is part of our vast service. Our complete equipment and experienced engineers insures accurate repairs on any and all makes or types of microphones.

Repair Costs Are Low

Floating diaphragm ... from $1.00 to $2.50
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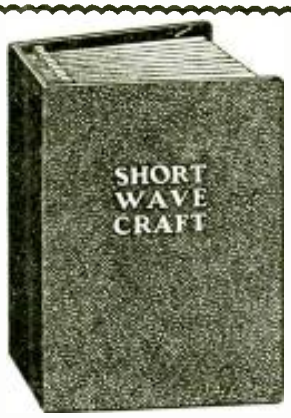

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It is now possible to *save your copies* and for this purpose we designed a splendid binder for you which holds twelve copies. It is made of *heavy substantial material* and is covered with black grain leatherette. The name of the magazine is stamped in gold on the cover.

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116 Page RADIO and SHORT WAVE TREATISE

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PARTIAL LIST OF CONTENTS

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Short Waves and Long Raves

(Continued from page 437)

cause I lacked a fixed condenser of the correct capacity costing 12c or 16c or some such gadget, but I do favor one article each month on a large set such as the Bosch "10-tuber" in the April issue, which happened to be the very outfit we have here and we learned to use it more correctly from the substance of that article, but derive more fun from the home-made sets.

Now then why not a diagram on a "long-wave" adapter for A.C. sets. Also some "crystal" short-wave sets.

EARL E. BENNETT,
260 Whitmore Ave.,
Jermyn, Pa.

(This letter gives us some good "food for thought" and we hope to receive many more constructive letters such as Earl's from our readers. We believe you will agree with us, Earl, that we have published a plentitude of simple 1, 2, and 3-tube receivers in recent numbers of SHORT WAVE CRAFT, *and as we have mentioned many times before the editors are constantly striving to keep both the "beginner" and the "advanced" student in mind. Profiting by suggestions expressed in previous letters from our readers, we have endeavored to lay off the big sets as far as possible, bearing in mind that the average experimenter's pocketbook today is much more nearly attuned to the cost involved in building a set requiring from 1 to 4 tubes. Nevertheless, the larger sets are very interesting, even to the general reader, as there is always a desire for more information on the "big Boys," using from 8 to 10 tubes as, of course, they do possess tremendous amplification and under good conditions and without too much static the 8 or 10 tuber will put "foreign" stations on the loud speaker with a mighty wallop. However the editors strive to keep in mind the fact that for the average experimenter, who probably builds a dozen sets or so a year, it is much easier to tear down and rebuild a 2 or 3 tube set.—Editor.)*

SUCCESS WITH OUR CIRCUITS!

Editor, SHORT WAVE CRAFT:

This is the first time I have written you, but am truly thankful for SHORT WAVE CRAFT, and have been a reader of it for a long time. I have built quite a number of circuits that have been described in it, and have had good success with them. At this time I take the opportunity of telling you how I appreciate what you have done for the thousands of short-wave "fans" here in Canada, as well as in other parts of the world, and wish you and SHORT WAVE CRAFT the best of success.

ARTHUR ROBERTS,
401 Clinton St.,
Toronto, Ont., Can.

(This is good news, Arthur, and the editors are sure glad to learn that they have, in your estimation, been of some real service to the thousands of short-wave "fans" who live in Canada. We are particularly gratified in noting that you have built a number of our sets, the circuits of which have been described in various issues of SHORT WAVE CRAFT *and furthermore—that they "work"!—Editor.)*

When To Listen In

By M. HARVEY GERNSBACK

"Radio Nations" the station of the League of Nations at Geneva, Switzerland, now operates on the following schedule. Saturdays only, 5:30-5:45 p.m. in English; 5:45-6:00 p.m. in French; 6:00-6:15 p.m. in Spanish. All time is Eastern Standard. Transmissions are from HBL, 9595 kc., and HBP, 7799 kc.

From "World Radio" the Journal of Empire Broadcasting of the British Broadcasting Co. comes to the announcement that from Oct. 8 on the zone system of designation of the different Daventry transmissions will be dropped. After this time transmissions will be as follows: Transmission 1, 2-4 a.m. (for Oct.); 2:30-4:30 a.m. (for Nov.); GSD, GSF Transmission 2, (no directional antennas being used) 7-8:45 a.m. daily and 7:30-8:45 a.m. on Sundays. GSG, GSF, probably GSF, GSD in winter. Transmissions 3, 9 a.m.-1 p.m. GSG, GSF, GSE, GSB will be used, 2 at a time. The first 2 will be used in the 9-11 a.m. transmissions and the other 2 later (this is not an exact schedule, but an approximation). Transmission 4, 1:15-5:45 p.m. GSD, GSB, or possibly GSB, GSA in November. Transmission 5, 6-8 p.m. GSD, GSB with a shift from GSD to GSA in the late fall. (All time is eastern standard.)

A letter from the director of YV3BC at Caracas, Venezuela, gives the following schedule:

Daily—11 a.m.-2p.m., 5-10 p.m. on 6134 kc. 10-10:30 p.m. on 9510 kc.

Sunday—9 a.m.-12:30 p.m., 3:30-6:30 p.m., 8:00-10:00 p.m. on 6134 kc. 10-11 p.m. on 9510 kc.

These programs are also radiated by a long wave station operating on 1200 kc.

FYA, Pontoise, France, is now operating a colonial beam transmission service as follows. For Indo-China, 8-11 a.m. on 15,240 kc. For Madagascar 11:15 a.m.-1:15 p.m. on 11,905 kc. For Africa 3-5 p.m. on 11,710 kc. For South America 6-9 p.m. on 11,705 kc. and for North America 9-11 p.m. on 11,705 kc.

The schedule of VK2ME at Sydney, Australia, for October follows: Sunday only, 12:30-2:30 a.m., 4:30-8:30 a.m., 9:30-11:30 a.m. For November the schedule is: Sunday only, 1-3 a.m., 4:30-8:30 a.m., 9-11 a.m. (E.S.T.).

YV1BC at Caracas, Venezuela, is now broadcasting on 25.65 meters as well as the old wave of 49.08 meters. The schedule is: 10:30 a.m.-1 p.m., 5:15-10 p.m. daily and 8:30-11 a.m., 1:30-11 p.m., 8-10 p.m. on Sunday part of the time on one wave and part on the other. Address is Apartado 290, Caracas, Venezuela, S.A.

In response to inquiries may we state the following: There are no s-w stations operating in the broadcast service in New Zealand at the present time. Also G-5SW at Chelmsford, England, was discontinued when the new transmitters at Daventry were opened last December.

RV59 at Moscow, U.S.S.R. on 50 meters broadcast as follows at present Sunday, Monday, Wednesday and Friday from 5-6 p.m. (E.S.T.) in English. Sunday from 8-11 p.m. REN at Moscow on 45.38 meters broadcasts in English on Tuesday, Thursday and Saturday from 5-6 p.m.

YV2AM at Maracaibo, Venezuela, on 21.26 meters is reported broadcasting from 6.30-11:30 a.m. HC2JSB, Guayaquil, Ecuador, on 37.50 meters is on Monday, Wednesday, Saturday from 8-11 p.m. A new one is CP5 at La Paz, Bolivia, on 49.4 meters. They are on the air from 6-6:30 and 9-10:30 p.m. ZGE, Kuala Lumpur, Federation of Malay States on 6130 kc. is on the air daily from 6:40-8:40 a.m. and Sundays from 7-9 a.m. Time is Eastern daylight time, 1 hour ahead of E.S.T. The above information comes from Frank E. Switalski of Cincinnati, Ohio.

"Key-Klix" Resumes

Because of the many requests made by amateurs and short-wave fans, the American Sales Company of 44 West 18th Street, New York, the oldest amateur supply house (Established in 1919), has resumed publication of "KEY-KLIX," containing 192 pages. This issue contains pages chock full of interesting articles and news by such well known radio authorities as: McMurdo Silver, Arthur H. Lynch, Lewis Winner and Henry McArthur, together with the most complete listing of fine Amateur and Short Wave equipment ever made, at the lowest prices in the history of Radio.

A line to the American Sales Company will bring you, free of charge this new issue of "KEY KLIX."

www.americanradiohistory.com

Amateur Transmitters

(Continued from page 405)

factured outfit, but there are many similar units available on the market at surprisingly low prices. For the fellow who prefers to "roll his own," a full description of the amplifier follows. It can be very easily built in "bread-board" form, and if the power supply used for the transmitter is good and husky, it might likewise run the amplifier. However, in most cases it will be advisable to build up a separate power supply, such as was described in the first article of the series, which appeared in the September issue.

The amplifier is conventional in design. A single-button microphone transformer is fed into a type 56 tube. This is the later model tube which replaces the 27 tube. If 27's are available they will work approximately as well. The first stage is resistance-coupled to another 56. This is transformer coupled to two 45 tubes working in push-pull. We couple to the primary side of the transformer with condensers. These are four microfarad units rated at 800 volts, although 600 volt units will stand up OK. All the resistors in the set are one-watt carbon units, except the 1000 ohm, 45 bias resistor, which is of 5 watts rating, wire-wound. The two 6 mf. filter condensers are rated at 600 volts. The filter chokes are rated at 30 henries, 150 M.A. each. A regular type 80 full-wave rectifier is used to supply the high voltage direct current. The *gain control* in the circuit of the first audio stage is a 250,000 ohm potentiometer. A *constant-current* choke is used in the plate lead of the RF amplifier. The rating of this choke is 30 henries at 150 milliamperes. Extreme care should be taken that a well-made, husky power transformer and modulation choke are used.

The microphone transformer has a primary input of 200 ohms, the same as the resistance of most good standard single-button microphones. The amount of battery used with the microphone depends on the unit itself. The particular mike used is an RCA-Victor unit, which has been commonly selling for less than two dollars. Ordinarily, 3 volts are used, but for higher output, and to enable one to speak further from the mouthpiece, as much as twenty-two and one-half volts may be used without harming the "mike." A single-pole switch should be used to turn off the mike current "when listening to the other fellow."

There are several coupling arrangements shown in the diagrams, which will cover the problems arising with any type of amplifier used. Connect the transmitter power supply minus to ground. Likewise run the lead from the other side of the condenser that goes to the center-tap of the push-pull modulator output transformer, to *ground*. If a voltage divider (resistance) is used to get the exact 300 volts, be sure the tap is *by-passed* to ground by a one mf. 400 volt condenser.

Tuning Up!

The transmitter is set up with the 160 meter coils in it. Modulator, power supplies, (or supply, if only one is used for both oscillator and amplifier), and microphone are all hooked up. By means of the monitor, tune the oscillator to the part of the band in which operation is desired, tap the excitation coil one-third of the way from the "cold" end of the oscillator plate coil, and neutralize the amplifier according to instructions given in the previous issue. While neutralizing, the modulator should be *on*, but with the volume control turned all the way off. Likewise be sure that the antenna is *off* while neutralizing. Next tune the amplifier for minimum current, and adjust the antenna coupling until the plate meter reads 40 mills, (MA.), or whatever the proper value for the modulator is. As an example, if a ten watt modulator were used, the coupling would be adjusted until the plate current registered approximately 67 mills (M.A.) at 300 volts to obtain 20 watts of input power to the amplifier. With the antenna coupled, run the *gain* all the way up, and check with the monitor. At zero beat, the voice of a person talking into the microphone should be heard clearly and distinctly. If instruetions and the rules set down have been scrupulously followed, and the proverbial grain of "horse-sense" has been used, there will be no trouble encountered. 73's and if you do strike any "snags," write to me and I will be glad to do what I can to help clear them up. However, please enclose a stamped, self-addressed envelope, as last month's mail ate quite a large hole in my pocketbook for stamps, not to mention stationery.

Parts List

1—Acratest microphone transf. X1.
1—Acratest push-pull input transf. X2.
1—Acratest push-pull output transf. X3.
1—Acratest power transformer 400-0-400 X 4 5V.—2½—2½.
3 30 henry 150 M.A. Acratest filter chokes (L1, L2, L3).
C1, 2—6 mf. 600 V paper or electrolytic condensers.
C2-1—Acratest .01 mf. bypass condenser.
2—5 prong sockets.
3—4 prong sockets.
C3, 1—4 mf. 800 volt condenser.
R1—250,000 ohm variable potentiometer. Acratest.
R2—2500 ohm resistor, Lynch (International).
R4, 1—75,000 ohm resistor, Lynch (International).
R5, 1—1 meg. ohm resistor, Lynch (International).
R6 & 7, 2—.5 meg, resistors, Lynch (International).
1—1 watt carbon resistor—Acratest.
R8-1—1000 ohm 5 watt resistor.
R9-1—20 ohm CT (center tap) resistor.
(Note: The complete modulator as shown in the photograph and referred to by the author is manufactured by Federated Purchaser.)

World's Tiniest Tube

(Continued from page 397)

tances and lead inductances are reduced to about one-tenth those of the larger tubes.

Tubes Used O.K. in 1 Meter Receiver

These tubes have been operated in a tuned-radio-frequency receiver at a wavelength of 1 meter. This receiver consisted of two stages of tuned-radio-frequency amplification, using the screen-grid tubes, a grid leak detector and 1 stage of audio amplification, using the small triodes. The set was enclosed in a shielded box less than 7" long and 3" high. The amplification was found to be approximately four (4) per stage. The operation was in every way similar to that of conventional sets designed for much longer wavelengths.

A 75-cm. (30 inch) receiver using one stage of tuned-radio-frequency amplification has also been constructed.

The triodes have been operated as oscillators in a simple feed-back circuit at wavelengths as short as 30 cm. (12 inches). At this short wavelength the plate supply was 112 volts and the plate current 3 milliamperes.

It appears from these results that these small tubes should make reception possible at wavelengths well below 1 meter, in the conventional circuits used for much longer wavelengths. Due to the small size of these tubes they are not very suitable for transmitters, as the power output is very low.

This work was carried out as part of a program of research on short waves. These tubes are not available commercially, and no attempt is being made to manufacture them at the present time.

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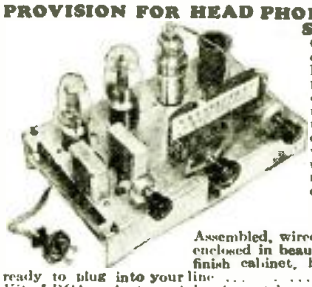
Verified Worldwide Reception
Completely Self Powered Latest Type 77-43 and 25Z5 Tubes—15-200 meters
PROVISION FOR HEAD PHONES AND SPEAKER

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Greatest Short Wave Book!

WE are pleased and proud to announce the greatest and most complete work on *SHORT WAVES* which has ever appeared in print.

There has been a big boom in short waves during the past two years in spite of the depression. Tremendous progress has been made, yet up to now there has not been an adequate book depicting ALL the progress that has been made.

THE OFFICIAL SHORT-WAVE RADIO MANUAL now fills this need completely.

It is a big book in which you will find EVERYTHING in short waves, no matter what it may be. It is not only a complete manual, but it is a veritable encyclopedia of facts, information, hookups, illustrations. It is impossible to explain the entire volume in a few sentences.

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

Here are the contents of the book:

14 VALUABLE FEATURES

- 1. THE LARGEST SECTION, featuring the most important short-wave receivers and how to build them, EVER ASSEMBLED BETWEEN TWO COVERS.
- 2. Short wave amateur transmitters in all their phases.
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- 8. A big section for the Short Wave experimenter on short-wave kinks—hundreds of them.
- 9. A section on the important new art of short-wave therapy (treatment of diseases by short waves).
- 10. A section devoted exclusively to Short wave converters. This includes how to build them, as well as commercial models with FULL SERVICING DATA.
- 11. An important section on Short Wave antennae and noise eliminating procedures.
- 12. The most complete section of Short Wave Superheterodynes in print. This section includes both how to build as well as commercial models of receivers. The latter with full service data.
- 13. A section on amateur 'phone transmitters and how to build them.
- 14. A Short Wave Physics section on theoretical Short Wave data for the advanced experimenter, as well as student.

THE OFFICIAL SHORT-WAVE RADIO MANUAL contains hundreds upon hundreds of illustrations and hookups that are invaluable to you as a short-wave enthusiast. It contains a veritable "gold-mine" of information.

Over 200 big pages
Over 1,000 illustrations
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SPECIAL PRE-PUBLICATION OFFER: You now have the opportunity to order this book before it comes off the press and save money. The price of the new OFFICIAL SHORT-WAVE RADIO MANUAL will be $2.50 as soon as it comes off the press (late in October). No reduction in price will be made later. To you who order this book before publication the price is $2.00.

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IMPORTANT!

Inasmuch as this is the first time that such a monumental work in short waves has been published, Mr. Hugo Gernsback has consented to personally autograph the first one thousand copies, all of which are numbered. If you wish an autographed copy of the Manual, place your order immediately.

Clip—Mail This Coupon Today!

SHORT WAVE CRAFT, 11-33
96-98 Park Place,
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Gentlemen: I enclose herewith my remittance of $2.00 for which please send me one copy of the 1934 OFFICIAL SHORT-WAVE RADIO MANUAL, at the pre-publication price of $2.00. I understand that the price of the book will be $2.50 as soon as it is published. (Send remittance, check or money order. Register letter if it contains cash or currency.)

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Short Waves and Long Raves

(Continued from page 413)

but I can't help but give all credit of my present knowledge to SHORT WAVE CRAFT. It sure is a wonderful magazine for "beginners" and "old-timers" alike.

Mastering the code slow but sure, I hope to sweat through the "exam." soon.

I sincerely hope you print this as I am very anxious to communicate with other "hams" and "fans," guaranteeing them an answer; so come on all you "radio bugs," foreign and local alike, drop me a line and let's make friends—the sooner the better.

FRANCIS MILTNER,
37 Nebraska St.,
Painesville, Ohio.

(You seem to have had a lot of fun with the "Denton 2-Tube Receiver" and you are probably in for many more happy "listening-in" periods with it. Mr. Denton has a knack of turning out unusually efficient short-wave sets and his sets all seem to possess the faculty of smooth control of regeneration—the great "bugaboo" of many of the poorly designed and thrown together sets. We wish you success in learning the code; you will undoubtedly hear from several hundred "fans" and "hams" in answer to your request for correspondence. Let us hear from you again when you pass Uncle Sam's license examination and you have your "ticket."—Editor.)

HE GOT "PLENTY" OF REPLIES

Editor, SHORT WAVE CRAFT:

Many thanks for publishing my letter in the June issue of SHORT WAVE CRAFT. In response to my letter I have received about fifty letters and to reply to each one as I promised in my letter it would be a task far greater than I anticipated, and I should be glad if you apologize for me to the many friends who do not receive a reply. No doubt you will do me this favor in the next issue of SHORT WAVE CRAFT.

I am endeavoring to correspond with about 36 fellows in the U.S.A. and think that they will suit my purpose.

Thank you and all for the interest you have shown.

GEORGE WOOD,
4 Elmfield Rd.
Davenport,
Stockport, England.

(Glad to hear from you "old top" and also that you received fifty replies to your recent letter, which we published in the June number. You will probably have a jolly time of it corresponding regularly with the thirty-six short-wave fans in this country, and they should be able to keep you pretty well posted on the development of short-wave events on this side of the "big pond."—Editor.)

2-TUBE PORTABLE "BEATS 'EM ALL."!

Editor, SHORT WAVE CRAFT:

Just in the short-wave business a short time when I built the Two-Tube Portable receiver described in the February issue of SHORT WAVE CRAFT. I have never heard such results! I have built other sets, but this has it over them all. Some stations I have picked up are DJA, Germany, I2RO, Italy; VE9JR, Winnipeg, Manitoba, and EAQ, Madrid, Spain, besides other stations too numerous to mention. The volume was not so low; in fact I have many a time picked up DJA on a loudspeaker. I am only too sorry that I did not build this set sooner. Seeing that SHORT WAVE CRAFT describes such fine sets, I buy it every month.

JOHN H. FAY,
2203 Jackson St.,
Scranton, Pa.

(Well, Well, and to think you heard that fine bunch of DX stations, using only the portable receiver with but two tubes, described in our February issue, on page 587. We have received many letters of praise regarding the fine results obtained with Clark Kuney's portable, which was described, complete with the coil-winding data, in the February issue. One of the reasons why this set probably works so well is the fact that it is totally shielded and yet there is sufficient spacing of the parts in this receiver so that there is no undue losses due to induction in the metal can. Your reception of foreign stations on a loud speaker, using only the 2 tubes, is a very fine achievement and you will find many more interesting and valuable circuits described in the coming issues of SHORT WAVE CRAFT.

"OSCILLODYNE" KNOCKS 'EM SILLY!

Editor, SHORT WAVE CRAFT:

I am writing you this letter regarding my results with Mr. Worcester's "Oscillodyne." I never forget to read "fan" mail monthly in your magazine but as yet I haven't seen one that came from Detroit, so I thought I would write in and see what happens. Mr. Worcester stated in his article on the one-tube Oscillodyne that Canadians were received without an aerial. Well, here is something that will knock your ears off! I have received DJD, EAQ, VE9JR, XDA, GSF, GBS, *all without an aerial!* If any "fans" get to read this article, don't think it's the hooey; I have made many a two-tube set that's supposed to get Europe—and I didn't get it. Believe me, the Oscillodyne sure is the set for a beginner! I have also received VK2ME and VK3ME as "clear as a bell"—with an aerial of course.

DONALD HEIN,
4013 Harding Ave.,
Detroit, Mich.

(Wow! Wow! Donald, you take the cake! Fine business for Mr. Worcester's "Oscillodyne," and using only the 1-tube model at that! We believe that all short-wave "fans" will agree that it takes an efficient set, which, with only one tube used as a detector, will pick up stations on the other side of the world "without an aerial!" Your experience with the Oscillodyne bears out that of the editors, who also had some very surprising results with Mr. Worcester's "brain-child." Anyone might have thought of the Oscillodyne principle, but one of the principal secrets of this circuit lies in the careful balancing of the tickler inductance to that of the secondary or grid-coil. It took the genius of Mr. Worcester to find out just what this balance should be, and this valuable information he has given in his various articles on the 1, 2, and 5-tube Oscillodynes. One thing about the Oscillodyne, on which you will vote in the affirmative without a doubt, is the fact that the dial is always "alive" with stations; the Oscillodyne is moreover particularly free from the "dead-spot" bugaboo. Yes, as we look back we can't help but remembering the Oscillodyne as one of the real "bright spots" of the past radio year.—Editor.)

HE LIKES THE SIMPLE SETS!

Editor, SHORT WAVE CRAFT:

You certainly publish the finest theory obtainable in a radio magazine. But, please do not get too far above us fellows, with too many "tuned R.F." and "superhets"; there are a good many of us who cannot reach that high, we have to stick to the elementary 3-element tubes, because that's all we have in the way of equipment.

I have built the Oscillodyne, Beginner's Twin, and the Argonaut with excellent results, mostly from old battery receivers, the new parts being grid condensers, the grid leak and aerial condenser.

I agree with R. G. Hunt in your June issue in the respect that I've been unable to build some of the even simple sets, be-

(Continued on page 440)

—building, testing and repairing all kinds of radio receivers!

THE three volumes of this Library cover the entire field of building, repairing and "trouble-shooting" on modern radio receivers. The Library is up-to-the-minute in every respect and is based on the very latest developments in the design and manufacture of equipment. 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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VOLUME III: covers the essential principles underlying the operation of vacuum tubes in as non-technical a manner as is consistent with accuracy. It discusses the construction, action, reactivation, testing and use of vacuum tubes; and an interesting section is devoted to remote control of industrial processes; and precision measurements.

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THE FINEST S. W. GLOBE

A Man's-Sized Globe for Short-Wave Fans

Here, at last, is the most marvelous globe bargain of the world. It's a big fellow, as you can see in comparison with the standard telephone set. The globe measures 12 inches in diameter, and the total height, with pedestal, is 16 inches. The globe is printed in some fourteen different colors, and is waterproof, so that it can be washed without trouble. The "Meridian" in which the globe moves is made of highly polished and nickel-plated metal, while the base is a beautiful dull black. A simple lock "A," makes it possible for you to change the angle of inclination, for easier inspection and measurement. Only the best of material is used in the making of this globe, and this is the first time that a large globe of this kind has been sold at such an extremely low price.

Only with a world globe of this kind is it possible to get a true picture of the relation of countries to each other, air-line distances, etc. For instance, which is nearer to New York—Moscow, Russia, or Rio De Janeiro, Brazil? Capetown, South Africa, or Tokio, Japan? Honolulu, Hawaii, or Lima, Peru? You will be amazed when you actually come to measure the distances. This is best done by stretching a string over the globe, in such a way that it passes directly over the two cities or two points in question. Not only is a flat map deceptive but, when it comes to distance, it is all wrong. *The true measurements can be made only on a globe.* This globe is big enough to give your den or room a professional appearance; and those who own them would not part with theirs.

The low price we are quoting is for introductory purposes; it must be increased in a short time.

The World Short-Wave Globe, as illustrated, 12-inch diameter, 16 inches high. Authentic, up-to-date (published late 1932); over 7,500 names and places—there have been 1362 official changes in the past ten years. Spelling conforms to rulings of U. S. Department of Commerce, and Royal Geographic Society, London, England. Names as they are spelled by their local broadcasters. Washable lacquer finish; movable-meridian style of mounting. Smart modern base design in black, polished nickel meridian. All globes are packed in a carton for safe shipment, and we guarantee delivery in perfect condition to you. List price, $12.50. Your Special Price..... **$3.75**

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Worth $60 your price $4.50

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Gold Shield Products Co. 112 Chambers St. S. W. E. New York, N. Y.

Short Wave League

(Continued from page 433)

ceivable that a couple of thousand phone-transmitters could be installed in a city of 3,000,000 like Chicago.

Why don't you put the LEAGUE to some good use, as does the A.R.R.L.? A good improvement would be the adoption of an unlimited CW license clause, requiring code speed of 15 or 20 wpm (words per minute) and a stiff technical "exam." Only holders of this type of license should be allowed to operate on the 7 and 14 mc. (megacycle) bands. Hams should only be eligible after one year's experience.

Also why not put some "ham" articles in your magazine. We've had about enough 2-tube D.C. receivers. Why not apply for the stuff QST receives but does not publish? You'd have a "FB" magazine with all your space filled with high quality literature.

MAURICE KRAAY,
Munster, Ind.

Reading, Pa., S-W League

Editor, SHORT WAVE CRAFT:

We have organized the READING SHORT WAVE LEAGUE. To date we have 14 members. It was organized August 17, 1933. The officers of the League were elected as follows: Allyn M. Freese, President; Ralph L. Jones, Secretary; Ellsworth E. Starke, Treasurer. All meetings are scheduled for every Friday night, at 8 p.m. at 312 North Fourth Street, until further notice.

ALLYN M. FREESE,
President, Reading Short-Wave League,
Reading Pa.

Learning Code a Stumbling Block!

Editor, SHORT WAVE CRAFT:

About the "code-less" licenses that you are sponsoring. Do you think that after obtaining such licenses the licensees would be content to remain on this band? The "code" is the only thing that prevents me from securing a license right now. Of course if a stiff technical "exam." were given, a number of good amateurs could get the right start for telephone work, but the technical part of the "exam." is so easy, a child 5 years old could learn it in a month. It is learning the "code" that requires the work!

Rule 4 in the new regulations is the one that should clear up a lot of QRM. Even with their bands reduced the "CW" boys will be much better off than formerly, IF this rule is enforced. The wide bands should clear up a lot of the QRM on 160 meters.

Your September Issue is the best yet. It might well be called "Something-for-Everybody." Let's have the "fiction" every month.

C. H. SKATZES,
45 Flax St.,
Delaware, Ohio.

Calls Code Test "Radio Poppycock"

Editor, SHORT WAVE CRAFT:

You have the very magazine for the radio experimenter. I am building the "Acratone Discoverer." As I have had very little time lately, I haven't finished it. I know it will be a humdinger, because SHORT WAVE CRAFT always has something worthwhile.

As for that "codeless" phone, below 6 meters, I am in favor of it. I know code is very hard for some fellows (including myself). I know plenty of experimenters, who are anxious to experiment with modulation. Looks like Uncle Sam should give them a break. In short, I call that code test for phone, "Radio Poppycock."

W. F. MENDENHALL, U. S. N. G.
W4AML, W4BUY, W4ZZC
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MODERN SHORT WAVE RECEIVERS—

The OSCILLODYNE 1-Tube Wonder Set

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

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

A REALLY NEW CIRCUIT

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

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

ABSOLUTELY FOOL-PROOF

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

Oscillodyne Wonder Set

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

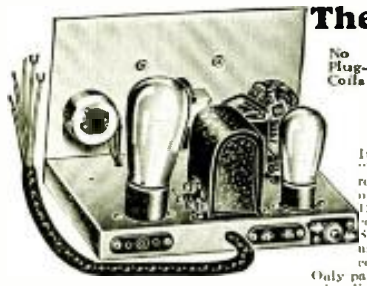
No. 2146. Official One-Tube Wonder Set, completely wired and tested as per above specifications. YOUR PRICE **$6.20**

No. 2147. Official One-Tube Wonder Set, but not wired, with blueprint connections and instructions for operation, complete shipping weight 3 lbs. YOUR PRICE **$5.35**

No. 2148. COMPLETE ACCESSORIES, including the following: one 6 month guaranteed Neontron No. 237 tube; one set No. 1678 Brandes matched headphones; four No. 6 Standard dry cells; two standard 45-volt "B" batteries, complete shipping weight 22 lbs. YOUR PRICE **$5.10**

The Beginner's Ideal Set

The Oscillodyne 2-Tube Loudspeaker Set



This illustrates the rear of the set

No Plug-in Coils

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

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

Only parts of the highest quality, such as Hammarlund condensers, Yaxley switches, Kurz Kasch vernier dials, etc., have been used. These parts are mounted on a sturdy cadmium-plated metal chassis which measures 9 in. long x 6¼ in. wide x 6 in. high.

No. 2197. 2-Tube Oscillodyne Loudspeaker Set, Completely wired and tested. Shipping wt., 9 lbs.

YOUR PRICE **$10.85**

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

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EXTRA SPECIAL

Baird Universal Short Wave and Television Receiver Seven Tubes

15 to 560 Meters

This is the same receiver which a short time ago sold for $80. It is a receiver which is "Universal" in the strictest sense of the word. Not only will it intercept SHORT WAVE and TELEVISION SIGNALS but REGULAR BROADCASTS AS WELL. In other words, it receives **everything** on the air below 550 meters. Amazingly simple in construction, marvelously proficient in performance. The set employs 7 tubes, namely 2-24's; 2-27's; 1-45 and 1 B. B. rectifier. Provisions are made for connecting a television neon tube and for switching from loudspeaker to televisor. A complete complement of 12 plug-in coils is furnished with the set. These coils cover a range of from 15-200 meters. Three additional coils to cover the broadcast range of from 200-550 meters can be furnished at an additional cost of $1.00 per coil. Provisions are also made for earphone reception as well as for a phonograph pick-up connection. Only high grade parts such as Hammarlund condensers, etc., are used. The chassis is completely wired and assembled ready to use and is CONTAINED IN A HANDSOME MAHOGANY CABINET. The supply of these sets is very limited, being only twenty in all. **Act fast if you desire to take advantage of this offer. Shipping weight, 65 lbs.**

LIST PRICE $80.00

No. 35 Baird Universal Short Wave and Television Receiver. YOUR PRICE. ONLY **$22.51**

2-Tube, 12,500 mile Doerle Receiver Rear view, both A.C. and Battery Model look alike.

Specifications of Doerle Sets

No. 2174. Electrified 2 Tube 12,500 Mile Doerle Receiver, completely wired and tested, less tubes. Measures 9" long x 6" high x 6 1-8" wide. Shipping wt., 5 lbs.
YOUR PRICE **$9.45**

No. 2175. Electrified 2 Tube 12,500 Mile Doerle Receiver in kit form, less tubes, but including blueprints, and instructions. Ship. wt., 5 lbs.
YOUR PRICE **$8.25**

No. 2176 Complete set of tubes for above: either one—57 and one—56 for A. C. operation, or one—77 and one—37 for battery operation.
YOUR PRICE **$1.80**

No. 2177 Electrified 3 Tube Doerle Signal Gripper, completely wired and tested; less tubes. Measures 10¼" long x 7" high x 8 1-8" wide. Ship. wt., 7 lbs.
YOUR PRICE **$14.20**

No. 2178. Electrified 3 Tube Doerle Signal Gripper in kit form, including blueprints and instructions; less tubes. Shipping wt., 7 lbs.
YOUR PRICE **$12.75**

No. 2179. Complete set of tubes: either one—58 one—57 and one—56 for A. C. operation or one—78 one 77.— and one—37 for battery operation.
YOUR PRICE **$2.70**

BATTERY SETS

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No. 2145. COMPLETE ACCESSORIES, including 2 No. 230 tubes; and one type 34, one set of Brandes Headphones, 2 No. 6 dry cells; 3 standard 45-volt "B" batteries; 1 B. B. L. 9 inch Magnetic Loudspeaker Shipping weight, 32 lbs.
YOUR PRICE **$11.00**

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of either one of books illustrated herewith—**FREE OF CHARGE**—with the purchase of any of the short-wave receivers listed on these pages.

Book No. 866 explains in a thorough manner the ways and means of obtaining an amateur transmitting license. Furthermore, all government rules regulating amateur transmissions are reviewed. Book 830 is a comprehensive compilation of the most prominent short-wave receiver circuits published during a period of two years. **Build up your radio library with one of these books.**

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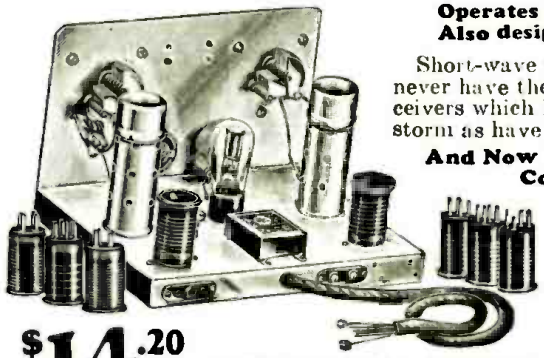
ELECTRIFIED DOERLE 2 and 3 Tube Receivers

Operates on either AC or Battery. Also designed for 2-volt operation

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

And Now These Doerle Sets Have Been Completely Electrified



$14.20

3-Tube Doerle Signal Gripper
Rear view of A.C. Model—2-volt model does not have tube shields.

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

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

They are low-priced, yet pull in short-wave stations from all over the world REGULARLY, in practically ANY LOCATION.

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

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

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

Improved Circuit and Design

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

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

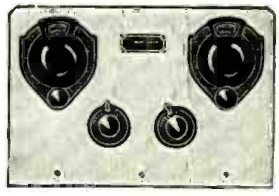
Only First-Class Parts Are Used

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

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

Our Own Tests

Every one of these Doerle receivers, without exception, is tested in our laboratory *under actual operating conditions*. We refrain from *giving* you the astonishing list of stations which we, ourselves have logged during the course of our tests. We would much rather have you and our many other short-wave friends talk about the results. *Each receiver is accompanied by schematic diagram and wiring blueprint, as well as a pamphlet of detailed instructions.*



FRONT VIEW showing general appearance of Doerle receivers.

These fans tell you how our sets actually perform—

THE OSCILLODYNE

HOW IT WORKS

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

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

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

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

A PEACH

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

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

HENRY TOWNSEND, Ramsey, N. J.

THE DOERLE RECEIVERS

SOME LIST!

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

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

THIS IS GOING SOME!

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

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

A DOERLE ENTHUSIAST

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

Samuel E. Smith, Lock Box 241, Grayling, Mich.

FRANCE, SPAIN, ETC., ON LOUDSPEAKER

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

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

ARTHUR W. SMITH, Springfield, Mass.

REGULAR FOREIGN RECEPTION

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

ARTHUR C. GLUCK, Brooklyn, N. Y.

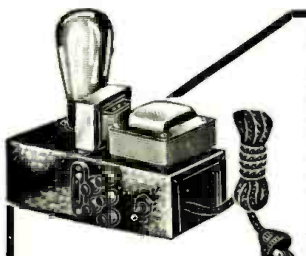
THRILLED BY DOERLE PERFORMANCE

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

RANDOLPH GRAY, Quincy, Mass.

We Actually Guarantee Results on These Sets

These Are Fool-Proof Short Wave Sets—Sets Which Work At Your Command. No Longer Is It Necessary To Be Sceptical About Short Waves.



This is a special Short-Wave Hum-Free A. C. Power Pack.

Special Doerle Designed Power Pack

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

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

The power pack supplies 250 volts at 50 mils for the plates of the tubes, 22½ volts for the screens, and 2½ volts at 5 amperes, for the filaments. These various voltages are obtained from convenient binding posts on the side of the pack. Furthermore, provisions are made for energizing the field of a dynamic speaker. Any speaker having a field resistance of from 1500 to 2500 ohms may be thus energized. All the component parts of this pack are built into a sturdy, metal base which is black, crackle finished. The power transformer and one of the chokes are the only units which are mounted on top of the chassis. The pack employs a type 280 full-wave rectifier which is inserted in a socket on top of the base. A convenient on-off switch is mounted on the side. The pack is sold complete with four feet of connecting cord, terminating in a special Belden soft rubber plug. Measures 7¾" long x 4" wide x 4¾" high overall. *Sold complete with 280 tube.* Ship. wt. 10 lbs.

No. 2149 Short-Wave Power Pack, including 280 tube
YOUR PRICE $6.25

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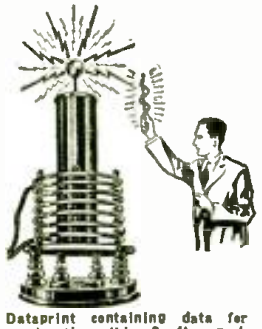
DATAPRINTS



Just the Technical Information You Need To Build Electrical Apparatus

Dataprint containing data for constructing this 3 ft. spark Oudin-Tesla coil. Requires 1 K. W. 20,000 volt transformer as "exciter"; see list below.

. . . . . $.75

Includes condenser data.

OTHER "DATAPRINTS"

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36 inch spark, data for building, including condenser data $0.75
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Violetta type, high frequency coil data; 110 volt A.C. or D.C. type; 1" spark; used for "violet ray" treatments and "Experiments"... 0.50
How to operate Oudin coil from a vacuum tube oscillator 0.50
3 inch spark Tesla coil; operates on Ford ignition coil 0.50
3 inch spark Oudin coil; 110 volt A. C. "Kick-Coil" 0.50

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Any size, 200 to 5000 watts. (1 Primary and 1 secondary voltage data supplied—specify watts and voltage desired) $0.60
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Powerful battery electro-magnet; lifts 40 lbs.....$0.50
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(20% Discount on all orders for $3.00 or more. No C.O.D.)

The DATAPRINT COMPANY
Lock Box 322 RAMSEY, N. J.

Short Wave League

(Continued from page 418)

My opinion is that such an idea would be ideal from several angles. Personally I can see little damage done. Anyone qualified to pass the theoretical "exams" *certainly would know as much about transmitter operation as some one having a code speed of 30 per.* (The italics are ours. —*Editor.*)

From my own experience I have seen hams with unlimited phone licenses who found it impossible to make an ordinary two-tube regenerative receiver work properly! One did not have even a faint idea of how to measure the wavelength of a 5-meter transmitter without a wave-meter! Would a person qualified to operate an ultra short wave phone lack this knowledge? And speaking of measuring wavelengths: I asked one operator of a 5 meter phone station (has an "unlimited" phone ticket) how he determined his wavelength. He set the tank condenser somewhere near the place he thought 5 meters ought to be! I suppose that is correct operating procedure!!

Being a "service man" I find most of my spare time taken up reading the latest dope of B.C. receivers. It leaves me little time to apply to *code.* Besides learning the code requires certain definite hours each day if it is to be learned successfully. Practice cannot drift for several days. That's what happens every time I attempt to learn. The only free time I have is Sunday and that comes once a week. I certainly would enjoy experimenting with ultra S. W. phone on these days and would if I knew the code. Therefore I am decidedly in favor of a "codeless" phone license on Ultra S. W.

In closing I would suggest that such a license be issued for a short time (with proper theoretical "exams") to see how it would work out. It could easily be discontinued if it did not prove successful.

NORMAN G. WISWELL,
Box 397,
Colebrook, N. H.

Who Threw That Brick!?*

Editor, SHORT WAVE CRAFT:

I believe it is my duty as an amateur to write this letter regarding your 5-meter no-code idea.

First let me state that I am entirely against it, and with the amount of letters coming in from fellows who believe as I do, I think that you should admit that you are wrong and drop it for something more worthwhile.

I suppose that you have received more letters for than against it, but I'll bet that about 99% of these are from chumps who are just too darn lazy to knuckle down and learn the code and pass the "exam." If they would spend as much energy toward that goal as they do writing letters, and hoping they can get a ticket gratis they would get on the air before they grow old and bent. They won't this way, because your proposition won't get to first base with the F.R.C. (Federal Radio Commission).

Anybody who is too lazy to do the small amount of work required to get a license, isn't going to do a lot of experimenting when and if he gets on 5 meters anyhow. All he would do is to buy a mail-order transmitter and receiver and "chew the rag."

Unnecessary QRM would result, thus hindering the boys who are doing worthwhile work. I actually mean this—even on five meters with its limited range. With no restraint, every Tom, Dick, and Harry would have a 5 meter phone installed to gossip around the neighborhood until, as a local ham says, "It would almost run competition with the American Telephone & Telegraph Co." Hi! What if there are 400-10 kc. bands on 5 meters? Each phone can't be allocated on a separate band—and I've heard phones built by "real" hams that blanket 30 kc. Also it is entirely con-

(Continued on page 436)

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UX-171A	5.0	Power Amplifier ½ amp	.30
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UY-247	2.5	Power amplifier pentode (A-C Fil.)	.60
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WD-12	1.1	Detector amplifier	.60
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UX-231	2.0	Power amplifier	.60
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59	2.5	Triple grid power Amp. (A-C Heater)	.60
75	6.3	Duplex-Diode Triode (A-C Heater)	.85
77	6.3	Triple-grid detector amplifier (A-C Heater)	.85
78	6.3	Triple-grid R-F amp. (A-C Heater)	.85
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UX-183	5.0	Sparton type power Amp. (A-C Fil.)	.85
UY-484	3.0	Sparton type detector Amp. (A-C Heater)	.85
UX-586	7.5	Sparton type power Amp. (A-C Fil.)	2.10
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125 Mil. rectifier tube B.H. (Raytheon type)			1.25
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UX-280	5.0	Full Wave Rectifier	.40
5Z3	5.0	Heavy-Duty Full-Wave Rectifier	.85
25Z5	25.0	Rectifier-doubler (Heater)	.85
UX-281	7.5	Half Wave Rectifier	1.10
UX-282	2.5	Full Wave Mercury Vapor Rectifier	.85
UX-283	5.0	Heavy duty full wave mercury vapor rectifier	.85
UX-216B	7.5	Half Wave Rectifier	.85
UX-213	5.0	Full Wave Rectifier	.40
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National 5880-AB-S Power Unit for ACSW-58 Receiver, with tube	23.55
Hammarlund Comet "Pro" in cabinet, wired, with RCA tubes & coils	95.00
National FB 7 Short Wave Receivers, wired, less coils and tubes	26.45

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Hammarlund Midget Variable Condensers:

20 mmf.	$ .88	140 mmf.	$1.47
35 mmf.	.88	200 mmf.	1.64
50 mmf.	1.06	260 mmf.	1.77
80 mmf.	1.18	320 mmf.	2.06
100 mmf.	1.35	Dual midget 140 mmf.	2.82

Filament Transformers:

2½ volt-c.t., 6 amp.	$.95	6.3 volt-c.t., 3 amp.	.95
2½ volt-c.t., 9 amp.	.95	7½ volt-c.t., 3 amp.	.95
5 volt-c.t., 3 amp.			.95
Types 210, 281 and 250 guaranteed			$1.19
866 M.V. rectifiers . . . guaranteed			1.40

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Two Candler students do remarkable receiving feats at World's Fair Code Contest. Jean Hudson, W8BAK, 9 years old, wins championship in Class "E." McElroy, inactive, as operator for 11 years, copies 57 wpm in Class "A," beating his former record of 56½ wpm.

Walter H. Candler

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$9.75 less tubes

Resco S. W. 5 Tube A. C. Receiver

using (2) 57's—(2) 56's and (1) 280 rectifier. Aluminum chassis and panel with Vernier dial. Special

$17.95 less tubes

SHORT WAVE BARGAINS

1 Tube Oscillodyne Kit	$3.95
2 Tube Oscillodyne Kit	6.95
New Hammarlund Star Midget Condensers: 5 Plate 49c; 7 Plate 49c; 13 Plate 58c; 23 plate 60c.	
G. E. Power Transformer for Xtal or buffer supply	1.69
2½ V. 8 amp. fil. trans. cased	1.49
Set of 4 short wave plug-in coils	1.79
Bliley Crystals. 40-80—160 meter	3.90

All Merchandise Guaranteed. Please include postage

Radio Electric Service Co., Inc.

N. E. Cor. 7th & Arch Sts. Phila., Pa.

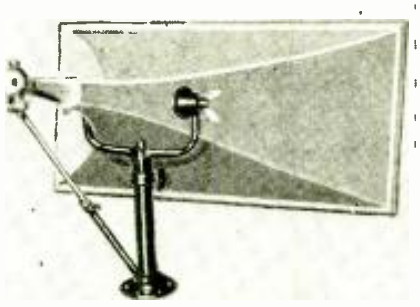
Wide-Area Horn With Adjustable Mounting

● A new horn designed to give wide area coverage has just been announced by the Macy Engineering Company.

The wide bell of this horn which measures 50" in length by 23" in height suffices to serve an area where two horns of the usual type would be required. The horn is exponentially curved over its length of 54". While this horn has been especially designed for sound truck use, it is also applicable for airport and stadium short-wave "rebroadcast" purposes. The bell just fits the width of the overage automobile and its length permits the use of two such horns, one facing front and one rear.

The horn is pictured here with a new bracket, which allows the horn to be swung throughout a complete circle and tilted up or down to any desired angle; after adjustment it may be locked in position for operation—hand-screws make rapid adjustment possible. By loosening two screws, the horn may be removed from the bracket for use without the standard. This is an important feature in truck work, as the speakers may be removed for use in an auditorium. A six inch platform is all that is required for mounting. This mounting is made for both round and square mouth horns.

This type of horn is designed for coupling to a standard type of giant dynamic unit, such as the Macy GU2, which is rated at 33 watts and has a frequency range of from 50 to 8,000 cycles. Amplifiers of high wattage output may be employed and short-wave programs made audible to thousands of people.



An exponential horn useful in broadcasting short-wave programs to large audiences. (No. 125)

(Manufacturer's name and address supplied upon receipt of stamped envelope.)

Ham and Yeggs—"Solution"

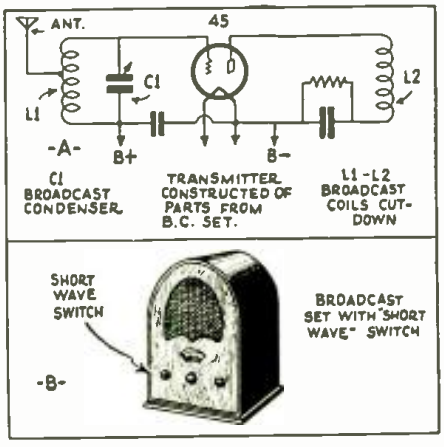
(Continued from page 428)

● MR. FRASER has left the editors as much up in the air as anyone else, when it comes to the solution of his mystery story—"Ham and Yeggs." Looking at it from purely a radio standpoint, there are several ways in which Quinn, the kidnapped victim in the story, could have communicated with the outside world. A few of these possible methods are outlined together with respective diagrams.

Of course, the first that comes to mind in the story is the incident of breaking the 45 tube. We believe this was premeditated rather than purely accidental. It would seem that it would be necessary to put the radio that was located downstairs out of commission, in order that there would be no possibility of Quinn's further activities being discovered by his kidnappers. We believe this is the key to the supposed accidental breaking of the tube.

As for communicating with the outside world, the first logical method would probably have been for Quinn to construct a small transmitter, using the parts from the receiver located in his room. A diagram shown in Fig. A, is about the most simple and easily constructed type of transmitter. However there is a certain time element that has to be taken into consideration for the construction of this unit. Therefore the editors would rather believe that Quinn had one of these so-called "broadcast and short-wave" midget receivers, rather than an ordinary broadcast receiver. Communication with the outside world would then be comparatively simple and quickly accomplished, as we will endeavor to point out. Most of the cheaper so-called "all wave" receivers have a switching arrangement allowing the local oscillator of the superheterodyne circuit to be tuned in the vicinity of from 100 to 200 meters, thus permitting reception of police calls and 160 meter amateur stations. The method of switching usually employed eliminates the first detector, leaving the local oscillator to be used as an autodyne detector and coupling the antenna through a choke-coil, directly to the grid circuit of the oscillator. As some of you will readily testify these sets will give out very strong signals, creating interference in other short-wave receivers for several miles around. This being the case, it would only be necessary for Quinn to have disconnected one of the voltage supply wires to the oscillator tube and tapping it back to the connection to form an improvised key. In this way Quinn could easily have communicated directly, that is, he could have held two-way communication with any of the local amateurs and inform them as to his location, etc. An illustration of the method used in this case is shown in Fig. B.

The above is just a general outline of the opinion of the editors regarding the solutions. However, maybe some of our readers have a more ingenious solution of the story. If you have, kindly send them along and those that the editors judge the best will be published in a forthcoming issue of SHORT WAVE CRAFT.



Diagrams showing possible ways in which short-wave signals could have been sent by the captive.

A Prize-Winning FRENCH Transmitter and Receiver will be described In The Next Issue!

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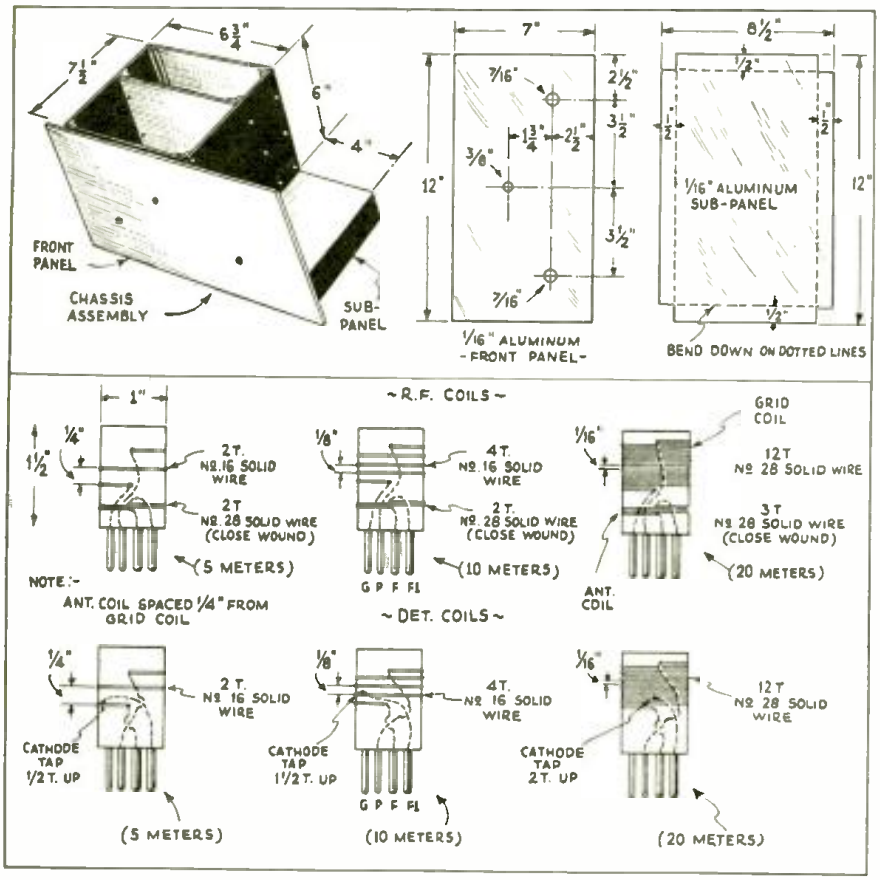
A 4-Tube "5 and 10" Meter Receiver

(Continued from page 408)



Coil Data and Receiver Chassis Dimensions.

—large dial—main tuning; left-hand knob —R.F. stage trimmer condenser; right-hand knob—regeneration control.

Antenna and Power Supply

Antennas are of prime importance in the reception of signals in either the 5 or 10 meter bands; in fact they spell the difference between the reception and non-reception of some of the weaker stations. About the best type is the vertical doublet, with each side measuring eight feet in length, and mounted as high from the ground as possible; for best results the feed line (lead-in) should be tuned. Such an arrangement is shown in the sketch, together with other types of antennas and their various lengths.

The power supply shown in the photographs was especially constructed to work on ultra high frequency receivers. To remove the main *hum* it was only necessary to use two 30 henry iron core chokes, with three 8 mf. electrolytic condensers. However on certain frequencies there was a decided hum, (this is usually termed *tunable hum*) and about half a day was spent in trying to remove it; RF. chokes and bypass condensers were tried in every part of the circuit, with no improvement at all. The power transformer used happened to have two extra filament windings that remained unused. These idle coils were finally suspected and one lead of each winding was *grounded* to the negative side of the circuit; sure enough the hum entirely disappeared, no trace of it could be found on any frequency. If you happen to be having trouble from *tunable hum*, watch all *unused* low voltage secondaries! To improve regulation a heavy-duty 20,000 ohm wire-wound resistor is connected across the output terminals of the high voltage.

The *power-supply* unit should be capable of furnishing no less than 250 volts under full load. This high voltage is necessary in order to obtain full gain of the tubes. Lower voltages will in all cases produce weaker signals on the speaker or phones, and may even cause the set to fail entirely on the 5 meter band!

Parts List of Receiver

1—Pentode output transformer. Acratest.
1—Chassis—see text and drawing for details.
6—4 prong coil forms; ultra-high frequency type; National.
2—4 prong isolantite sockets; National (Hammarlund).
2—6 prong isolantite sockets; National (Hammarlund).
1—6 prong wafer socket (laminated); Eby (Na-ald).
1—5 prong wafer socket (laminated); Eby (Na-ald).
2—35 mmf. variable tuning condensers; Hammarlund.
1—20 mmf. variable tuning condensers; Hammarlund.
1—Vernier dial; National, type B.
1—2.5 millihenry choke; National.
1—250 millihenry choke (universal wound).
1—50,000 ohm potentiometer; Acratest.
1—"Interruption Frequency" transformer, 700 turns pri. 1500 sec; Gross Radio.
3—.001 mf. mica fixed condensers. Flechtheim.
2—.005 mf. mica fixed condensers.
2—.00005 mf. mica fixed condensers (connected in series).
1—.0001 mf. mica fixed condenser.
1—.5 mf. bypass condenser.
4—.01 mf. bypass condensers (tubular).
1—25 mf. 25 volt electrolytic condenser; Acratest.
1—300 ohm 1 watt resistor, Lynch (International). Also following resistors.
1—500 ohm 1 watt resistor.
1—2,000 ohm 1 watt resistor.
1—25,000 ohm 1 watt resistor.
1—100,000 ohm 1 watt resistor.
1—250,000 ohm 1 watt resistor.
1—.5 megohm 1 watt resistor.
1—2 megohm 1 watt resistor.

Parts for "Power Supply"

1—Power transformer 325-0-325 plate, 2.5 fil, 5 v. R.T. Co.

(Continued on page 442)

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Tubes Guaranteed 3 Months

Foundation Kit, includes 1 Metal Case, 1 Chassis and 1 Shielded Compartment 2.45

Special—Shielded Short Wave Battery Set

Described in September Short Wave Craft

Perfect Performance Assured— 17 to 200 Meters

USING 1-'30, 1-'32, 1-'33, 1-'34. LOW CURRENT DRAIN INEXPENSIVE TUBES.

COMPLETE KIT of parts with 2 sets of coils (8 coils) $8.95.

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Tubes Guaranteed 3 Months

Foundation Kit, includes 1 Metal Case, 1 Chassis and 1 Shielded Compartment—$2.45.

A REAL THRILL IN STORE FOR SHORT WAVE RECEPTION. Get Police reports, Ship-to-Ship and Amateur Conversation, also Short Wave Broadcast Stations.

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turn, the wire is cut apart and the two ends brought to the terminals of a 43 plate midget variable condenser. This condenser tunes the feeders.

Tuning Each Feeder Separately

The coupling coil for this system is *not* "split" in the center. In this case, TWO 43 plate midget variable condensers are required. The system does not give as good results as the other. Furthermore, it is more complicated and expensive.

Correct Dimensions for Short-wave Receiving Antennas

For all-around best results the antenna wires, A_1 and A_2, designated in Figs. 1, 2 and 3 (but also applying to all other antennas shown here) should be of the following lengths:

For	20	meter	reception A1 & A2, each	16½	ft. long
For	40	meter	reception A1 & A2, each	33¼	ft. long
For	80	meter	reception A1 & A2, each	66½	ft. long
For	160	meter	reception A1 & A2, each	133	ft. long

THE TRANSPOSED FEEDERS, for use with above antennas, are to be the following length:

For	20	meter	reception	33¼ ft.
For	40	meter	reception	66½ ft.
For	80	meter	reception	133 ft.
For	160	meter	reception	266 ft.

However, even the smallest of these antennas, with correspondingly short feeder lines, can be used for short-wave reception on ANY of the bands. The table is for the benefit of those who are situated in places where larger antennas can be erected. Obviously, the larger of the above antennas will give correspondingly better results, but even the 20 meter antenna will improve reception on ANY short wave receiver. Its fundamental wave-length lies within the 20 meter band, but its harmonics will take in many corresponding bands.—*Courtesy RADIO.*

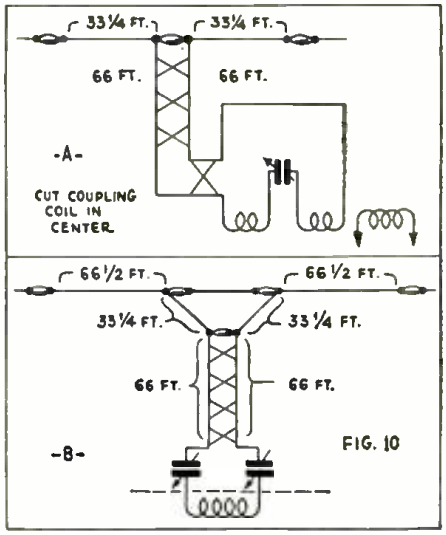


Fig. 10—Diagram A shows Mr. Wallace's preferred coupling system, the coupling coil 1½ inches in diameter being wound with 16 turns of No. 22 double cotton covered magnet wire. At the eighth turn the wire is cut apart and the two ends connected to the terminals of a 43 plate midget variable condenser which tunes the feeders. Diagram B shows how to tune each feeder separately; here the coupling coil is not split and two 43 plate midget variable condensers are used.

A Good "Key Click" Filter

By C. W. DUREE, W9EII-W9DMD

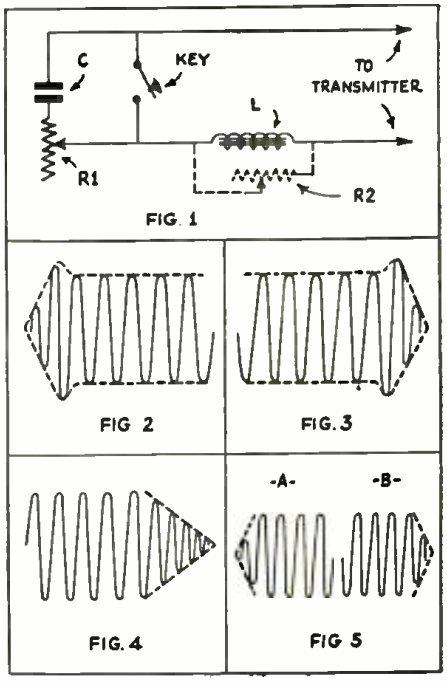
A GOOD key click filter is composed of an inductance, some resistance and a capacity in the keying circuit of the transmitter. The correct method for wiring the filter is to put the inductance in series with the key and the condenser and the resistance across it, as in figure 1.

Before building a filter of any kind it would be a very good idea to have a knowledge of how it works. Here is a very concise explanation. The object of the whole arrangement is to introduce a lag in the keying—a split second lag, to be true, but a lag nevertheless. The idea is this—when the key is pressed (without a filter) a surge of current is sent into the tube and therefore into the oscillatory circuit, and as a result the transmitter starts oscillating violently and if we could look at the wave radiated from the antenna it would look as shown in figure 2. When the key is released there is another surge of power (voltage surge) and the signal would look like figure 3. One can see from the drawings that what we need is something to apply the power gradually, but not so gradually as to introduce "tailing" (figure 4) and which will also release the power gradually.

A "lag circuit" accomplishes this very nicely. The lag circuit is composed of choke L, condenser C, and resistance R1. When we use the proper values of these the key can be pressed and the tube will go smoothly into operation, the signal will appear as shown in figure 5a; when the key is released the signal will appear like figure 5b. The only trick in building and operating this unit is to find the proper values of the parts. Remember, they are never quite the same in two different units. A little experimenting and common sense will do that little trick.

The inductance L can be a regular filter choke from 2 to 50 henrys inductance and of about 125 milliamperes capacity (depending on the current drawn by the transmitter). When using a 30 to 50 henry inductance it might be necessary to shunt it with a variable resistor (shown by R2 in figure 1) having a maximum value of 500 to 10,000 ohms. A 1mf. fixed condenser will handle the job nicely at C. Incidentally, the voltage rating of the condenser should be at least half of the plate voltage of the transmitter. The resistor R1 can be any good variable resistor with a value of between 200 and 500 ohms.

The only operation kink to follow is: plug the unit into the keying circuit of the transmitter and the resistors in the unit are adjusted until the clicks in a nearby broadcast receiver disappear entirely. It can be adjusted so the clicks cannot be heard in a receiver in the next room. Try it!



Circuit for "Key Click" filter, utilizing a condenser, variable resistor and a choke L. The graphic curves show the action with and without filter.

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Cooking With Short Waves

(Continued from page 394)

toast that has been burnt to a black crisp does not have even the slightest taste of burn.

How Ultra Short Radio Waves Are Made

Ultra short radio waves are generated in this apparatus by a standing wave oscillator, a large double end vacuum tube. It has a cylindrical shape and is four feet long and six inches in diameter. It is made in three sections; an inner section of copper construction and large glass cylinders for the end sections.

Current from a motor-generator set at 7500 volts (ordinary household voltage is 110) is impressed on the plates and fed to the grids of the double-end tube. Instantly, the current begins to oscillate within the four-foot tube, just as water would swish back and forth within the tube if the tube were shaken longitudinally. However, since the particles of electricity have practically no weight, their speed is tremendous. They race back and forth within the tube with the speed of light and traverse 245,520,000 lengths of the tube each second!

All the while they are reversing their direction of flow, first forward and then backward; reversing with tremendous rapidity—120,000,000 times a second!

The voltage of this ultra high frequency current fluctuates just as rapidly, changing from its maximum value to its minimum every 1/120,000,000 of a second. The opposite ends of the tube always have opposite voltage; when one is plus the other is minus and vice versa.

The voltage of the end points of the tube may be represented by the ends of a seesaw, one up and the other down, then the one down and the other up. This imaginary seesaw would see-saw at a tremendous rate—each end would go up and down 60,000,000 times each second!

This ultra high frequency current is tapped from the oscillator and led to an eight-foot antenna from which the invisible power hurtles off into space. At some distant point, a small aerial picks up the radioed power and passes it through rectifying tubes the size of an ordinary lamp bulb. The rectifiers smooth out the current's 120,000,000 reversals of direction each second into continuously flowing *direct current*, suitable for driving electric motors or similar appliances.

Short-Wave Antennas

(Continued from page 409)

while you, too, enjoy the full benefits from this method of placement. Note the insulator in the center of the antenna. This separates the two antennas, each having its own feeder system. This installation keeps your antenna away from the annoying power lines and both you and your neighbor will have the ultimate in short wave antennas.

Fig. 5

If your neighbor permits you to use his house for the far-end suspension of your antenna, and if he is not interested in the "community antenna" idea, erect the system in the manner shown here. The feeder lines are attached to the center, with ropes of sufficient length at both ends to permit correct suspension of the antenna proper. This method keeps your antenna free and clear from the power lines.

The Correct Coupling System

The feeders of the antenna shown here must be tuned with a coupling coil, 1½" diameter, wound with 16 turns of No. 22 Double Cotton Covered wire. At the 8th

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The COMET "PRO"

Add the Crystal to Your Standard "PRO"

THE results of adapting an improved type of quartz-crystal filter to the COMET "PRO" have exceeded even our expectations. We believe they will amaze the average operator, already familiar with the unexcelled selectivity and sensitivity of this famous short-wave superheterodyne.

Without sacrifice of sensitivity, a remarkable reduction of high-frequency noise is obtained, and single-signal selectivity becomes a reality.

For usual operation, the new Crystal "PRO" retains all of the previous characteristics and efficiency of the Standard "PRO"—nothing taken away. Then, by a mere flip of a front-panel switch the crystal filter is brought into the circuit for either CW or PHONE work—instantly sharpening the tuning curve to a needle-point.

Should an unusually strong heterodyne interference be present on either side of the peak, another simple panel control is adjusted to introduce an "interference notch" in the curve, which effectively eliminates the heterodyne without broadening the peak.

The result of this unique feature—exclusive in the new Crystal "PRO"—is the successful attenuation of an unwanted signal to the point of non-interference while the wanted signal remains at maximum intensity.

The Hammarlund Crystal Filter may be added at small cost to any Standard "PRO" Receiver. Inquiries are invited from present "PRO" owners who desire the greatly increased efficiency this distinctive feature assures.

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424 W. 33rd St., New York

—Check here for detailed description of the COMET "PRO".—Check here for information about adding Crystal Filter to the Standard "PRO".—Check here for General Parts Catalog.

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251 Westinghouse Power Generators

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Power Generator

FOR SHORT WAVE BROADCASTING

Reg. Price Was $75

There are two pairs of stator poles—two North and two South. Around these four poles are wound the four field coils which, when energized, produce poles of alternate polarity. Each of these poles is provided with four slots into which are fitted the A.C. windings. The rotor is a 12-tooth inductor that carries the D.C. armature coils which supply the D.C. exciter current required by the alternator; a built-in commutator takes off the generated D.C. Three leads extend through the casing to permit a 1½ V. flashlight-type battery to be switched into circuit for starting, and to control the A.C. output of the generator. Rotated at its normal speed of 4,500 r.p.m., the output is 200 W., at 115 to 125 V. (on open circuit), 900 cycles.

Manufactured by Westinghouse for the U. S. Signal Corps, the sturdy construction of this instrument recommends it to the technician. The rotor turns in ball bearings. Shaft length (driving end), 2 ins.; diameter, 9 16-in.; the end is threaded for a distance of ⅜-in. At the end opposite from the drive the shaft extends ¾-in. Case dimensions, exclusive of the shaft, 4½x6¼ in. in diameter. Guaranteed new and perfect. Worth $75.00, but while they last, only $4.95, plus shipping charges. Shipping weight 13 lbs. Send check or money order.

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A replacement unit for the popular King and Silvertone sets. Consists of Power Transformer and Choke for Silvertone 1928 and 1929 Models, and for King Models H and J. Measure 6½ x 5½ x 2¾". Wt., 5 lbs. Supplies 4—226, 1—227, 2—71A and 1—280. Specifications: 1½ V. at 4½ amps.; 2½ V. at 1¾ amps.; 5 V. at ½ amp.; 5 V. at 2 amps.; 600 V. C.T. at 60 mils.

PRICE as long as supply lasts **$1.73** Each

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Enclosed you will find my remittance of $———, for which please send me:

( ) Power Generator, $4.95 each
( ) King-Silvertone Power Pack, $1.73 each

Name .....

Address .....

City..... State.....

Ham and Yeggs

(Continued from page 396)

Quinn was not smiling as he watched Smooth silence the newscast.

"You'll be comfortable here," the racket boss promised. "There's another radio, a new one still crated, that I'll have the boys put in your bedroom.

"Thanks," Quinn was unimpressed. "But how about a magazine or something to read?"

"Plenty of 'em around somewhere." Smooth was rising from the meal. "We always—oh, here's Sleepy. Excuse me."

"Hyah, Boss!" Sleepy saluted.

"Show Moneybags the grounds, and view, Sleepy. An' tell Carenza I want him in my office. We are not to be disturbed *by anyone*."

"I get it, Boss. C'mon, Quinn-sy, we stroll."

* * *

At the evening meal, some spirited discussion arose. The prisoner was eating with Smooth and Sleepy. He had noted that never more than two of the five gangsters ate at once. The others would be on outside guard, he supposed.

"I tell you, I don't like it, Boss," Sleepy declared. "This guy that dropped in, might *not* have been a farmer."

"He looked and acted like a hick, didn't he? Just phoned to town. Didn't see pal Moneybags. Didn't ask questions. An' walked back the same way."

Sleepy admitted the truth of this summary. Still he was worried. "But a gumshoe bull, a smart one, *could* look an' act like a farmer, too. No, he *didn't* ask questions—an' that's what bothers me. Why didn't he? We only took this place a while ago. An' he's supposed to be on the next farm. I say a real farmer would've asked *some* questions. . . ."

"Some rubes are tight even with the tongue," Smooth snapped. "Forget it. You go out to phone the ransom message in the morning." Smooth seemed absorbed in other matters.

"Mind if I shorten the aerial for that set in my room?" Quinn asked Smooth.

"Why? Doesn't it work?"

"Not so hot. We happen to have a set just the same at home, is how I know a shorter wire works much better."

"Okay." Smooth was obliging. "Sleepy will help with a ladder. Make it snappy. Soon be dark. You can do the climb yourself. But I wouldn't try to signal from there."

"I wouldn't either," Quinn chuckled.

He had the needed help. The job did not take long. Quinn rested a moment, leaning against a chimney. He gazed southward. No lights. Nothing showed distinctly in the dusk. To the east, however, was a reflected glow on part of the cloud bank, looming dark, full of rain. That would be light from the small town, eleven miles. . . .

"Down, pal," called the watchful Sleepy. "You can't fly it!"

Quinn obeyed. Then went indoors.

Near midnight the captive came down from his room.

"Seems to be a tube or something burned out in that new radio, upstairs," he regretted. "At least the set's dead, and one tube doesn't light."

"Turn this one on, if you like," Smooth invited. He indicated the mantel model. None of the three mobsters in the house showed any desire or preparation for sleep.

"Oh—guess I've heard enough programmes tonight." Quinn yawned. "Just wondered if maybe I could try it with a tube from this set. The one I think's dead has '245' on its top. So if this set has one with the same mark—?"

"Sure. I'll show you where to look," Smooth offered. "I saw the works of this one. Dealer showed me all about it."

Smooth found the required tube, removed it, gently. He handed it to Quinn. They went upstairs together.

Quinn switched on the new receiver. "See," he explained vaguely, "this tube doesn't light."

He reached in past it, jerked back his hand with an "Ow-uh!" and dropped the good '45 from the other hand.

"Some mechanic!" Smooth guffawed, viewing the wreckage. "Both sets dead! You should've been a radio man! Nighty-night!"

* * *

Near five a.m. the rescue surprise party caught Smooth and two henchmen sleeping. The outside guard had been clubbed. At Quinn's door, Sleepy, resisting, suffered a bullet-pierced wrist.

Dozens of men and youths swarmed indoors. Smooth judged that each civilian brought at least three policemen.

"Hi, Ham!" was almost the sole greeting shouted at Quinn.

"Want three guesses, Smoothie?" queried a grinning cop.

Another handed a note to the furious gang boss. He read in puzzled silence: "QRR 2 rdo hams. Hw abt rescue? QRA 11 mi W. fm Spagton—old Manners home. QRJ—only xmtr hr. CUL. Tnx de W3—Quinn."

They translated: "Emergency call to radio hams (amateur operators). How about rescue? Location 11 miles West from Spagton. I cannot receive you—only transmitter here. See you later. Thanks from W3—(legal call of Quinn's home station)."

Receiver parts had formed his emergency transmitter.

(See Page 432 for explanation of method used to send out signals which brought aid.)

New Double-Button Mike

● THE accompanying illustration shows a very useful and desirable double-button mike, which is being sold at an unusually low price. This Lifetime mike is of the double-button type, ruggedly constructed, accurately matched and beautifully finished in bright polished aluminum. It is slightly over three inches in diameter and 1½" thick over all. The mike has a gold-plated stretched diaphragm of special construction, gold-plated contact buttons, high quality carbon granules, the resistance of the microphone being 200 ohms per button and the front button being adjustable. This mike covers the entire voice range and is intended for amateur and public address work. The mike is furnished with an impedance matching transformer. An attractive feature of this mike is that the purchasers' call letters can be furnished on the title plate mounted on top of the mike supporting frame. The mike stand measures 9" high, the ring being 5½" in diameter. The letters measure 1" high and the polished aluminum stand comes complete, with eight springs for mounting the mike. (Refer to No. 124).

A popular-priced "Ham" mike (No. 124)

Commander BYRD'S Short Wave . . . . Receiver Read All About It In the Next Issue!

(Name and address of manufacturer furnished upon receipt of stamped envelope; mention No. of article.)

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The Short Wave Scouts

(Continued from page 393)

ing such data is given for the ten unverified stations as to enable an intelligent check to be made by the Judges. In the interest of all SHORT WAVE SCOUTS, however, contestants should try to send in 100% verification lists, if possible.

7.—This is an *international* contest in which any reader, no matter where located, can join. It is allowable for SHORT WAVE SCOUTS to list stations in their own countries, if they desire to do so. In other words, SHORT WAVE SCOUTS residing in the United States can log stations in the United States, as well as foreign stations. There will be no discrimination in this respect.

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

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

10.—In order to have uniformity of the entries, when writing or typing your list observe the following routine: *USE A SINGLE LINE FOR EACH STATION;* type or write the entries *IN THE FOLLOWING ORDER:* Station call letters; frequency station transmits at; schedule of transmissions, if known, (all time should be reduced to Eastern Standard which is five hours behind Greenwich Meridian Time); name of station, city, country; identification signal if any. Sign your name at the bottom of the list and furthermore state the type of set used by you to receive these stations.

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

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

13.—The first contest will close in New York, November ', 1933. It is realized that the time is somewhat short, but it will make it possible for SHORT WAVE SCOUTS to send in their verifications which they have accumulated over a period not more than 60 days before October I.

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

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

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

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

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See a 2-Tube Superheterodyne

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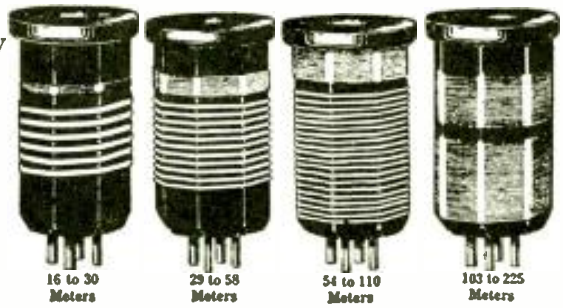

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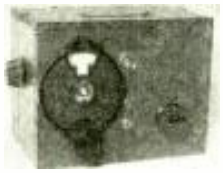
BRAND NEW CIRCUIT

See October SHORT WAVE CRAFT



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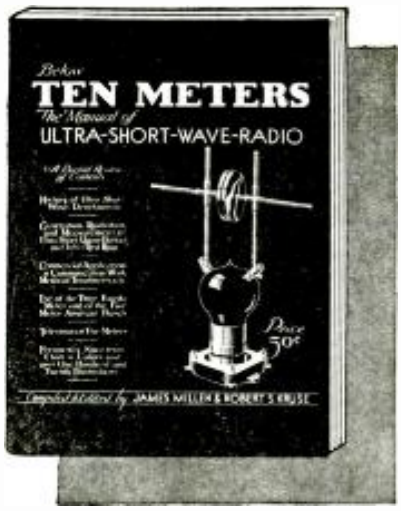

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"Smoothing Up" Your Receiver Controls

(Continued from page 410)

may develop through its use. Nevertheless it is by far the most efficient control so far discussed.

Figure 1-F is a combination of the methods used in Fig. 1-A and Fig. 1-E, and it is a very efficient system because it allows the detector to be set at maximum sensitivity by varying the S. G. voltage, while at the same time regeneration can be controlled by the throttle condenser C2. However another control is added to our already crowded panel, and this is a decided handicap. Furthermore the frequency stability and *detuning* effects are only slightly improved over the previously mentioned methods.

Electron coupling, then, seems to offer us a decided advantage in so far as *frequency stability* is concerned, but first let's examine Fig. 1G. This is, perhaps, the closest approach to electron coupling; however, there are several disadvantages such as greater tube noises and hand-capacity effects, unless sufficient shielding is used. It is therefore not recommended for a stable receiver.

Electron Coupling

In Fig. 1-H, we arrive at the first great improvement in frequency stability; it is the popular *electron-coupling* system. Tube noises are considerably reduced by this method, and the control of regeneration is comparatively smooth. Here a tap is taken off of the coil L2 about ⅛ the total number of turns from the low potential end. Regeneration is controlled by varying the screen-grid voltage as in Fig. 1-E. The most critical point in this method seems to lie in the proper selection of the grid-leak-condenser combination. Unless these parts are of the correct value, it will be found that a powerful carrier will only result in a feeble signal when the regeneration control is retarded properly. Grid condensers as low as .00005 mf. and as high as .0005 mf. were tried with varying degrees of success, depending almost entirely upon the particular tube employed as a detector. A grid-leak of low value proved best in all cases; about 1 megohm being the proper size.

The Best "Regen" Circuit I Found

The circuit shown in Fig. 1-I proved to be the one that was most satisfactory. It is a form of *electron coupling* that has greater *frequency stability* than any of the other possible methods. It is also very quiet and the regeneration control is smooth and causes only the very slightest amount of *detuning*. The coils are easy to construct, and the tickler coils requires only one or two truns for regeneration over the entire band of from 10 to 100 meters. This ticker, L2, is wound at the low potential end of coil L1, and in the *opposite direction* from this winding. Furthermore, it was found that when employing a 57 type detector tube with a grid condenser of .00005 mf. and a leak of 1 megohm, the circuit could be made extremely sensitive when the screen-grid voltage was in the order of ninety volts. At this high S.G. voltage it was also found advisable to space the tickler ¼ inch away from the coil L1.

In all of the cases outlined, it was found that the radio-frequency choke R.F.C., was a very important item; use only the very best in this position. The grid-leak and condenser also play an important part, and oftimes improved results can be had from any detector circuit merely by making a change in the value of these two units. Use only the very best grade of mica condensers throughout the entire circuit, and make sure that the resistors are of a kind that will retain their rated values permanently.

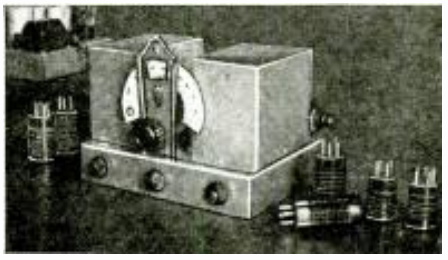
R.F. Coupling Methods

The next confusing subject to be discussed is that of a suitable means of coupling a *radio-frequency amplifier* to our regenerative detector. Five methods of doing this appear in Fig. 2, bottom page 411.

The popular tuned-plate impedance method is shown in Fig. 2-A. Theoretically, this system is advantageous in that a closer approach to maximum amplification is obtained from the screen-grid tube, through the tuned high impedance load in its plate circuit. However, the difference in potential across the tuning condenser C2 is productive of noises unless a very good condenser is employed. Also the grid condenser C1 must be of high quality to prevent leakage into the grid of the detector tube, thus causing lack of sensitivity and still more noises. Exceptionally good results can be had from this system, providing that high quality parts are used throughout.

Fig. 2B shows a slight improvement over the previous system; the only difference being that the plate of the R.F. tube is now connected to a tap placed somewhere about midway in the coil L1. This is a form of auto-former coupling, and there is some voltage step-up in the coil itself. Also selectivity is improved somewhat. But alas, it is subject to the same faults as the previous method, and extra good condensers must be employed at C2 and C1.

In Fig. 2C a resistor is placed in the plate circuit of the *radio-frequency amplifier* tube, and again we employ the condenser C1 as a means of coupling. However, another detector grid condenser C2 is used and there is now less likelihood of leakage through the two condensers thus placed in series. Furthermore the tuning condenser C is now at ground potential.



A close-up of the receiver employing the circuit improvements here described. It consists of a 58 T.R.F., a 57 electron-coupled detector, a 57 first A.F. and a 2A5 output tube. This receiver will be described in a later article.

The disadvantage of this system lies in the necessity of a larger applied voltage to the amplifier, due to the large voltage drop across the resistor R.

To overcome this fault a *radio-frequency* choke is used in place of the resistor, as shown in Fig. 2-D. The D.C. resistance of the choke is negligible and if a good unit having low distributed capacity is used, satisfactory results can be had.

In all of the above cases the actual coupling between the two tubes is made through the condenser C1, and as previously mentioned this condenser must be a good one or noisy reception and lack of sensitivity results. This condenser, then, is the weakest spot and its elimination is desirable.

Therefore in Fig. 2-E is shown what is perhaps the safest and most efficient method of coupling used today. It is the familiar *inductive coupling* method, and has several advantages, the first of which is that there is no longer any change of leakage from the *radio-frequency plate circuit* to the detector grid. Furthermore, we now have a means of controlling the selectivity of the receiver through an increase or decrease in either the number of turns on the coil L1, or in the degree of coupling between this coil and L2. This system therefore proved to be the most practical, due to its advantages of increased selectivity and the reduction of tube and condenser noises.

(Part II—Antenna Coupling Methods and various means of Controlling Volume will appear in the December issue.)

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Amateurs who made good

John J. Glauber

● MR. GLAUBER was born in New York City in 1903 and remained there until 1914, when his family moved to Newark, N. J. Through a "Ham" on the same street his interest in radio began in 1916, when a "crystal" receiver was constructed which would get NAA's time signals at noon; he ran home from school and missed lunch to hear NAA. In 1917 when the United States entered the war the receiver was dismantled.

John J. Glauber

In 1919 a regenerative receiver was built around an old Moorehead tube with gratifying results. In 1921 a "spark" transmitter was operated under the call letters of 2BMS and in 1923 a 100 watt self-rectified C. W. transmitter was put on the air. This lasted until 1923 when studies at college did not allow enough time to operate. 1925 was an eventful year—Mr. Glauber received an M.E. degree from Stevens Institute of Technology, and the call of 2BMS was lost because of failure to renew the license in time.

After graduating a position was accepted in the Mechanical Research Dept., of the Interborough Rapid Transit Co.'s 59th Street power station, in New York City. After six months the "radio bug" began to itch and a position was accepted in the laboratory of the U. S. Tool Co., manufacturers of variable condensers. After one year Mr. Glauber accepted an engineering position with the Arcturus Radio Tube Co. In 1930 the amateur station desire again came to the surface, an extra first-class license was taken out, and a 40, 20 and five meter transmitter put into operation under the call letters W2CPE. The station is operated for experimental purposes only and has never been on the air for the handling of traffic, because of lack of time. Mr. Glauber now holds the position of chief engineer of the Arcturus Radio Tube Co.

IN THE NEXT ISSUE!

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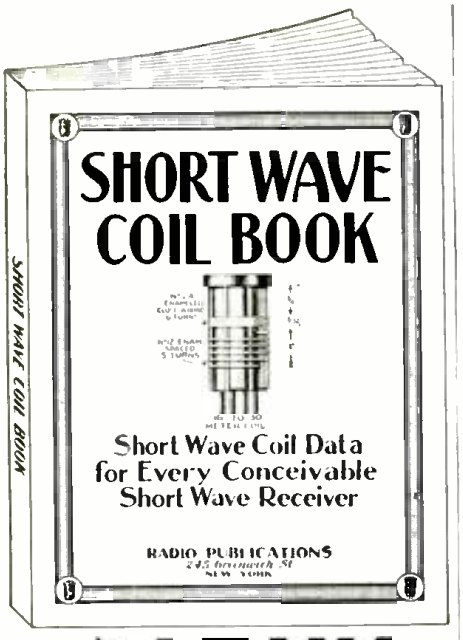

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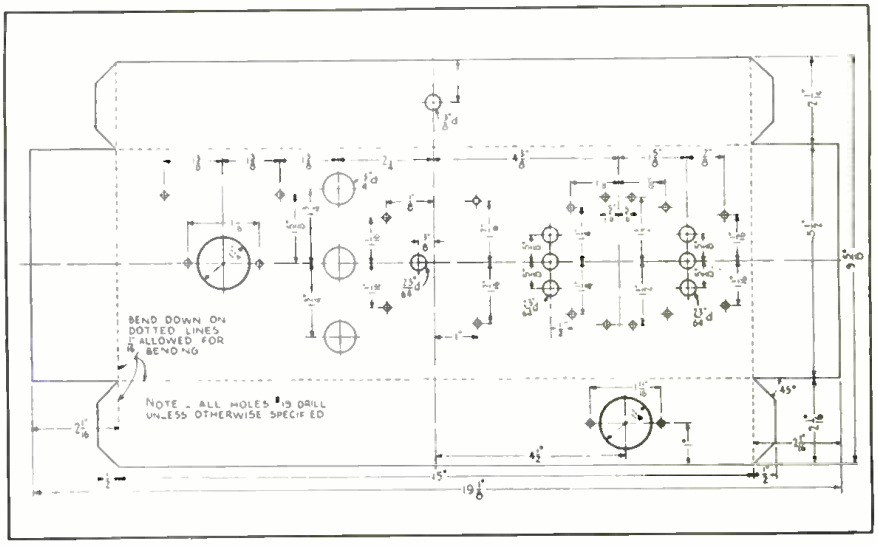
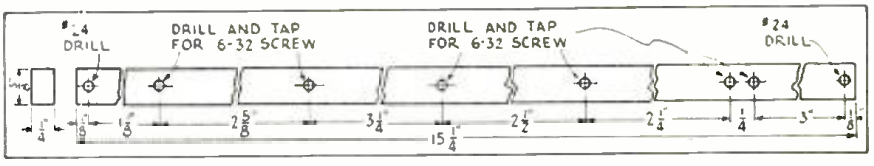
Two bakelite strips ⅛" by ⅜" by 4½".
One phone jack (J4).
Two Wyeth shield cover guide brackets.
One Wyeth shield cover. Sheet steel sprayed and baked black.

Power-Pack Parts List

One metal chassis 15" by 5½" by 2". Trymo.
One 300-0-300 volt Power Transformer, S-M 336U. (T3).
One Filter Choke, S-M 338. (L5)—30 Henry.
Two R.F. Chokes, S-M 275 (L6), (L7)—40 M.H. (milli-henry).
One 30 Henry Choke (L8)—30 H.
One Toggle Switch (S1).
Three 8mf. 600 volt electrolytic condensers, (C10), (C11), (C12).
One Eby wafter socket, 6 prong, blank.
One 80 type rectifier tube; Gold Seal, Arco or Van Dyke.
Power supply cable, 6 wire, 3 to 4 ft. long.
Two Eby 6 prong plugs for power cable.
Two wire power cable and plug, 15 ft.
Wire, soldering lugs, machine screws, etc.

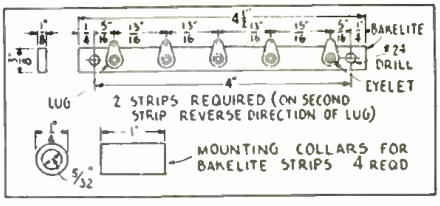




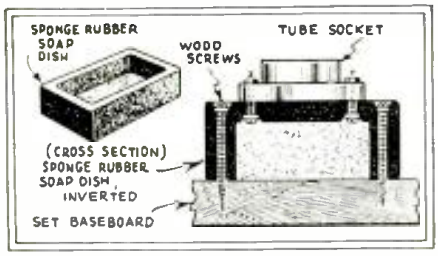
Large drawing shows dimensions and hole-drilling layout for power-pack chassis.

Directly above: Details of brass "ground" rod, to which all "ground" connections are made at various points along the chassis.

Right: Dimensions of bakelite terminal strip with soldering lugs.



Making A Resilient Tube Socket



A simple and very effective resilient tube socket is here illustrated.

An ordinary sponge-rubber soap dish, which can be purchased for about fifteen cents at any drug-store may be used as a shock-absorbing mounting for tube sockets by inverting it and fastening it to the baseboard of the set under the socket by two long wood-screws. Large washers must be put under the heads of the wood screws to prevent them cutting into the rubber. The socket is mounted in the center of this inverted soap dish and held in place by 6-32 machine screws and nuts. Large washers must also be used on these screws. In this manner, the socket is supported about an inch above the baseboard on this resilient rubber mounting. Flexible leads should be employed for making connection to the tube socket, as rigid leads might transmit vibration to the tube.—*Charles Felstead.*

IN NEXT ISSUE!

Some New Features in Short-Wave Super-hets —Don't Miss Them.

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The Wyeth All-Wave 6

(Continued from page 399)

ground bar to the rotors of the midget condensers.

Two bakelite strips properly drilled and mounted on brass collars form the supporting medium for the bleeder resistors, and the detector grid resistor and condenser. Lugs are secured to the strips by eyelets passed through the holes and riveted. The pigtails of the resistors are then inserted in the eyelets and soldered securely. This method of mounting greatly simplifies wiring and at the same time provides an absolutely rigid support for the component parts.

Note that isolantite tube sockets are used for the R.F. and detector tubes, also for the coil mounting socket. For highest efficiency it is always advisable to use isolantite sockets where radio frequency currents are present. The remainder of the sockets used in the audio and power circuits are of the ordinary wafer type which are entirely suitable in low frequency or D.C. circuits.

Careful attention to the arrangement of the parts beneath the chassis enables the shortest possible leads to be used. Condenser banks C4 and C5 were selected since each unit consists of three 0.1 mf. condensers compactly assembled in a metal case, which is easily mounted. Tubular, pigtail condensers may be substituted in their place but more difficulty may be experienced in mounting and wiring efficiently.

Center-tapped resistors R6 and R7 are connected across the heater supplies of the tubes and the center points grounded to the bar. This procedure eliminates the necessity of bringing out the center tap leads to the power supply, thus reducing by two the number of lines connecting the receiver with its power source.

For those who want to make their own coils the following coil winding data is given:

Coil No.	Wave Length Range in Meters	Secondary Turns. Connect to G and F2	Tickler Turns. Connect to P and F1
131L	16.6-31	6½ No. 22 E.	5¾ No. 34 D.S.C.
131M	30-56.7	13½ No. 22 E.	7⅜ No. 34 D.S.C.
131N	55-104	25½ No. 22 E.	12⅝ No. 34 D.S.C.
131O	103-195	46½ No. 24 D.C.C.	25⅝ No. 34 D.S.C.

In above coils but two windings are present, secondary and tickler. Jumper connects prongs C and G of coil form.

Coil No.	Wave Length Range in Meters	Primary Turns Connect to C and F2	Secondary Turns Connect to G and F2	Tickler Turns Connect to P and F1
131P	163-343	60 No. 37 E.	82½ No. 29 E	32⅝ No. 34 D.S.C.
131Q	273-600	60 No. 37 E.	155½ No. 34 D.S.C.	55⅝ No. 34 D.S.C.

131 P and 131 Q have three windings—primary, secondary, and tickler. The primary coil is wound on a cardboard form 1¼ inches in diameter and is secured within the secondary winding. Coil ends are brought out to the prongs as shown in wiring diagram.

A variable antenna coupling condenser of about 25 mmf. was used externally to the receiver and is therefore not shown in the wiring diagram. A variable condenser which is easily and quickly adjustable was found to be the most satisfactory. If it is desired to incorporate the condenser in the receiver, it may be mounted adjacent to the antenna choke coil beneath the chassis. In most cases once the optimum value of capacity is determined no further adjustments need be made.

The Power Supply Unit

The power-pack is of conventional design and therefore little need be said concerning its construction. The parts are mounted on a chassis 15 by 5½ by 2 inches. This chassis may be purchased undrilled. For those who wish to construct their own chassis, complete details are given herewith. From the diagram it will be noted that chokes L6 and L7 are connected in the plate leads of the rectifier tube. This precaution is quite necessary for best results. These chokes are mounted underneath the chassis adjacent to the plate terminals of the rectifier socket.

NC

OUTLINE SPECIFICATIONS

SW-58

TUNED R. F.

The SW-58 employs a regenerative detector with two audio stages with push-pull output for direct connection to any standard speaker with impedance of about 5000 ohms.

TUBES

AC Model SW-58 uses two type 58 variable-MU pentodes in RF and detector, one type 56 (or 227) in first audio, and two type 245 output tubes. DC model, type SW-34, uses two type 234 variable MU screen grid tubes in RF and detector, one type 230 in first audio, and two 231 output tubes.

COPPER SHIELDS

Heavy copper shields and properly placed parts in metal cabinet avoid stray coupling and interlocking.

R-39 AND ISOLANTITE

Are used for all dielectric material in RF and detector circuits.

TUNING CONDENSER

Is National 2-gang type SE with isolated rotors.

COIL RANGES

12 coil ranges are available—9 to 2000 meters.

D. C. OPERATION

D.C. model, SW-34, for battery operation, using 2-v. tubes listed above. 6 Volt Model also available.

A. C. OPERATION

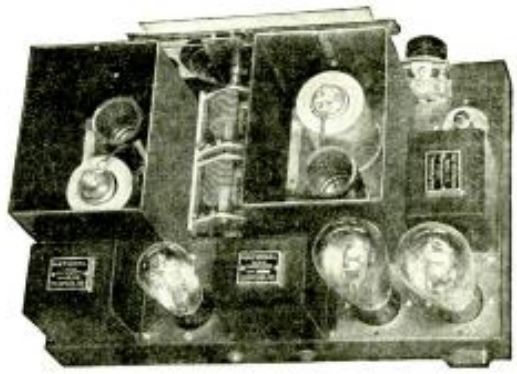
The SW-58 operates on AC with NATIONAL 5880 special short-wave power unit. RCA licensed.

SEND FOR A NEW CATALOGUE AND DATA SHEET

Our new catalogue No. 220 just off the press, and special data sheets, give complete information on these and other NATIONAL Short-Wave Receivers and Precision-made Short-Wave Parts. Use coupon below.

IF YOU PREFER T. R. F. in a short-wave receiver . . .

MANY experienced operators prefer the Tuned R.F. circuit for short-wave work. Extremely low background noise and high usable sensitivity together with unequalled flexibility and ease of control, make the SW-58 outstanding among high-frequency receivers, while its selectivity is second only to the most modern superheterodynes. The Class A push-pull output assures fine volume for loudspeaker operation—important to all short-wave broadcast listeners. And it is made for either full A.C., or full D.C. operation (the D.C. Model is called the SW-34), thus being suitable for *any* location.



NATIONAL

AC SW-58 & DC SW-34

SHORT-WAVE RECEIVERS

NATIONAL CO., INC., 61 Sherman St., Malden, Mass.

Gentlemen: Please send me your new catalogue No. 220 and special catalogue sheet, giving full particulars of the NATIONAL SW-58 and SW-34. I enclose 6c to cover mailing costs.

Name .....

Address .....

SWC—11-33

Parts List

One Wyeth receiver panel, drilled, sprayed and baked black.

One Wyeth special size chassis 16¼" by 8" by 2".

One special aluminum shield for coil.

One "Hand-Hole" Cover for coil opening.

One National Dial—Type N Vernier.

One .00014 mf. (each section) tuning condenser (C1).

One .000075 mf. Midget condenser, (C2).

One Hammarlund 3-plate midget condenser MC-20-8 (C6). Cap.-20 mmf.

One .00015 mf. small moulded condenser (C3).

Two bypass condenser banks (3-.1 mf., units in each) (C4) and (C5).

Two tubular condensers 25 mf., 400 V. (C8) and (C9).

One tubular condenser, 0.1 mf., 200 V., (C7).

One 400 ohm resistor, 1 watt (R1) Lynch, (International).

Two 8000 ohm resistors, 2 watt (R2) and (R3) Lynch, (International).

One 4000 ohm resistor, 2 watt (R9) Lynch, (International).

One 2 Meg. 1 watt (R4) Lynch, (International).

One 2000 ohm, 1 watt resistor (R5), Lynch, (International).

Two 40 ohm C. T. resistors (R6) and (R7) Lynch, (International).

One 800 ohm resistor 2 watt (R8) Lynch, (International).

Three radio frequency chokes (L2, (L3), (L4)—85 M.H. each.

One each of the following Short Wave Coils 131L, 131M, 131N, 131O, 131P and 13Q (L1).

One 1 to 3 interstage transformer (T1).

One 1 to 2 input push-pull trans. (T2).

One Output Transformer (optional) (T4).

Two National Isolantite 5 prong tube sockets (V2) & Coil (L1).

One National Isolantite 6 prong tube socket (V1).

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SHORT WAVE QUESTION BOX

3-TUBE S. G. "DOERLE"

A. T. Hellie, Cementon, Pa.

(Q) Will you please print a diagram of the 3-tube screen-grid "Doerle," using a 10 amp. 2½ volt filament transformer?

(A) On page 212 of the August, 1933, issue of SHORT WAVE CRAFT you will find an article entitled, "The 3-Tube Doerle Signal Gripper 'Electrified'" which will give you all the information necessary to revamp your set.

TESTING A. F. TRANSFORMERS

Albert Miller, Shenandoah, Pa.

(Q) What is the best way to test audio transformers?

(A) The most economical method of testing transformers is with a pair of phones and a 4½ volt "C" battery. If a decided click is present when the connection is made, the winding is O.K. Another way is to use a high resistance voltmeter and battery; with this method the primary and secondary windings can be identified.

CONDENSER CAPACITY

Harrison J. Blind, W. Lafayette, Ind.

(Q) What is the capacity of the equalizer condenser used in the antenna Cigar Box 1-Tube Catch-All Receiver?

(A) The antenna condenser used in this set is a 100 mmf. variable of the postage stamp variety.

(Q) What is the tuning range of this set?

(A) With the coils specified in the article, the range is approximately from 20 to 200 meters.

COILS FOR "CASH BOX" RECEIVER

James Gilroy, Pittsburgh, Pa.

(Q) What is the size of wire used in the coils of the "Cash Box" receiver in the May issue?

(A) No. 28 double silk covered wire.

(Q) Will a 230 work just as well as the 199?

(A) Yes.

(Q) What is the output in watts of the "Flea Power Transmitter" in the March issue?

(A) It is difficult to say just what the output of this set is. However if the set was carefully constructed it is possible that an output of one watt can be obtained.

4-TUBE "DOERLE" HOOK-UP

William H. Nicoletti, Brooklyn, N. Y., also T. Solonchak, Brooklyn, N. Y.

(Q) Will you please publish a diagram of the three-tube Doerle receiver with an addition of a pentode amplifier.

(A) You will find such a diagram printed on this page. This combination should produce very strong signals.

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

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

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

OSCILLODYNE COIL DATA

Edward Wehmeyer, Jefferson Barracks, Mo.

(Q) Please give me the coil winding data for the one-tube "Oscillodyne" using 1½" coil forms.

(A) The same coil data given in the article on the 1-tube "Oscillodyne" can be followed when using 1½" diameter form. The best type of wire to use in hooking up the short-wave receiver is solid copper with *push-back* insulation. All connections should be soldered with pure rosin core solder.

80 TUBE IN MAJESTIC "B" ELIMINATOR

Harold W. Walker, Philadelphia, Pa.

(Q) Is it possible to rewire a Majestic "B" eliminator to use a type 80 tube.

(A) The Majestic "B" eliminator can be wired to use a 80 tube if a separate filament transformer is used to heat the filament of the tube. No filament winding is incorporated in the Majestic power-pack.

OBTAINING VERIFICATION CARDS

John McCulloch, Brooklyn, N. Y.

(Q) How do I obtain verification of reception from various foreign stations, that I have received?

(A) The usual procedure is to make notations of the type of program and character of announcements and submit them to the main office of the broadcasting system. If your notations are correct and check with the programs you will receive a verification card or letter. Don't forget to mention in your letter that you enclose therewith an *International Postage Reply Coupon*. Don't send cash or stamps. The coupon costs 9 cents and you can buy it at your local Post Office. Pin (not paste) it to your letter. AND be sure to affix the *correct postage* to your letter.

PILOT SUPER-WASP

Edward F. Drury, Dupo, Ill.

(Q) I have a Pilot Super-Wasp, battery model, made over for 6.3 volt tubes and I am using a 39 radio frequency tube, 36 detector, 37 audio and 38 audio, resistance coupling is used in both audio stages. The regeneration is controlled by a 50,000 ohm resistor in the screen-grid lead of the detector tube. The oscillation of the set is very good from the numbers 10 to 70 on the dial, but the set does not oscillate well from 70 to 100. Would you please tell me what the trouble may be?

(A) From what you state in your letter we believe that you have an insufficient number of tickler turns. Also, we suggest that you change the capacity of the condenser coupling the plate of the R.F. tube to the grid of the detector to a smaller value.

3-TUBE "BAND-SPREAD" RECEIVER

R. S. Gillman, Mart, Texas.

(Q) I am preparing to build the 3-tube band spread receiver described in June, 1933, issue of SHORT WAVE CRAFT. You specify the use of .0001 mf. Hammarlund condensers and I would like to know if I could use .00014 mf. instead. Will these work just as well with the coil data given? I have become interested in short waves through the influence of SHORT WAVE CRAFT, I am for your magazine 100% and never miss reading a copy.

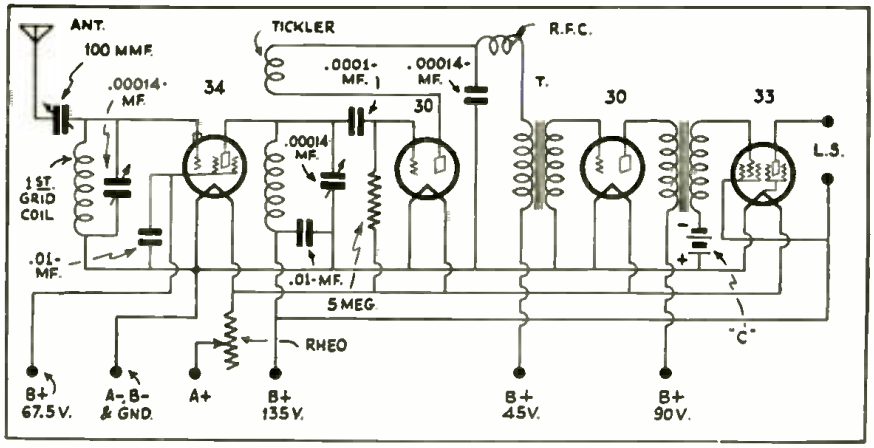
(A) In the 3-tube Band-Spread Receiver described in the June, 1933, issue of SHORT WAVE CRAFT, either the .0001 or .00014 mf. condensers can be used with very little change in the function of the set. The larger condensers will, of course, give a slightly greater overlap in band changing.

"MASTER COMPOSITE" QUERY

Robert Adams, Greenville, S. C.

(Q) I am interested in building the "Master Composite" receiver described in the June SHORT WAVE CRAFT. But before I actually begin to construct the set I would like your opinion regarding the best method of volume control to be used with a doublet antenna. What about the cathode method?

(A) The variation of the cathode bias on the R.F. stage is about the best method of volume control. A diagram of this system is printed on this page. We are very pleased to hear that you are building the "Master Composite" receiver and feel sure that you will obtain very fine results.



4-tube "Doerle" hook-up! Just what you have been looking for! R.F., Regen. Detector and 2 A.F.

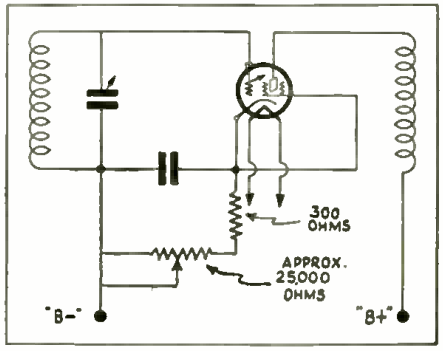


Diagram showing how to use variable cathode bias as a "volume control."

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POLICE RADIO ALARM STATIONS

By Frequency and Wavelength

2506 kc.-120 m.

Dial:

KGZE San Antonio, Tex.

2470 kc.-121.5 m.

Dial:

KGOZ Cedar Rapids, Ia.
KGPN Davenport, Ia.
KGZG Des Moines, Ia.
WPDZ Fort Wayne, Ind.
WPDT Kokomo, Ind.
WPEC Memphis, Tenn.
KGPI Omaha, Neb.
WPDP Philadelphia, Pa.
KGPD San Francisco, Cal.
KGPM San Jose, Cal.
KGPW Salt Lake City, U.
KGPK Sioux City, Ia.
WRDQ Toledo, Ohio
WPFL Gary, Ind.
WPFQ Swathmore, Pa.
WPFO Knoxville, Tenn.
WPFR Johnson City, Tenn
WPEM Woonsocket, R. I.

2458 kc.-122.0 m.

Dial:

WPDO Akron, Ohio
WPDN Auburn, N. Y.
WPDV Charlotte, N. C.
WRDH Cleveland, Ohio
WPDR Rochester, N. Y.
WPEA Syracuse, N. Y.
..... Asheville, N. C.
WPDG Youngstown, O.

2450 kc.-122.4 m.

Dial:

WPDK Milwaukee, Wis.

WPEE New York, N. Y.
WPEF New York, N. Y.
WPEG New York, N. Y.
KGPH Okla. City, Okla.
KGPO Tulsa, Okla.
KGPZ Wichita, Kans.
KGZF Chanute, Kans.
KGZP Coffeyville, Kans.
KGPQ Honolulu, T. H.

2442 kc.-122.8 m.

Dial:

KGPX Denver, Col.
WPDF Flint, Mich.
WPEB Grd. Rapids, Mich.
WMDZ Indianapolis, Ind.
WPDL Lansing, Mich.
WPDE Louisville, Ky.
KGPP Portland, Ore.
WPDH Richmond, Ind.
KGZH Klamath Falls, Ore.
WPFC. Muskegon, Mich.
WPFE Reading, Pa.
KGZR Salem, Ore.
WPES Saginaw, Mich.

2430 kc.-123.4 m.

Dial:

WPEK New Orleans, La.
KGPB Minneapolis, Minn.
WPDI Columbus, Ohio
KGPP Portland, Ore.
WPDM Dayton, Ohio
KGZD San Diego, Cal.
WPFD Highland Park, Ill.
WPFF Toms River, N. J.
WPFK Hackensack, N. J.
KGZJ Phoenix, Ariz.

2422 kc.-123.8 m.

Dial:

KSW Berkeley, Cal.
WMJ Buffalo, N. Y.
KGPE Kansas City, Mo.
KGZC Topeka, Kan.
KGPG Vallejo, Cal.
WPDW Washington, D. C.
WPFG Jacksonville, Fla.

2414 kc.-124.2 m.

Dial:

WPDY Atlanta, Ga.
KGPS Bakersfield, Cal.
WCK Belle Island, Mich.
WPDX Detroit, Mich.
KGZA Fresno, Cal.
WRDR Grosse Pt. Vil. Mich.
WMO Highland Pk., Mich.
KGPA Seattle, Wash.
WPDA Tulare, Cal.
KGZM El Paso, Tex.
WPFH Baltimore, Md.
KGZN Tacoma, Wash.
WPFI Columbus, Ga.
WPFM Birmingham, Ala.
WPFR Clarksburg, W. Va.
.....Santa Barbara, Cal.
.....Mount Pleasant, N. Y.

1712 kc.-175.15 m.

Dial:

WPED Arlington, Mass.
KGPJ Beaumont, Tex.
WPDB Chicago, Ill.
WPDC Chicago, Ill.
WPDD Chicago, Ill.
WKDU Cincinnati, Ohio
KVP Dallas, Tex.
KGPL Los Angeles, Cal.
KGJX Pasadena, Cal.

WPDU Pittsburgh, Pa.
KGPC St. Louis, Mo.
KGZI Wichita Falls, Tex.
WPFA Newton, Mass.
KGZL Shreveport, La.
WPEH Somerville, Mass.
WPEP Arlington, Mass.
KGZB Houston, Tex.
WPFJ Hammond, Ind.
WPFN Fairhaven, Mass.
KGZQ Waco, Tex.
WPET Lexington, Mass.
WPEI E. Providence, R. I.
.....Portland, Me.

1574 kc.-189.5 m.

Dial:

WRDS E. Lansing, Mich.
WMP Fram'gham, Mass.
WPEW North'pton, Mass.
KGPY Shreveport, La.
WPEL Middleboro, Mass.
WPEV Portable, Mass.

1558 kc.-192.5 m.

Dial:

WEY Boston, Mass.
KGPD San Francisco, Cal.
WKDT Detroit, Mich.

1534 kc.-196.1 m.

Dial:

KGHO Des Moines, Ia.

190 kc.-1570 m.

Dial:

WBR Butler, Pa.
WJL Greensburg, Pa.
WBA Harrisburg, Pa.
WMB W. Reading, Pa.
WDX Wyoming, Pa.

Alphabetically By Call Letters

KGHO	Des Moines, Iowa	1534 kc.
KGJX	Pasadena, Cal.	1712 kc.
KGOZ	Cedar Rapids, Iowa	2470 kc.
KGPA	Seattle, Wash.	2414 kc.
KGPB	Minneapolis, Minn.	2430 kc.
KGPC	St. Louis, Mo.	1712 kc.
KGPD	San Francisco, Cal.	1558 kc.
KGPE	Kansas City, Mo.	2422 kc.
KGPG	Vallejo, Cal.	2422 kc.
KGPH	Oklahoma City, Okla.	2450 kc.
KGPI	Omaha, Neb.	2470 kc.
KGPJ	Beaumont, Tex.	1712 kc.
KGPK	Sioux City, Iowa	2470 kc.
KGPL	Los Angeles, Cal.	1712 kc.
KGPM	San Jose, Cal.	2470 kc.
KGPN	Davenport, Iowa	2470 kc.
KGPO	Tulsa, Okla.	2450 kc.
KGPP	Portland, Ore.	2442 kc.
KGPQ	Honolulu, T. H.	2450 kc.
KGPS	Bakersfield, Cal.	2414 kc.
KGPW	Salt Lake City, Utah	2470 kc.
KGPX	Denver, Colo.	2442 kc.
KGPY	Baton Rouge, La.	1574 kc.
KGPZ	Wichita, Kans.	2450 kc.
KGZA	Fresno, Calif.	2414 kc.
KGZB	Houston, Tex.	1712 kc.
KGZC	Topeka, Kan.	2422 kc.
KGZD	San Diego, Cal.	2430 kc.
KGZE	San Antonio, Tex.	2506 kc.
KGZF	Chanute, Kans.	2450 kc.
KGZG	Des Moines, Iowa	2470 kc.
KGZH	Klamath Falls, Ore.	2442 kc.
KGZI	Wichita Falls, Tex.	1712 kc.
KGZJ	Phoenix, Ariz.	2430 kc.
KGZL	Shreveport, La.	1712 kc.
KGZM	El Paso, Tex.	2414 kc.
KGZN	Tacoma, Wash.	2414 kc.
KGZP	Coffeyville, Kans.	2450 kc.
KGZQ	Waco, Tex.	1712 kc.

KGZR	Salem, Ore.	2442 kc.
KSW	Berkeley, Cal.	1712 kc.
KVP	Dallas, Tex.	1712 kc.
WBA	Harrisburg, Pa.	257 kc.
WBR	Butler, Pa.	257 kc.
WCK	Belle Island, Mich.	2414 kc.
WDX	Wyoming, Pa.	257 kc.
WEY	Boston, Mass.	1558 kc.
WJL	Greensburg, Pa.	257 kc.
WKDT	Detroit, Mich.	1558 kc.
WKDU	Cincinnati, Ohio	1712 kc.
WMB	W. Reading, Pa.	257 kc.
WMDZ	Indianapolis, Ind.	2442 kc.
WMJ	Buffalo, N. Y.	2422 kc.
WMO	Highland Park, Mich.	2414 kc.
WMP	Framingham, Mass.	1574 kc.
WPDA	Tulare, Cal.	2414 kc.
WPDB	Chicago, Ill.	1712 kc.
WPDC	Chicago, Ill.	1712 kc.
WPDD	Chicago, Ill.	1712 kc.
WPDE	Louisville, Ky.	2442 kc.
WPDF	Flint, Mich.	2442 kc.
WPDG	Youngstown, Ohio	2458 kc.
WPDH	Richmond, Ind.	2442 kc.
WPDI	Columbus, Ohio	2430 kc.
WPDK	Milwaukee, Wis.	2450 kc.
WPDL	Lansing, Mich.	2442 kc.
WPDM	Dayton, Ohio	2430 kc.
WPDN	Auburn, N. Y.	2458 kc.
WPDO	Akron, Ohio	2458 kc.
WPDP	Philadelphia, Pa.	2470 kc.
WPDR	Rochester, N. Y.	2458 kc.
WPDS	St. Paul, Minn.	2430 kc.
WPDT	Kokomo, Ind.	2470 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.	2470 kc.
WPEA	Syracuse, N. Y.	2458 kc.
WPEB	Grand Rapids, Mich.	2442 kc.
WPEC	Memphis, Tenn.	2470 kc.
WPED	Arlington, Mass.	1712 kc.
WPEE	New York, N. Y.	2450 kc.
WPEF	New York, N. Y.	2450 kc.
WPEG	New York, N. Y.	2450 kc.
WPEH	Somerville, Mass.	1712 kc.
WPEI	E. Providence, R. I.	1712 kc.
WPEK	New Orleans, La.	2430 kc.
WPEL	Middleboro, Mass.	1574 kc.
WPEM	Woonsocket, R. I.	2470 kc.
WPEP	Arlington, Mass.	1712 kc.
WPES	Saginaw, Mich.	2442 kc.
WPET	Lexington, Mass.	1712 kc.
WPEV	Portable, Mass.	1574 kc.
WPFA	Newton, Mass.	1712 kc.
WPFC	Muskegon, Mich.	2442 kc.
WPFD	Highland Park, Ill.	2430 kc.
WPFE	Reading, Pa.	2442 kc.
WPFF	Toms River, N. J.	2430 kc.
WPFG	Jacksonville, Fla.	2442 kc.
WPFH	Baltimore, Md.	2414 kc.
WPFI	Columbus, Ga.	2414 kc.
WPFJ	Hammond, Ind.	1712 kc.
WPFK	Hackensack, N. J.	2430 kc.
WPFL	Gary, Ind.	2470 kc.
WPFM	Birmingham, Ala.	2414 kc.
WPFN	Fairhaven, Mass.	1712 kc.
WPFO	Knoxville, Tenn.	2470 kc.
WPFP	Clarksburgh, W. Va.	2414 kc.
WPFQ	Swathmore, Pa.	2470 kc.
WPFR	Johnson City, Tenn.	2470 kc.
WRDH	Cleveland, Ohio	2458 kc.
WRDR	Grosse Pt. Village, Mich.	2414 kc.
WRDQ	Toledo, Ohio	2470 kc.
WRDS	E. Lansing, Mich.	1574 kc.

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AIRPORT RADIO STATIONS—Alphabetically by Call Letters

The number in parenthesis following the location indicates the frequency group in which the station operates.

KGTY	Butte, Mont. (2)	KGTZ	Spokane, Wash. (1)	KNAU	Tulsa, Okla. (1)	WEER	Richmond, Va. (9)
KEU	Burbank, Calif. (1)	KGUA	El Paso, Tex. (5)	KNAV	Okla. City, Okla. (1)	WHG	Columbus, Ohio (2)
KFM	Sacramento,Calif.(1)	KGUB	Houston, Tex. (8)	KNWA	St. Paul, Minn. (6)	WHM	Indianapolis, Ind.(2)
KFO	Oakland, Calif. (1)	KGUD	San Antonio, Tex.(5)	KNWB	Fargo, N. D. (6)	WKDL	Miami, Fla. (10)
KGE	Medford, Ore. (1)	KGUE	Brownsville, Tex.(5)	KNWC	Pembina, N. D. (6)	WMDV	San Juan, P. R. (10)
KGGUC	Ft. Worth, Tex. (1)	KGUF	Dallas, Tex. (5)	KOE	Cheyenne, Wyo. (1)	WNAO	Newark, N. J. (1)
KGJW	Brownsville,Tex.(10)	KGUG	Big Spring, Tex. (5)	WAEC	Pittsburgh, Pa. (2)	WNAK	Cleveland, Ohio (1)
KGQZ	San Diego, Calif.	KGUH	Waco, Tex. (5)	WAED	Harrisburg, Pa. (2)	WNAL	Brookville, Pa. (1)
KGSB	Alameda, Calif, (2)	KGUK	Shreveport, La. (5)	WAEE	Camden, N. J. (2)	WNAM	Bellefont, Pa. (1)
KGSP	Denver, Colo. (3)	KGUL	Abilene, Tex. (4)	WAEF	Newark, N. J. (2)	WNAT	Orlando Twnshp., Ill. (1)
KGSR	Pueblo, Colo. (3)	KGUM	Frijole, Tex. (5)	WAEG	Cresson, Pa. (2)	WNAU	Moline, Ill. (1)
KGT	Fresno, Calif, (1)	KGUN	Douglas, Ariz. (5)	WAEH	Milwaukee, Wis. (6)	WQDQ	New Orleans, La. (5)
KGTA	Winslow, Ariz. (2)	KGUO	Tuscon, Ariz. (4)	WAEI	Detroit, Mich. (7)	WQPD	Atlanta, Ga. (5)
KGTD	Wichita, Kans. (2)	KGUP	Phoenix, Ariz. (5)	WAEJ	Springfield, Ill. (5)	WSDC	Newark, N. J. (4)
KGTE	Wichita, Kans. (1)	KGUQ	Indio, Calif. (5)	WAEK	Mobile, Ala. (4)	WSDD	Boston, Mass. (4)
KGTH	Salt Lake City, U.(3)	KGUR	Burbank, Calif. (5)	WEEB	Baltimore, Md. (9)	WSDE	Birmingham, Ala.(4)
KGTJ	Las Vegas, Nev. (3)	KGUS	Blythe, Calif. (8)	WEEC	Charleston, S. C. (9)	WSDK	Memphis, Tenn. (5)
KGTL	Kingman, Ariz. (2)	KGUT	Robertson, Mo. (5)	WEEF	Spartanburg, S.C.(9)	WSDL	Duluth, Minn. (6)
KGTN	Las Vegas, Nev. (2)	KGUZ	Ponca City, Okla.(1)	WEEG	Greensboro, N.C.(9)	WSDS	Chicago, Ill. (6)
KGTQ	Springfield, Mo. (2)	KKO	Elko, Neva. (1)	WEEH	McRae, Ga. (9)	WSDT	Nashville, Tenn. (5)
KGTR	Robertson, Mo. (2)	KMP	Omaha, Neb. (1)	WEEJ	Jacksonville, Fla. (9)	WSID	Cincinnati, Ohio (5)
KGTS	Omaha, Neb. (5)	KMR	No. Platte, Nebr. (1)	WEEM	Miami, Fla. (9)	WUCG	Chicago, Ill. (1)
KGTV	Beaumont, Tex. (4)	KNAS	Kansas City, Mo.(1)	WEEN	Linden, N. J. (9)		
KGTX	Pocatella, Idaho (2)	KNAT	Dallas, Tex. (1)	WEEO	Orlando, Fla. (9)		

TELEVISION STATIONS

Television transmission at the present time is highly experimental in nature, and for this reason it is difficult to give operating hours, scanning speeds, lines per second, etc., with any degree of accuracy.

According to frequency and wavelength

1600-1700 kc. 176.5-187.5 m.

Dial:

W2XR—Radio Pictures, Inc.
Long Island City, N. Y.
1000 watts. 60 lines

W1XAV—Short Wave & Television Co.
Boston, Mass.
1000 watts. 60 lines

W8XN—Sparks-Withington Co.
Jackson, Mich.

200-2100 kc. 142.9-150 m.

Dial:

W9XAO—Western Television Corp.
Chicago, Ill.
500 watts. 45 lines

W6XAH—Pioneer Mercantile Co.
Bakersfield, Cal.
1000 watts. 60 lines

W9XK—Iowa State University
Iowa City, Iowa
100 watts. 60 lines

W8XF—Goodwill Station
Pontiac, Mich.
1000 watts

2100-2200 kc. 136.4-142.9 m.

Dial:

W3XAK—National Broadcasting Co.
5000 watts. Portable

W2XBS—National Broadcasting Co.
New York, N. Y.
5000 watts

W6XS—Don Lee Broadcasting Corp.
Gardena, Calif.
1000 watts

W9XAP—National Broadcasting Co.
Chicago, Ill.
2,500 watts

W9XAK—Kansas State College,
Manhattan, Kans.
125 watts

2200-2300 kc. 130.4-1364 m.

Dial:

W9XAL—First National Television Corp.
Kansas City, Mo.

2750-2850 kc. 105.3-109.1 m.

Dial:

W9XG—Purdue University
W. Lafayette, Ind.
1500 watts. 60 lines

W2XAB—Atlantic Broadcasting Corp.
New York, N. Y.
500 watts

43,000-46,000 kc. 6.52-6.98 m.
48,500-50,300 kc. 6.00-6.20 m.
60,000-80,000 kc. 3.75-5.00 m.

Dial:

W9XD—The Journal Co.
Milwaukee, Wis.
500 watts

W9XE—U. S. Radio & Tele. Corp.
Marion, Ind.
1000 watts

W8XF—Goodwill Station,
Pontiac, Mich.

W3XAD—RCA-Victor Co.,
Camden, N. J.
2000 watts

W2XBT—National Broadcasting Co.
Portable
750 watts

W1XG—Short Wave & Television Co.
Boston, Mass.
200 watts

W2XR—Radio Pictures, Inc.
Long Island City, N. Y.
1000 watts

W2XF—National Broadcasting Co.
New York, N. Y
5000 watts

W6XAO—Don Lee Broadcasting System
Los Angeles, Calif.
150 watts

W3XE—Philadelphia Storage Battery Co.
Philadelphia, Pa.
1500 watts

W2XAK—Atlantic Broadcasting Corp.,
New York, N. Y.
50 watts

W10XX—RCA-Victor Co.,
Portable and Mobile.
50 watts

W8XAN—Sparks-Withington Co.,
Jackson, Mich.
100 watts

W8XL—WGAR Broadcasting Co.,
Cuyahoga Hts., Ohio.
200 watts

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SHORT WAVE STATIONS OF THE WORLD

SECTION TWO

The lists that appear herewith comprise Section Two of the SHORT WAVE CRAFT index of the world's short wave stations, which has proved very popular with S. W. fans everywhere. As compared with Section Two published in the September, 1933, number, it represents many additions and corrections. A member of the staff of SHORT WAVE CRAFT made a special trip to Washington, D. C., to obtain authentic data directly from the Federal Radio Commission.

Section One of this list, which appeared in the October, 1933 number, contained a "grand" list of short wave relay broadcasting, experimental and commercial radiophone stations. It will appear in the December, 1933 number, with further additions and last minute corrections.

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

AIRPORT RADIO STATIONS

The airport stations do not follow any fixed schedules, and are likely to be heard any time of the day or night. The airplane transmitters are usually heard on the same wavelengths. The little "boxes" are for your dial settings.

Group One

94.86 m.-3160 kc. 53.83 m.-5570 kc.
94.56 m.-3170 kc. 53.74 m.-5580 kc.
93.29 m.-3215 kc. 53.64 m.-5590 kc.
52.98 m.-5660 kc.

Bakersfield, Calif.	KQK
Bellefonte, Pa.	WNAM
Boise, Idaho	KRA
Brooksville, Pa.	WNAL
Burbank, Calif.	KEU
Cheyenne, Wyo.	KOE
Chicago, Ill.	WUCG
Cleveland, Ohio	WNAK
Dallas, Tex.	KNAT
Des Moines, Iowa	KQM
Elko, Nevada	KKO
Fort Worth, Tex.	KGUC
Fresno, Calif.	KGT
Iowa City, Iowa	KQQ
Kansas City, Mo.	KNAS
Lincoln, Neb.	KRF
Medford, Ore.	KGE
Moline, Ill.	WNAU
Newark, N. J.	WNAO
North Platte, Nebr.	KMR
Oakland, Calif.	KFO
Okla. City, Okla.	KNAV
Omaha, Nebr.	KMP
Orlando Twsp., Ill.	WNAT
Pasco, Wash.	KRD
Ponca City, Okla.	KGUZ
Portland, Ore.	KVO
Redding, Calif.	KUT
Rock Springs, Wyo.	KQC
Sacramento, Calif.	KFM
Salt Lake City, Utah	KQD
San Diego, Calif.	KGQZ
Seattle, Wash.	KZJ
Spokane, Wash.	KGTZ
Tulsa, Okla.	KNAU
Wichita, Kans.	KGTE

Group Two

103.23 m.-2905 kc. 60.15 m.-4990 kc.
97.63 m.-3070 kc. 54.45 m.-5510 kc.
97.15 m.-3090 kc. 52.88 m.-5680 kc.
60.39 m.-4970 kc. 52.7 m.-5690 kc.
52.45 m.-5720 kc.

Alameda, Calif.	KGSB
Albuquerque, N. M.	KSX
Burbank, Calif.	KSI
Butte, Mont.	KGTY
Camden, N. J.	WAEE
Columbus, Ohio	WHG
Cresson, Pa.	WAEG
Harrisburg, Pa.	WAED
Indianapolis, Ind.	WHM
Kansas City, Mo.	KST
Kingman, Ariz.	KGTL
Las Vegas, Nev.	KGTN
Newark, N. J.	WAEF
Pittsburgh, Pa.	WAEC
Pocatello, Idaho	KGTX
Robertson, Mo.	KGTR
Springfield, Mo.	KGTQ
Tulsa, Okla.	KSY
Wichita, Kans.	KGTD
Winslow, Ariz.	KGTA

Group Three

103.23 m.-2905 kc. 60.15 m.-4990 kc.
97.63 m.-3075 kc. 54.45 m.-5510 kc.
97.15 m.-3090 kc. 53.83 m.-5570 kc.
94.86 m.-3160 kc. 53.74 m.-5580 kc.
94.56 m.-3170 kc. 53.64 m.-5590 kc.
94.26 m.-3180 kc. 52.98 m.-5660 kc.
93.29 m.-3215 kc. 52.88 m.-5670 kc.
60.39 m.-4970 kc. 52.7 m.-5690 kc.

Denver, Colo.	KGSP
Las Vegas, Nev.	KGTJ
Pueblo, Colo.	KGSR
Salt Lake City, Utah	KGTH

Group Four

93.09 m.-3220 kc. 86.52 m.-3470 kc.
92.8 m.-3230 kc. 86.08 m.-3490 kc.
92.52 m.-3240 kc. 61.00 m.-4920 kc.
92.09 m.-3250 kc. 53.55 m.-5600 kc.
87.02 m.-3450 kc. 53.45 m.-5610 kc.
86.77 m.-3460 kc. 53.26 m.-5630 kc.

Abilene, Tex.	KGUL
Beaumont, Tex.	KGTV
Birmingham, Ala.	WSDE
Boston, Mass.	WSDD
Mobile, Ala.	WAEK
Newark, N. J.	WSDC
Tuscon, Ariz.	KGUO

Group Five

129.63 m.-2315 kc. 86.08 m.-3490 kc.
127.33 m.-2355 kc. 63.29 m.-4740 kc.
93.09 m.-3220 kc. 61.00 m.-4920 kc.
92.8 m.-3230 kc. 53.55 m.-5600 kc.
92.52 m.-3240 kc. 53.45 m.-5610 kc.
92.09 m.-3260 kc. 53.26 m.-5630 kc.
87.02 m.-3450 kc. 45.87 m.-6540 kc.
86.77 m.-3460 kc. 45.8 m.-6550 kc.
86.52 m.-3470 kc. 37.43 m.-8015 kc.

Atlanta, Ga.	WQPD
Big Spring, Tex.	KGUG
Brownsville, Tex.	KGUE
Burbank, Calif.	KGUR
Cincinnati, Ohio	WSID
Dallas, Tex.	KGUF
Douglas, Ariz.	KGUN
El Paso, Tex.	KGUA
Frijole, Tex.	KGUM
Indio, Calif.	KGUQ
Jackson, Miss.	KSDB
Little Rock, Ark.	KQUU
Memphis, Tenn.	WSDK
Nashville, Tenn.	WSDT
New Orleans, La.	WQDQ
Omaha, Nebr.	KGTS
Phoenix, Ariz.	KGUP
Robertson, Mo.	KGUT
San Antonio, Tex.	KGUD
Shreveport, La.	KGUK
Springfield, Ill.	WAEJ
Waco, Tex.	KGUH

Group Six

112.44 m.-2670 kc. 98.83 m.-3040 kc.
112.27 m.-2675 kc. 55.79 m.-5380 kc.
105.11 m.-2850 kc.

Chicago, Ill.	WSDS
Duluth, Minn.	WSDL
Fargo, N. D.	KNWB
Madison, Wis.	WSDR
Milwaukee, Wis.	WAEH
Pembia, N. D.	KNWC
St. Paul, Minn.	KNWA

Group Seven

111.19 m.-2680 kc. 51.5 m.-5820 kc.
102.1 m.-2935 kc.

Detroit, Mich.	WAEI

Group Eight

129.63 m.-2310 kc. 45.87 m.-6540 kc.
127.33 m.-2355 kc. 45.8 m.-6550 kc.
86.52 m.-3470 kc. 45.73 m.-6560 kc.
63.29 m.-4740 kc. 37.45 m.-8010 kc.

Blythe, Calif.	KGUS
Houston, Tex.	KGUB

Group Nine

126.1 m.-2380 kc. 63.22 m.-4740 kc.
101.83 m.-2950 kc. 53.07 m.-5650 kc.
100.46 m.-2990 kc. 45.52 m.-6590 kc.
72.11 m.-4160 kc. 45.45 m.-6600 kc.

Baltimore, Md.	WEEB
Charleston, S. Car.	WEEC
Greensboro, N. Car.	WEEG
Jacksonville, Fla.	WEEJ
Linden, N. J.	WEEN
McRae, Ga.	WEEH
Miami, Fla.	WEEM
Orlando, Fla.	WEEO
Richmond, Va.	WEER
Spartanburg, S. Car.	WEEF

Group Ten

113.29 m.-2650 kc. 45.59 m.-6580 kc.
104.53 m.-2870 kc. 37.43 m.-8010 kc.
97.32 m.-3080 kc. 36.5 m.-8220 kc.
55.5 m.-5400 kc. 24.33 m.-12,330 kc
53.64 m.-5700 kc. 18.47 m.-16,240 kc
45.66 m.-6570 kc. 18.24 m.-16,450 kc

Brownsville, Tex.	KGJW
Miami, Fla.	WKDL
San Juan, P. R.	WMDV

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SHORT WAVE LEAGUE

HONORARY MEMBERS

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

Executive Secretary

Should the "Code Test" Be Abolished Below 6 Meters?

Some History and an Argument for "Code"

Editor, SHORT WAVE CRAFT:

I have long been a reader of our amiable and mutual friend, the executive secretary, Hugo Gernsback's various publications. Often the stuff was good, and sometimes only fair, however, it was what the boys wanted, and good or bad—they got it.

Back in the days when Hugo published *Radio News*, we heard very little about Short Waves, and it was left mostly to the "Hams." Instead, Hugo gave us fantastic pictures on the covers and real interesting and valuable BCL dope inside, and, oh! I must not forget his novel Ralph 124C41+.

In those days the "Hams" were on 200 meters and surely many will remember when they used to play phonograph records to each other, or should I say "Electrical Transcriptions" as would W2FYZ. And in all fairness, every one must admit that it was these "Hams," the old-timers, that have done much toward the development of the present short-wave bands. These lads spent many weary hours and hard-earned money for material to do what has been done. So in view of this, don't you think that they should have a voice in the question of code tests?

In the early days of radio, thousands of "door-bell" electricians and "tinkers" immediately classed themselves as *radio engineers*—even as many are doing today! (Hi. Hi.) Those of you who are in the service business will admit that it has become very poor. Not because there aren't any sets to service, but because the "tinkers" and the "slouch" who hasn't the push or intelligence to learn his work properly, going on a call and if it is something more than "tubes" or the "aerial"—he is stuck and usually makes things worse for the set, the customer, and the next serviceman!

But to get back to short waves, how many of the members of the LEAGUE listen-in on the "Ham" bands? Especially on a night when they are all on. Let us take the "code" band first; there are plenty of signals but one can usually hang-on to a fellow by his note and the general text of his transmission.

Now let's take the "phone" band; what have we got—let's run over the band slowly. Ah! about three thousand "lusty" voices calling CQ into *telephone company* mikes—yow sah! If you're in the second district, like I am, pick out a poor 8 or a 6 and try to listen to him through all the HASH going on around you. I admit I haven't a Comet Pro or a National FB7 receiver, yet I have a fairly good set and plenty of verifications to go to the Denton Contest. And I am not a "Ham," yet I think that 60% of the Hams (Licensed and Bootleggers) do not know what 100% modulation really means, and should be shut down. I also think that for phone Xmtr's crystal control should be *compulsory!*

(By this time, if they have read this far, the editors must be furious.) (No, they're not at all.—*Editor.*) I HAVE READ AND REREAD THE LEAGUE'S PLATFORM.

To avoid misunderstandings it should be understood that the sponsors of the League only advocate the "no code" test for a special "experimental" band, below 6 meters for example.

Sure, no *code test* for below 6 meter transmission! But if twenty or thirty thousand well-meaning lads can learn the code, and pass the "exam.," why can't the rest. (Fact is, according to U. S. Government, a certain percentage just can't learn code, no matter how hard the boys try.—*Editor.*) And further, if there are so many that know the code on the air how many will go on if there were no code test?

It must be remembered too, that the test does not merely constitute the code test. If a chap DOESN'T WANT or CAN'T learn the code, is he willing to learn the regulations governing amateur transmission, the "Q" signals and theory?

Gosh, if the YL's can learn the code and pass the test and become good hams, what kind of guys are those that say they can't. Yet, a little heart to heart talk with K. B. Warner would make good brass pounders out of em. How about it K. B.?

I cannot understand how or by what authority the LEAGUE booklet, entitled, "Privileges and Duties of Members," call CW or code transmission antiquated or unnecessary. To my mind, regardless of what phase, method, or manner, of radio transmission it should most emphatically be required that the operator know the code. For example, suppose someone, be they on land or sea, aircraft or submarine, were in trouble, and as we all know that it is a simple thing to devise a means of sending code signals, (if it is at all possible, of course) and if this or these parties were to attempt to summon aid, with whatever makeshift or manufactured apparatus they may have, were to operate by chance on this band or any band for that matter, of what service could the six meter operator be with no code knowledge? Even if he were to hear the signals, they would mean nothing to him, and he would continue to fill the ether with a chaos, from which no good can come. (Maybe the sub or airplane uses phone too!!—*Editor.*)

If these chaps REALLY were radio and short wave enthusiasts and honestly meant to work for the advancement of the science they could sit down and study the code, even if they never use it, at least to avoid the contempt of the *real amateur.* The deveopment of radio as well as everything else requires study, many tedious hours of study, so how are these would-be hams going to study real technical problems if they haven't the ambition to devote a few minutes a day for a couple of weeks to the code?

Their object, to my mind, is only to have a toy. Something that they can play with and call their friends, and neighbors with. Or am I selfish? (That last sentence is a *real* mouthful!—*Editor.*)

J. S. WARING.
(No address given.)

Get Your Button!

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

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

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

Against the "Codeless" License

Editor, SHORT WAVE CRAFT:

We have read in recent issues of this magazine complaints registered by those who desire to eliminate the code test in getting their "ham ticket."

We hope in the near future to get our licenses and are at present pounding away at code, and though we find it rather difficult, we don't intend to give up. In our opinion most of those who desire a "codeless" test are those who have discovered some freak article such as "How to Build a Phone Transmitter in a Cigar Box," or "Build this Phone Transmitter for Thirty-five Cents."

We do not mean by the above statement that a person should have a transmitter big enough to "fill a hotel," but we do mean that many of those wishing "codeless" tests would build rotten transmitters which would make nothing but QRM.

We have an "SWL station" and we have read in Q. S. T. of hams more than 50 kc. out of their band; those are the type of amateurs a "codeless" test would produce in our opinion.

JOHN LAZOWSKI,
27 Northview Terrace,
Toronto, Ont., Can.
E. ADAMS,
509½ Yarge St.,
Toronto, Ont., Can.

A Logical Argument for "Codeless" Exam

Editor, SHORT WAVE CRAFT:

I have read with considerable interest the various opinions of the readers of SHORT WAVE CRAFT regarding a code-less license to operate on phone in the ultra S. W. bands.

(Continued on page 433)

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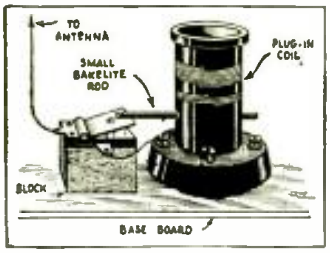
$5.00 For Best Short Wave Kink

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



$5.00 Prize

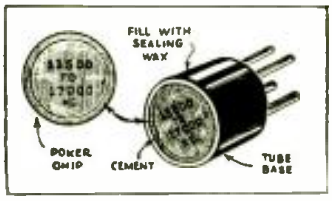
AUTOMATIC "DEAD-SPOT" ELIMINATOR

This simple device will save much trouble when changing coils because the antenna condenser is automatically adjusted. A wooden block is fastened to the base close to the coil socket. A leaf type condenser is fastened to the block. Holes are drilled in the coil form so that when a small rod is inserted, the rod will press the condenser plate down to the required or "pre-calibrated" position.—L. B. Tooley.

▼ ▼ ▼

COIL MARKERS

Poker chips make excellent markers or labels for plug-in type short-wave coils, as the illustration clearly shows. The plug-in "form" or "tube-base" may be filled with hot sealing wax and the poker chip pressed in the top of the form, so as to be held in place by the wax when it sets.



It is a better plan however not to fill the form with wax, as some short-wave experts advise, due to electrical losses in the solid material within the form. In this case the poker chip can be sandpapered down around the edge so as to fit snugly into the end of the form, plus a little cement or glue if necessary. The "KC" value is afterwards printed on the face of the chip with black drawing ink.

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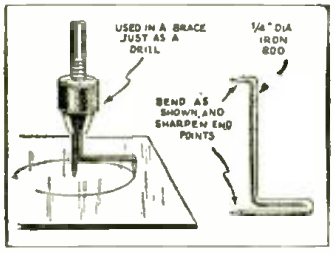
PANEL CUTTER

Here's a simple but efficient "panel cutter" for anyone who is hard pressed for such an instrument, but who does not wish to purchase one. This cutter was made for one particular job; however, it



would be a good idea to make several to suit the average needs. The cutter illustrated was made from a piece of ¼" diameter iron rod and, of course, some form of steel is better if you can obtain it. The cutting edges of the steel may be hardened by heating to a red heat and then plunging the points in oil.—Robert Dreher.

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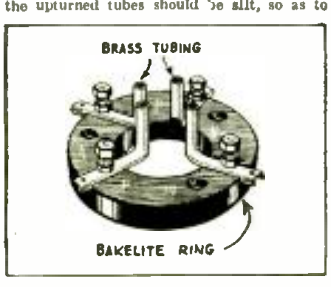
IMPROVISED SOCKET

The accompanying illustration shows a tube socket which actually is made by a radio concern in England but the idea is a good one to remember, for if you are ever in need of a socket and have none around, you could easily put one of these sockets together, as it is made very simply from a few short pieces of copper, brass or other metal tubing. One side of each of the upturned tubes should be slit, so as to



give the tubes more resiliency when the socket pins are inserted into them. The four L-shaped tubes are screwed into position in slots filed with a round file into a bakelite ring.—H. W. S.

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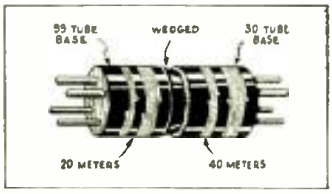

PLUG-IN COIL WRINKLE

Here is a wrinkle which I have used and which saves a lot of time often wasted in hunting for so many loose plug-in coils. I took 20 and 40 meter plug-in coils and by a little close fitting I managed to make the 99 type tube base, containing the 20 meter coil fit into the 40 meter coil which is wound on a 30 type base. In some cases you may have to file a little bit off on a taper on the edge of the smaller tube, or if there is too much space you may have to glue a piece of paper around the smaller tube.—E. A. Hokkanen.

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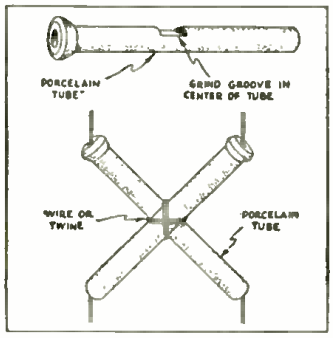
TRANSPOSITION INSULATORS

Home-made transposition insulators for use in transposition lead-ins, which are now quite the rage for short-wave receivers, and where the old pocketbook will not stand the expense of the insulators manu-



factured expressly for this purpose, can be improvised as here shown. They are made from two porcelain tubes. Each tube has a flat spot ground on it on an emery wheel, so that when they are bound together to form a cross, they can be rigidly held in position by tape, wire, or twine.—Nels Sahli.

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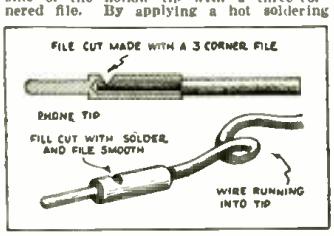
SOLDERING CORD-TIPS

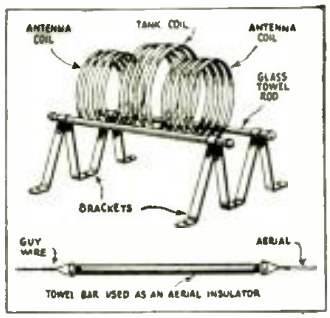
When attempting to solder lead wires into phone cord-tips the author found it much easier if a notch was filed in the side of the hollow tip with a three-cornered file. By applying a hot soldering



iron to the side of the tip the solder can be flowed into the shell of the tip through the slot filed in the side, any excess solder being clipped and filed off afterward.—Woodrow Elmore.

TOWEL-BAR INSULATORS

Two ordinary glass towel bars with their supporting brackets makes a good stand-off insulator for a set of copper tubing or heavy wire transmitting inductances. When the coils are mounted as illustrated, the correct degree of coupling can be obtained by sliding the coils along the glass rods to increase or decrease the coupling between the tank and antenna coils. The coil may be stretched or compressed to change its tuning without having to change the position of any insulator, as was formerly the case. A towel bar may also be used as an aerial insulator as shown in the lower drawing.—Dennis Delaney.



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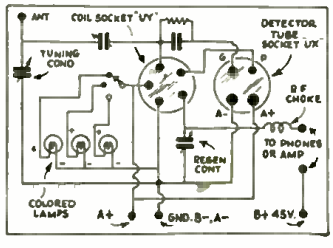
MULTI-COLOR DIAL

Parts needed are coil forms (plug-in) whose base will fit into a type UY socket, and one small piece of brass for each wave band covered. One pilot light socket for each band and the necessary bulbs. Wind coils on the UY coil form, using the plate and cathode prongs for the secondary and the two filament prongs for the primary ends.

The small pieces of brass strip are drilled to slip over the grid prong, and soldered on at different angles for the different forms. Use a dial with trans-



lucent scale, and mount three light sockets behind the dial, bonding negative contacts together, and grounding. Then bring out the leads from the positive posts of the pilot light sockets to three separate contact points, which are mounted to one side of the coil socket, so that the different coil forms when plugged into the coil socket, will cause the brass strip to contact a different contact point; thus each coil, when plugged in, will light up the dial to a different color. These bulbs can be purchased in most variety stores, or ordinary bulbs may be dyed to the colors desired.—O. D. Elder.

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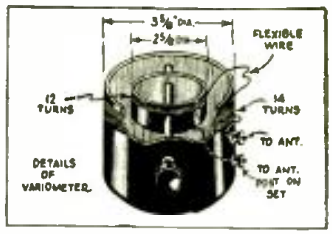
TUNING VARIOMETER

Here is a description of a short-wave variometer. I recently made a short-wave receiver which was to operate on the 80 to 100 meter wave bands. I tried for two days to tune out the "whistles" of the amateur phone station so I could understand what they were saying. I tried different condensers, grid-leaks, etc., but all was in vain until I thought of putting a variometer on it. Herewith are the plans for making it. After connecting the variometer in series with the aerial I could tune in the phone stations very good and keep the code signals at the desired pitch.



The stator coil contains 14 turns of No. 22 enameled wire and the rotor has 12 turns of No. 22. Both coils are close-wound. It is also best to have a long wooden shaft instead of a metal one. Bakelite is very good.—R. B. Forehand.

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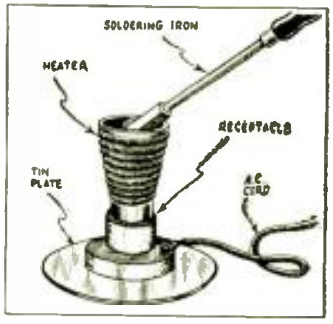
SOLDERING IRON HEATER

A nifty way to heat soldering irons without gas or a blow torch, follows: A porcelain (white glass) receptacle of good quality is mounted on a round piece of tin, about 1/16" stock, and a diameter of



three or four inches. A heavy extension cord is connected directly to the connections of the receptacle and wrapped with heavy tape. Care should be taken so as not to have the metal base make contact with either line. A cone-shaped nichrome heater is placed in the receptacle, and the soldering iron inside the cone. The iron may touch the inside wire, this is all right. The iron is heated in a very few minutes.—B. Vaughan.

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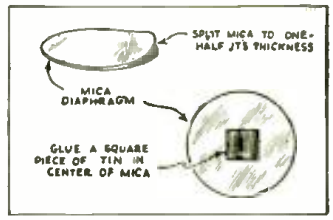
IMPROVING INFERIOR HEAD-PHONES

While working with short-wave sets I found that my ordinary head-phones lacked the quality of tone and volume of the Baldwin units. I desired the Baldwin quality of tone, but I did not want to have an extra pair on hand. So, I cut a diaphragm from a sheet of mica, split to one-half its size, and glued a square piece



of tin in the center to be attracted by the magnets. This arrangement made my phones about 1/5 louder in volume and 50% better in tone quality, without the expense of buying others, which also uses a mica diaphragm vibrated by a different method.—Lawrence B. Johnson.

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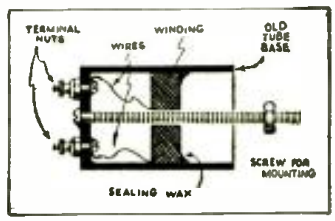
R.F. CHOKE CASE

Here is a neat case for R.F. choke coils; an old tube base, a few screws, and a lump of sealing wax is used. Remove the four prongs, drill a hole in the exact center, put two half-inch screws in either of the prong holes for the outside connections, solder two wires on the head or the inside of the base, solder the other end to the choke leads, put the choke in the tube base and pour sealing wax around the ends of the choke so that it is held tightly in the tube base.—Stanley Letkiewicz.



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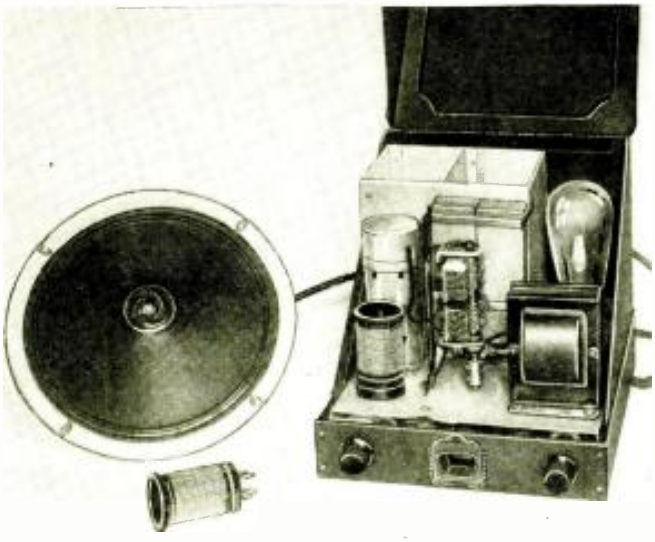
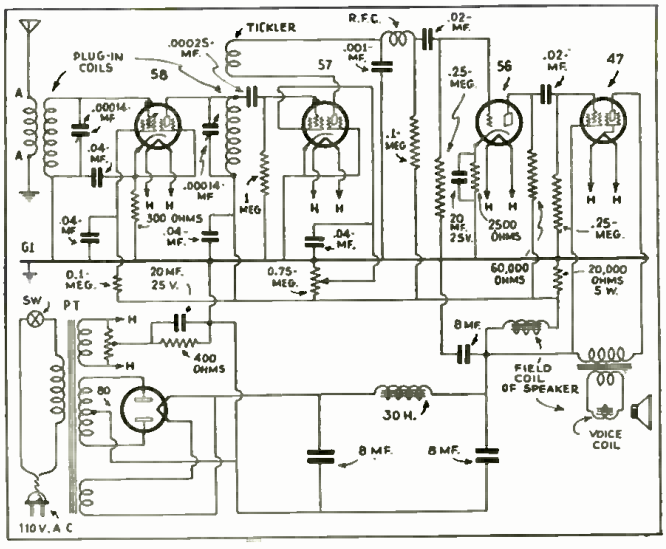
WHAT'S NEW In Short-Wave Apparatus

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



General appearance of the new A.C. short-wave receiver. (No. 119)



Wiring diagram of the A.C. operated short-wave receiver at left.

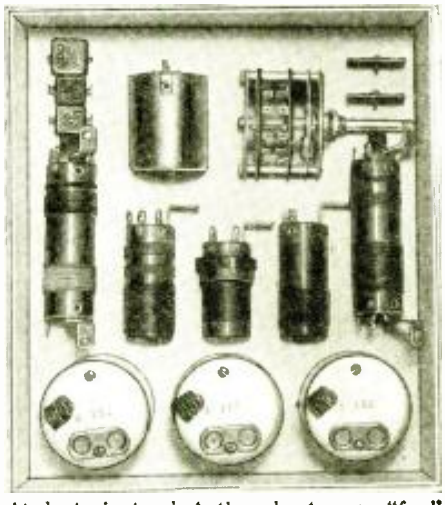
New 4-Tube A. C. Short Wave Receiver

● THE Leotone 110 Volt A.C. type short-wave receiver here illustrated has a number of desirable features to commend it. The set is very thoroughly shielded and the diagonally divided metal shield cabinet opens with a minimum of physical effort, so as to expose the inside chassis, greatly facilitating the removal and replacement of plug-in coils when changing to the different wave bands. This set has the tuning condensers mounted vertically, which makes a new departure, the drum dial being read through the lower part of the window of the cabinet. The dial is turned by one of the small knobs in the corner of the cabinet.

This set has been designed to use new style tubes as the diagram shows, and a loud speaker has been especially selected to work with it and to match the impedance of the 47 output tube. One nice feature about this set is that it is extremely compact and small in size, considering that the line-up includes a tuned radio frequency stage, a regenerative detector stage and two audio amplifier stages, the two latter utilizing a 56 and a 47 tube respectively. The power supply unit is included in this extremely compact set also. The filter includes sufficiently large condensers and choke to ensure smooth and quiet reception at all times. This set operates from any 110 volt 60 cycle A.C. lamp socket and is used with any ordinary ground and aerial.

All-Wave Superhet Coil Kit

● AT last the short-wave "fan" has his heart's wish fulfilled, for an enterprising manufacturer has at last brought out just what we have all been looking for, a complete coil kit for building a 7-tube All-Wave Superheterodyne receiver. The Miller coil kit consists of a pre-selector stage, tuned first detector, oscillator stage, and two stages of high frequency intermediate amplification, duo-diode detector and automatic volume control, 59 Class "A" pentode output and mercury vapor rectifier tube. Waveband changes are effected by a new low-loss switching method. As the makers of the kit point out, the circuit is designed to fulfill the requirements not only of the short-wave broadcast listener or fan, but also the requirements of the "Ham" as well. The kit includes coils covering the broadcast and short-wave bands down to 15 meters. The kit comes complete with schematic diagram and blue-print and chassis layout drawing, as well as pamphlet of constructional hints.



At last, just what the short-wave "fan" has been looking for—an All-Wave Superhet I.F. and Oscillator Coil "Kit." (No. 121)

Very Latest In Testing Kits

Here is a worthwhile addition to any serviceman's testing outfit. No serviceman's box is complete without this latest addition to radio perfection. This testing kit is solderless and interchangeable. It is composed of a complete line of necessary parts for a standard testing outfit. Anyone of the various types of attachments can easily be connected to your test leads with no screws or other bothersome and time wasting devices to be adjusted. It is not necessary for you to carry around a half-dozen or so cumbersome connecting leads and terminal plugs if you own such a kit as the one shown in the photograph. Two ordinary test leads are all that is necessary. As can be seen in the photograph the kit comprises connecting lugs, connecting clips of the alligator style together with points that fit into ordinary telephone tip jacks. The handles of the various parts of this kit are made up of two different colors namely red for positive identification and black for negative. In other words there are two complete sets of the various parts, one black and one red. This should definitely eliminate any danger of making wrong connections in the various testing operations performed by the average experimenter or serviceman.

Two of the test attachments have spade lugs, two are fitted with spring clips and two others are fitted with sharp test prods. Colored red and black to denote the positive and negative polarities, the outfit is extremely attractive and useful.

A very attractive assortment of the latest type test prods is shown above. (No. 120)

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

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WAVE REVIEW

Edited by C. W. PALMER

Probably there are not many amateurs who can afford to construct a super-het solely for ultra-short-wave work, but many will perhaps be prepared to make a simple converter unit that will change an existing broadcast set into an ultra-short-wave superheterodyne. Post "A" goes to "Ant" post of "BC" receiver.

A word about the parts. Starting from the aerial, the series aerial condenser has a maximum capacity of only .000007 mf. (7 mmf.) Very small! This is used to decrease the load on the aerial tuning, which may prevent the valve (tube) from oscillating unless the condenser is correctly set. The tuning condenser has a capacity of .00005 mf. maximum capacity. It *must* be noiseless in action.

Although in the original model ebonite fixing pieces (bakelite mountings) were used to keep the coils rigid, you might use No. 12 or 14 gauge wire. Then the fixers would not be needed as the coils would be held right on the condensers and the thickness of the wire would hold things steady. The tube socket must be of very low capacity. We already have quite enough capacity to contend with between the tube elements and in the base.

Now for the coil. It is not possible for us to give you the exact dimensions of this component. Much depends on the wiring, the coupling and even the capacity of the tube itself. As a rough guide the grid coil, that is L1, can consist of two turns of No. 12 or 14 gauge wire wound on an inch former and then slid off. The turns will then spring out to about 1¼ inch diameter. About ¼-inch between the turns, please! You must leave an inch or so of wire on the ends of the coil for connecting directly to the tuning condenser.

The tube should have a low impedance, of not more than 10,000 ohms. (The type of tube specified cannot be obtained in the U. S. but there are several suitable tubes available. As a suggestion, we believe that some of the small power tubes would be ideal for this purpose.—*Editor*)

In trying out the converter, the broadcast set was tuned to about 250 meters, which is the maximum wavelength the authors could reach without causing instability. In any case the amplification at that wavelength was ample. It was found that the oscillator circuit had "dead spots" which simply could not be overcome. But by putting a coil L3 in series with the high tension supply ("B" plus lead) to the detector tube of the unit, and tuning this to the same wavelength as the normal set (broadcast set), all traces of blind spots were cut out and everything worked fine.

All through our work we did not use a direct ground. That brings us to a very important point. What is the use of giving you all this material without dealing with the aerial system? So here goes. You probably know that to get maximum results you should use a flatly tuned aerial. By flatly tuned aerial we mean one which has a wavelength about the same as, or is a harmonic of, the station you want to pickup. It is not always convenient to put up a long aerial of the correct length. Such an aerial would damp an ultra-short-wave set too heavily. We have to compromise and use a half wavelength or harmonic aerial.

A half of five is obviously two and a half meters, which equals 98 inches or 8 feet 2 inches. That should be the length of your half-wave aerial for five meter work. The correct length for other wavelengths can be worked out in a similar way, remembering that one meter is about 39 inches.

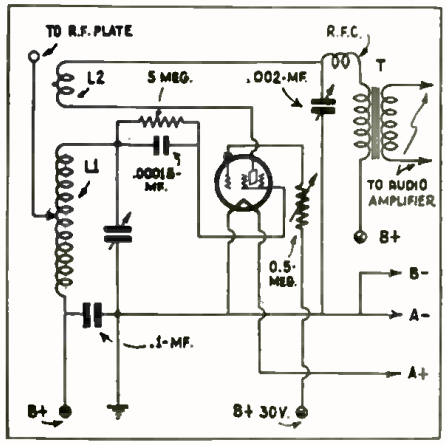
We do not normally use an earth (ground) but you might try two aerials spaced about two feet apart, using one as an aerial and the other as the earth. Often this gives much better results than a single wire.

Space-Charge Short-Wave Detectors

(From Amateur Wireless, London, England)

● DURING some short-wave experiments the authors used the space-charge detector whose circuit is shown here. The circuit is simple enough—you will see there is a screen grid tube—but don't make the mistake of connecting the grids in the normal way. Contrary to ordinary practice, the grid that is considered as the *control grid* has a slight voltage applied to it, about 30 volts positive, whereas the input from the aerial is fed onto the screen grid!

The inductance L1 is the ordinary tuning coil, but L2 is a reaction winding



Novel 1-tube receiving circuit employing a space-charge detector, the usual grid connections being reversed as shown, the screen-grid becoming the control grid.

(tickler coil) that may need to be increased above the normal size. The .002 mf. condenser we show as variable is naturally a preset (semi-variable mica insulated condenser) and should be adjusted until the receiver is oscillating just nicely, with the volume control set at maximum.

You then control regeneration by means of the variable resistance, giving wonderfully smooth regeneration, but your volume control must, of course, have a smooth movement itself.

S-W Superheterodyne

(From Das Funkmagazin, Berlin, Germany)

● WHILE the title of this set was "A Short Wave Superheterodyne," it might just as well have been called "All Wave." as the set is made up of an autodyne oscillator-detector, and a three tube set covering the broadcast band. It is very similar in design to some of the short-wave converters designed in the U. S. for use with broadcast receivers, except that the converter and set are made on one chassis and the same power supply is used for both.

In other words, the intermediate frequency amplifier and second detector are arranged to cover the broadcast band, and may be used as a broadcast set by simply turning a switch provided for the purpose. This is a rather novel idea, as the set can be used for both long and short waves.

The short wave section of the receiver, as explained above is an autodyne detector-oscillator of the usual type. The three coils X, Y, and Z are the tickler, secondary and primary respectively. A rotary switching arrangement permits changing to three short wave bands, covering the 20, 40 and 80 meter bands. Thus four bands are available without any plug-in coils, by manipulating two switches.

The same idea may be duplicated by the interested experimenter by following the instructions for making a good short-wave converter and then building a broadcast receiver in the same chassis with a single power supply unit to supply current to both parts of the set.

Short-Wave Aerial Coupling

(From Amateur Wireless, London, England)

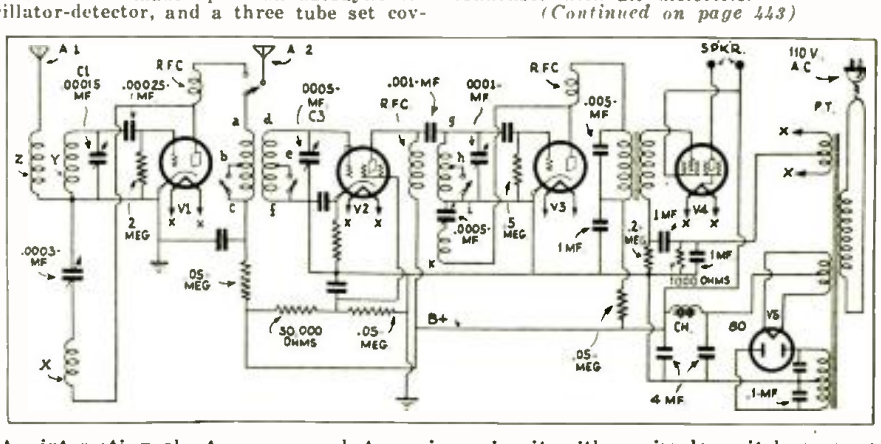
● AERIAL coupling is probably one of the most important points in the correct operation of short-wave receivers. A recent issue of *Amateur Wireless* contained an interesting article on this subject, part of which is reprinted here for the benefit of our readers.

Probably the majority of short-wave receivers in use at the present time consist of a detector tube with regeneration, the method of connecting the aerial to the detector tube being either that shown in A or B of the illustration.

In A, the aerial is coupled to the grid-coil by a semi-aperiodic coil of a few turns, with or without the addition of a low-capacity fixed or variable condenser in series with the aerial. The other method which is perhaps more widely used, is shown at B. Here the damping due to the "aerial load" is removed by connecting it to the top of the grid coil through a very small fixed or variable condenser, which reduces the effective capacity and natural wavelength of the aerial. The smaller this condenser is made, the more readily will the circuit oscillate, but on the other hand, there will be a loss of signal strength.

The small "pre-set" type condensers with solid dielectric, while excellent for some purposes, appear to introduce losses when used for aerial "de-loading" at the higher frequencies, and give inferior results to a condenser with air dielectric.

(Continued on page 443)



An interesting short-wave superhet receiver circuit with a simple switch arrangement whereby the I.F. amplifier and second detector may be used as an ordinary broadcast receiver. The short-wave section employs an autodyne detector-oscillator.

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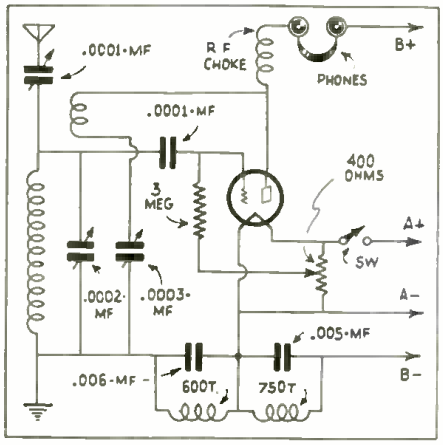
WORLD-WIDE SHORT-

Armstrong "Super" 1-Tuber

(From Amateur Wireless, London, England)

● IN a modern short-wave set the quenching frequency (commonly known to American readers as the *difference frequency* oscillation) for an Armstrong super circuit can be in the neighborhood of 7,000 to 10,000 cycles, mostly above audibility.

The Armstrong super arrangement is



Circuit for a 1-tube super-regenerative receiver, the coils with their shunt condensers being connected as shown in the ground side of the circuit.

extraordinarily simple. In addition to the ordinary one-tube short-wave circuit, all you need are a couple of large coils and fixed condensers to produce the quenching frequency.

The accompanying illustration shows the simple one-tuber. It has a straightforward circuit with a series aerial condenser, plug-in short-wave coil and a potentiometer giving control of the bias on the detector grid.

The quenching coils are wound on spools made from scrap plywood. Three large plywood discs approximately 3 inches in diameter should be cut from this plywood to form the "flanges" of the spools, while two similar discs 1 in. in diameter are needed for the center core on which the wire is wound. When you have cut the wood, clamp the five pieces together with a brass screw.

Wind 600 turns of No. 36 D.S.C. wire in one slot and 750 turns of the same gauge wire in the second slot in the same direction. The accompanying circuit diagram shows how the two coils are connected together in the grid side of the circuit.

To tune these two coils to the required oscillation frequency there are fixed condensers shunted across each. These have a critical effect on the quenching frequency.

If you want to get a good quenching oscillation and do not mind the note being just within the limit of audibility, then use .006 mf. condensers across each coil. If you have .005 condensers shunted, then the quenching will not be quite as effective, but the note will be above the range of the average ear.

As the fine results you can get from a short-wave Armstrong super depend largely on critical regeneration control you will find that this short-waver requires careful handling, but the results will repay you. Make several trials of various H.T. ("B") voltages and move the arm of the potentiometer with a pencil or insulated screwdriver until you get smooth oscillation and find that the set is "supering" properly.

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

Switch for Band Shifting

(From Funk-Technische Monatshefte, Berlin, Germany)

● THE receiver employs 5 tubes including the rectifier. The first of these tubes is an aperiodic R.F. amplifier, the second is a regenerative detector and the other two are audio amplifiers. The interesting part of the set is found in the method of changing from one wave band to another over the range covered—15 to 100 and 200 to 600 meters.

By referring to the diagram, you will note that the grid and plate coils of the detector have their common ends grounded to the chassis. The free ends are then connected to the circuit by a rotary switch. The plate section is merely a selector switch that connects the correct coil in the circuit. The grid section, however, connects a small trimming condenser in series with the coil and the main tuning condenser. This trimming condenser permits the coil to be adjusted to cover the desired band.

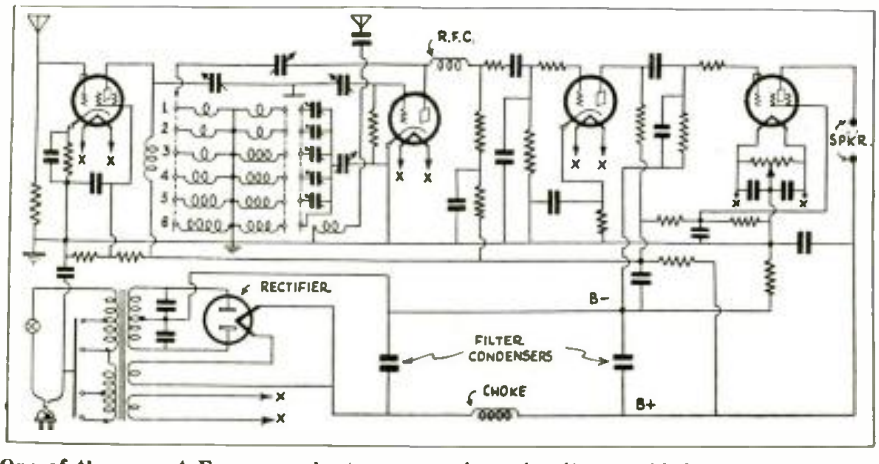
It will also be noticed that there are two aerial connections shown—one for the wavebands from 15 to 100 meters and the other for the 200 to 600 meter band. Apparently the aperiodic aerial coupling tube is not used on the broadcast band. You will also notice that on the broadcast band, no series trimming condenser is connected to the main tuning condenser, thus permitting the entire capacity to be across the tuning coil.

This method of selection permits a flexible control of the wave bands by the simple expedient of turning a *wave change* knob. The trimming condensers are adjusted once in lining up the set and then are left in the correct position. This method of control can be utilized with parts obtainable by using one of the three section wave change switches on the American market and insert a comparatively large tuning condenser, such as the .0005 mf. size. The small trimming condensers which should be small air insulated condensers will then permit the final capacity of the tuning condenser to be adjusted to suit each coil.

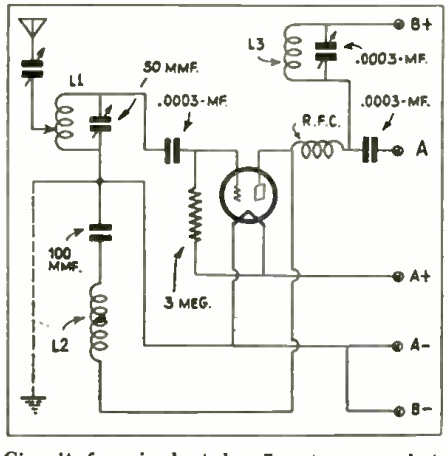
Ultra-Short Wave Converter

(From Amateur Wireless, London, England)

● HERE is some information on how to make an ultra-short wave converter that is simple yet really works.



One of the newest European short-wave receiver circuits, provided with an elaborate switching scheme for changing the various wave bands.



Circuit for single tube, 7-meter superhet converter, which enables one to receive these extremely short waves on any broadcast set.

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LONG RAVES . . . OUR READERS' FORUM

HE FINDS OUR SETS "HOT STUFF"!

Editor, SHORT WAVE CRAFT:

Thought I would write you a few lines to let you know what success I have had with receivers built from descriptions of same in your wonderful magazine. I became interested in short waves about a year and a half ago and as I had always thought it would be next to impossible for a novice to assemble a receiver that would work on such "touchy" wavelengths, so I decided to buy an inexpensive adapter or converter to try out first on my "BC" receiver, so, as I used to take the *Radio News* I picked a converter described by that magazine for my particular type of receiver (an RCA model No. 80, Superhet). The converter was a "Submariner"—probably familiar to you. It worked fairly well and I learned a lot about what to expect on short waves.

One day I bought one of your magazines. Boy! then did I get interested in *short waves!* After reading it through I decided I would get some of the stuff I had accumulated together and build a receiver. So with the parts I had and some parts bought from Kresge's I put together a regenerative 27 detector and wound all the coils on tube bases, etc., just as described in your "Beginner's Course" and I got it to work and was I surprised, for I received "stuff" I hadn't been able to get with the converter. Well, to make a long story short, I have added and torn down and rebuilt and tried out everything new that each month's SHORT WAVE CRAFT (which I am always right on deck to grab just the minute the newsstand gets it) would show until I have finally settled down with a combination of several of Mr. Shuart's and Mr. Denton's circuits, consisting of a 58 R.F., a 57 detector, a 56 first audio and a 45 second audio working into a dynamic speaker. I have not attempted yet to "gang" the tuning condensers as I have not been able to make them track close enough; prefer to dial each stage separately. I changed over to 5-prong detector coils a few weeks ago, rewinding same to use the "electron" coupled detector described by Mr. Shuart in the June issue and found a big improvement in smoother regeneration; even though using 22 volts on the screen and a 100,000 ohm potentiometer, I had too critical adjustment until I reduced the number of tickler turns to 2 or 3 turns.

I tune in EAQ every afternoon soon as I get home a little after 5 o'clock and listen to them until 6:00, then fish around to see if GSC is coming in on 31 meters. Last spring I used to listen to FYA every noon between 12:00 and 1:00 o'clock when home for lunch. Although I have a jack in the first audio for receivers I seldom ever use it, as I can get everything in loud enough on the speaker.

I have no long list of stations to forward you as I sometimes notice accompanies letters written you by builders of sets described in your magazine, but I do not have any trouble bringing in the main European stations heard mostly in this country. Never was much on getting up "early" in the morning but made it a point one Saturday morning a few weeks ago to get up and try for Australia and sure enough there was VK3ME, Melbourne coming through on 31 meters. Listened to them for about an hour before they finally faded out completely.

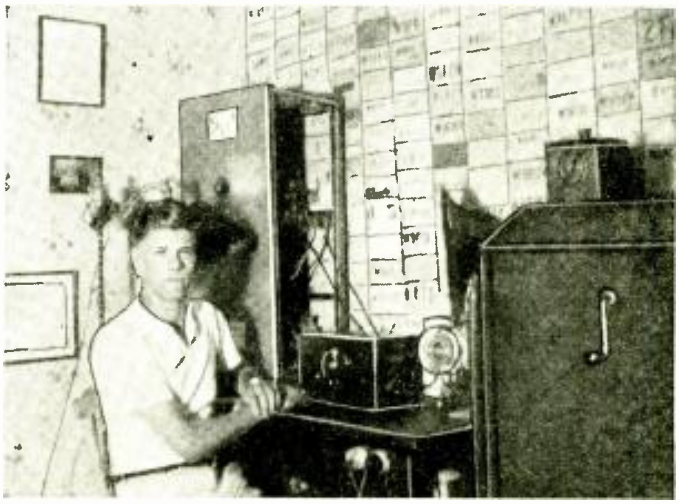
Well, I did not intend writing such a long letter when I commenced this, but have thought of writing you several times to let you know how pleased I have been with the results received from receivers built from your articles. I have scratched my head many a time when I thought I was stuck, but always find the information somewhere in your magazine to help me out.

Here's hoping you continue to issue your magazine *just* as you have in the past, dealing exclusively with short waves. I enjoy every page of it, every month.

CHARLES F. STEPHENSON,
4401 Cass St.,
Omaha, Nebr.

(Thanks for your valued letter, Charles, and the editors are pleased to know that their efforts in trying to make SHORT WAVE CRAFT *of the utmost value to all classes of readers has apparently begun to bear fruit. We have many new and interesting sets in mind for the short-wave experimenter, and both Mr. Shuart and Mr. Denton are developing new circuits constantly, which we shall describe right along in future numbers of this magazine. We are always particularly pleased to receive letters from our many readers, wherein they describe the results they have obtained with short-wave apparatus previously described in* SHORT WAVE CRAFT.*—Editor.)*

HAROLD ROTHROCK, W9AJK, HAS FINE STATION



Harold Rothrock, W9AJK, and his transmitting and receiving station at Evansville, Ind.

Editor, SHORT WAVE CRAFT:

You said, "Give us more station photos," so I am sending you one that perhaps you can use.

I have been reading SHORT WAVE CRAFT for several years now, and have always found it an interesting magazine. Right now I am building a 4-tube T.R.F. receiver from one of your circuits.

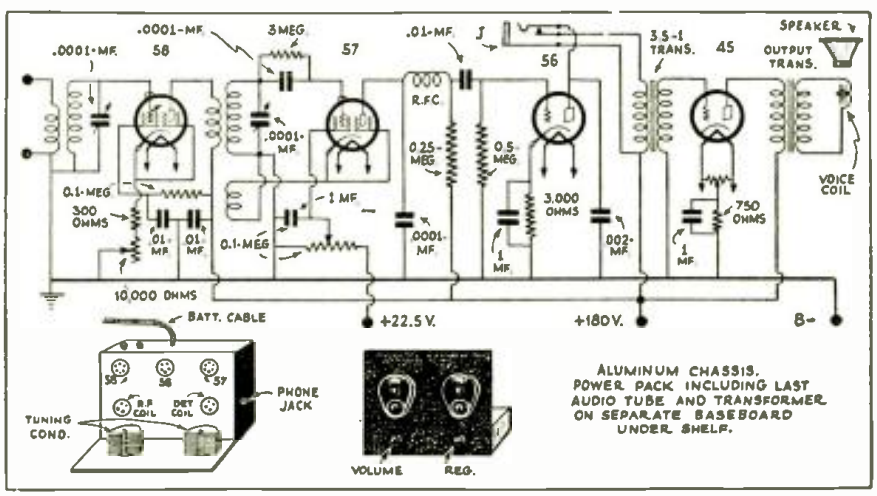
My station at the present time consists of two 210's in PPTNT for the transmitter, and a 57 and 47 in the receiver. Will be crystal-controlled soon, and it is my belief that this is the acme in an amateur transmitter.

The phonograph cabinet contains an 8-tube T.R.F. broadcast receiver, and the gadget on top of it is a home-constructed condenser mike, which incidentally works to perfection.

Would be glad to hear from other hams, or those interested in radio.

HAROLD ROTHROCK, W9AJK,
331 E. Riverside Dr.,
Evansville, Ind.

(Atta Boy, Harold, and we hope to obtain many more good photos of short-wave transmitting and also receiving stations from our valued readers. We are sure that thousands of our readers have a camera in their household and it is only a matter of taking a few "shots" and you should be able to obtain a pretty fair picture of your station. Send 'em along anyway and let the editors have a look at them.—Editor.)



Mr. Stephenson's interesting 4-tube receiver hook-up with which he has had excellent results.

DENTON 2-TUBER A "HUMDINGER"!

Editor, SHORT WAVE CRAFT:

A few days ago I finished constructing the Denton *2-Tube Receiver* described in the September issue of SHORT WAVE CRAFT, and Man!—does it work!!! Boy! Oh! Boy! I haven't caught a "wink of sleep" since the set's been in operation! I "logged" over fifty stations the first night of operation.

I'm only a little ways past the beginner's stage in this wonderful field of radio,

(Continued on page 437)

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SHORT WAVES and

A "CRACKERJACK" HAM TRANSMITTER

Photos above show two views of Alvin Abrams' crackerjack transmitter "set-up." This station is located in New York City; call letters W2DTT.

Editor, SHORT WAVE CRAFT:

I am enclosing two photographs of my short wave station in view of your request for some pictures. They were taken by my father whose hobby, by the way, is photography. They sure are beauties as you can see.

The present transmitter, which was built during Christmas, consists of a 4 stage crystal control circuit working on 7012 kilocycles. The oscillator is a type 47 tube, chosen because of its high output and small grid current. The voltage never exceeds 450 volts. This stage excites a 47 doubler with 550 volts. Variable resistors are used throughout for grid bias and screen dropping voltages as a better adjustment can be made in this manner. The third stage uses a —10 buffer with 700 volts of direct current. As it operates on the same frequency as the preceding stage it has to be neutralized, and a double spaced Pilot condenser is used for this purpose. The final stage consists of a —60 screen grid tube with 3000 volts. As the input to this tube ranges from 300 to 500 watts a circuit breaker was considered a necessity and has been good protection against overloads. It may be seen on the bottom panel, between the 2 switches. The final amplifier is keyed as it tends to reduce key clicks. The note is of pure d.c. in character and has a bell like ring to it which is very pleasing to the ear.

Power is obtained from 2 individual supplies, in the conventional manner; that is, stepped up, rectified, and filtered. A 72 is used for the large supply and an 83 for the smaller supply.

Reports of QSA 5 R8 are quite common from Europe and testify to the power and efficiency of the set. However its construction could not have been possible had it not been for the good will of the Duovac Radio Tube Co., which supplied the necessary tubes, for what's a transmitter without tubes?

The receiver is a 2 tube screen grid and pentode set. However I am not fully satisfied with its performance, and would like to trade something for a National SW3.

In closing I would like to ask the readers of SHORT WAVE CRAFT if they would be interested in the construction of a transmitter of this sort, and if so, to drop me a line and I will send along the circuits used and also a lot of information pertaining to its construction.

Best regards and hope to QSO again via short waves.

ALVIN ABRAMS,
Radio W2DTT,
570 West 191 Street,
New York City.

(A mighty fine transmitting "set-up," Alvin, and we are glad to reproduce the photos herewith for the benefit of our junior "Ham" fraternity, as a dandy example of what a well-designed transmitter may be made to look like. It was very kind of Alvin to offer to send you readers a copy of the circuits used in his transmitter, and as this information will only be available to the relatively few readers who write to him, we hope to prevail on him to give us a detailed article with diagrams in the near future.—Editor.)

Do You

Have a camera among your possessions—then why not take a photo of that "Transmitting" or "Receiving" Set-up? If photos are small, include films so we can make enlargements.

ROBERT S. KRUSE SPILLS THE BEANS!

Editor, SHORT WAVE CRAFT:

I venture a suggestion as to the present controversy between the voice (phone) and c.w. (code) camps of transmitting amateur radio.

It is this:

The complete radio amateur transmitting examination can be considered to consist of the following parts:

1—Legal requirements, which are matters of pure memory and necessary in any sort of transmission.
2—Basic technique, common to all sorts of transmission and therefore also necessary in any sort of examination.
3—The special customs of telegraphic radio, including the "code" and the international abbreviations. This is of slight educational value to the phone man as it is in an allied field. He will probably not use it, is often not equipped to hear the signals, but is at present required to show knowledge of it.
4—The special technique of phone radio, additional to that of par. 2, and in considerable part shared with other fields such as public-address work, broadcast service work and centralized reception systems. This is of more educational value than par. 3, and more likely to be used in one way or another.

From this tabulation it follows almost automatically that the merit of examination on par. 2 is uncertain, but that the addition of an examination on par. 3 to the c.w. (code) examination would seem to be well worth while.

Thus my suggestion is that matters be equalized, and the technical level of amateur radio be raised by adding a phone examination to all c.w. (code) license examinations—or better yet, using one and the same examination for all types of transmission. Incidentally this would eliminate a considerable group whose inadequate information makes them an "annoyance."

For them a trial-ground could readily enough be provided at 160 meters. One might as well learn at the beginning how "neighborhood interference" is caused and cured! Let it be understood that only receiving tubes are to be used in this band, for either voice (phone) or c.w. (code).

ROBERT S. KRUSE, E. E.

(Many thanks, "old timer," and many readers will probably agree with you. However, we often wonder if the true meaning of the word "amateur" has been sidestepped in the progress of amateur radio. When a "ham" is financially equipped to obtain all of the various refinements present in commercial radio activity and works definitely as a commercial radio man, we hardly believe he can be termed "amateur," as most of his activity is devoted to developmental work applying to his line of business, for which "amateur radio" forms a very nice cloak. Also we dread to think of the day when our radio regulations will discriminate to the extent where the amateur bands will be filled with "commercial amateurs."—Editor.)

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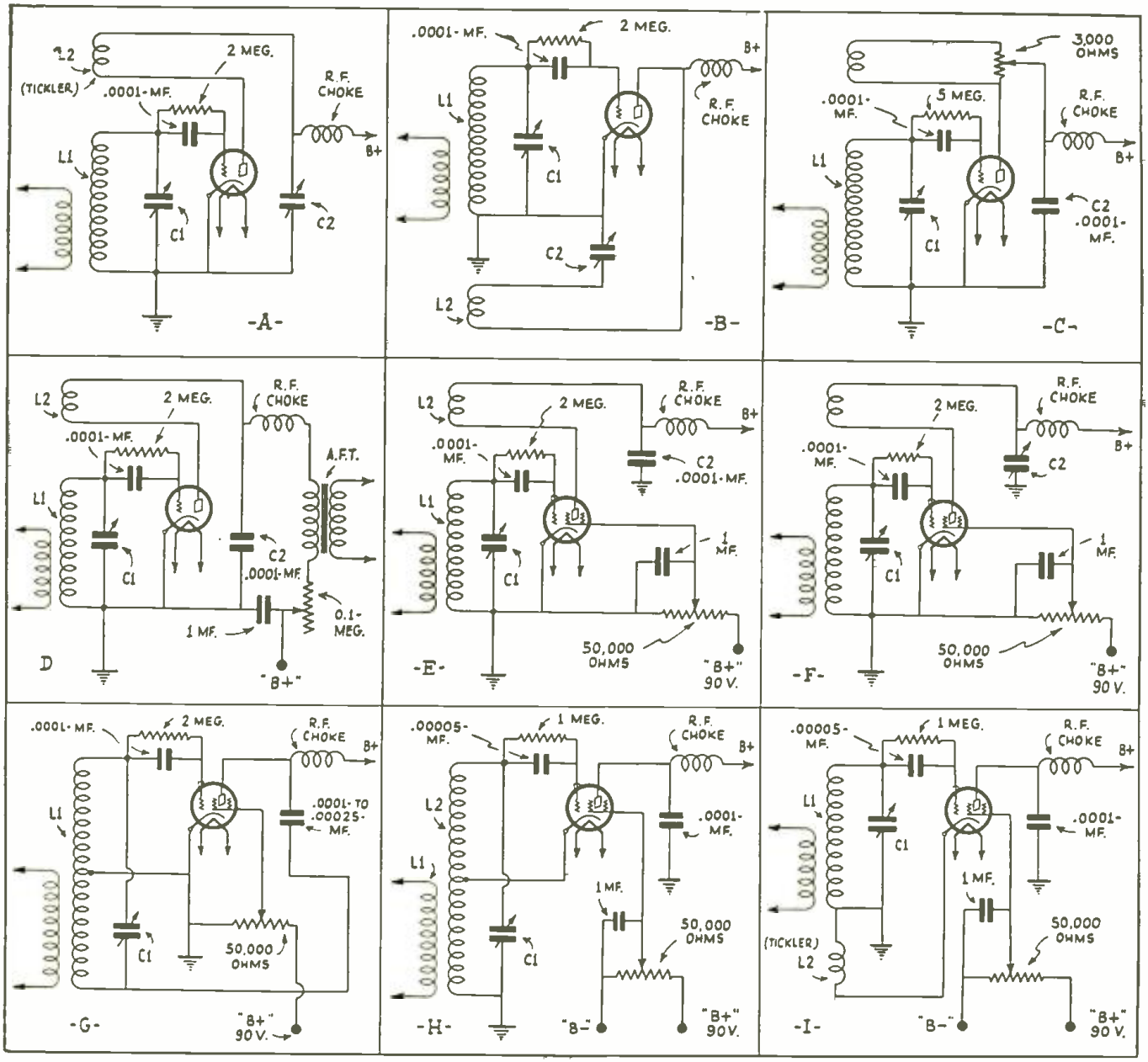
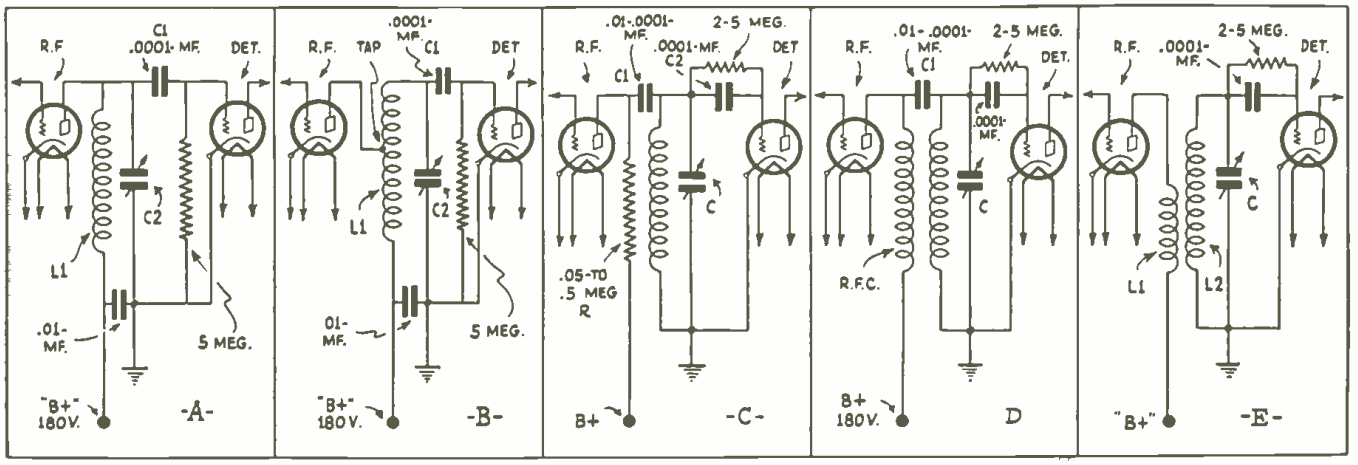
Regeneration Control Methods



R. F. Coupling Circuits



Nine different forms of regeneration control circuits are shown in the top drawing, the preferred circuits heing indicated in the author's text. The lower drawing shows several different hook-ups for radio frequency stages.

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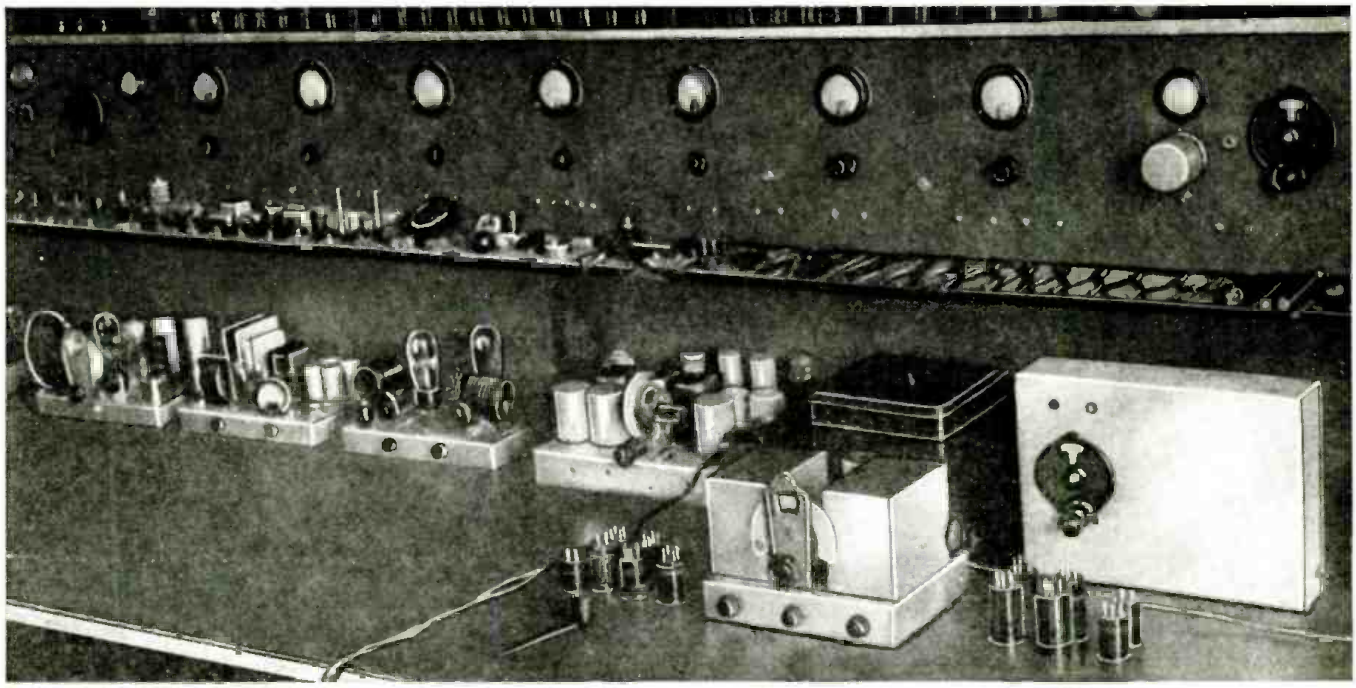

Mr. Malsberger's fine radio laboratory where the research was carried on, the results of which he describes in the accompanying article.

"Smoothing Up" YOUR RECEIVER CONTROLS

Part I—Improving the Regeneration Control; What is the best R.F. Coupling Circuit?

By CURTIS E. MALSBERGER

Mr. Malsberger made hundreds of tests on different forms of short-wave receiving circuits in his laboratory and he gives the readers of SHORT WAVE CRAFT the benefit of the results obtained from all these tests. Many different forms of regeneration control circuits were tried and the results are presented here. The best way to hook up the radio frequency stage was also investigated by the author and his findings are given herewith.

THERE is an adage to the effect that "Variety is the spice of life," and nowhere is this ancient saying more soundly applied than in *short-wave* radio. Yet the very great variety of available data on the subject of short-wave receiver design is often quite confusing to the average home set-builder.

One frequently finds highly contradictory statements in periodicals on the subject. In one article, for instance, we read that regeneration can be more easily controlled by the use of a variable condenser in the detector plate circuit, and in another article the condenser method is claimed to be all wrong and a "screen-grid potentiometer type" of control is recommended. Similarly, there is much contradiction in the methods advised for adding *audio-frequency* and *radio-frequency* amplifiers to a regenerative detector.

The writer will here endeavor to point out the advantages and disadvantages—the facts and the fallacies of design data on S. W. receivers exactly as he has found them through a prolonged series of experiments conducted in his own laboratory.

With the tremendous wealth of material available on this subject, and with the exceptionally efficient tubes and parts that have lately been developed by the many reliable companies in the field, there is no good reason why a short-wave receiver cannot be made as efficient and reliable as our modern broadcast sets.

9 Regeneration Control Methods

In order to clear up some of the confusion for the set-builder let us consider the pro and con of each individual subject. The proper place to start our discussion is, perhaps, with the *regeneration control*, and in figure 1 is illustrated nine methods of employing this control. Each has its advantages or disadvantages, and in one or two cases vastly superior results can be obtained.

For example, figure 1-A shows the diagram of probably the most popular system in use today. It is highly efficient although very critical, and requires extreme care in designing suitable coils; yet stability is not one of its strongest points. Figure 1-B shows a slight modification of this system which offers, however, no superior advantages. In fact both of these systems are subjected to the same faults; namely—noisy control, unless the condenser C-2 is a very good one and both systems cause a small amount of *detuning* that is objectionable in practice.

The third method, Fig. 1-C, uses a potentiometer of 3000 ohms connected across the tickler coil, and while it is not extremely critical it is frequently noisy in operation, due to the detector plate current flowing through the potentiometer. Also it does cause considerable *detuning* at higher frequencies.

Factors That Mar Regeneration

Figure 1-D is not a very satisfactory method because of the noise that may develop when varying the detector plate voltage. Also due to this changing plate voltage the tube constants are affected and serious *detuning* results.

The method illustrated in Figure 1-E is quite an improvement over the predecessors. There is less *detuning*, and the coils are less critical to construct. This system is generally satisfactory with the exceptions that it is not extremely stable, and unless the potentiometer is a good one considerable noise

(Continued on page 426)

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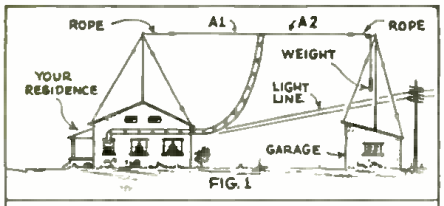

FIG. 1

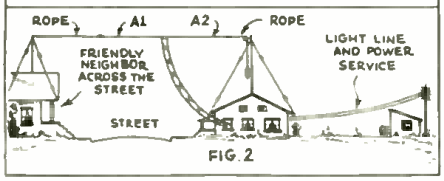

FIG. 2

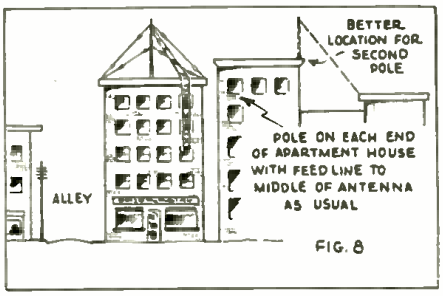

FIG. 8

Fig. 1—Antenna placement for location where "lead-in" is close to power line. Note balance weight to keep aerial taut. Fig. 2—Improved antenna, remote from power line.

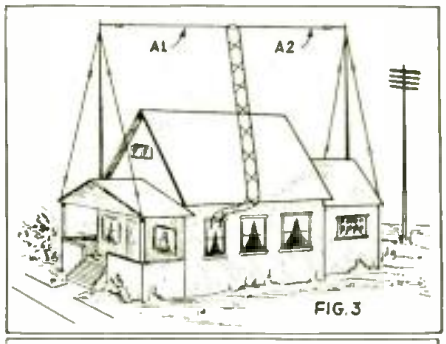

FIG. 3

Fig. 3. Fairly good construction where space is at a premium.

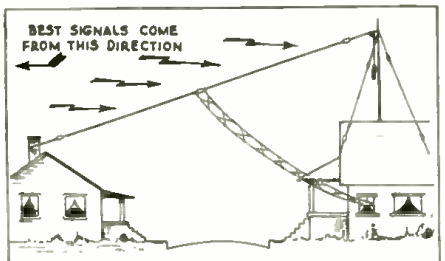

FIG 9

Fig. 8. Aerial construction with transposed lead-in for "apartment" houses.

Fig. 9. Showing the use of sloping antenna to receive signals from a certain direction.

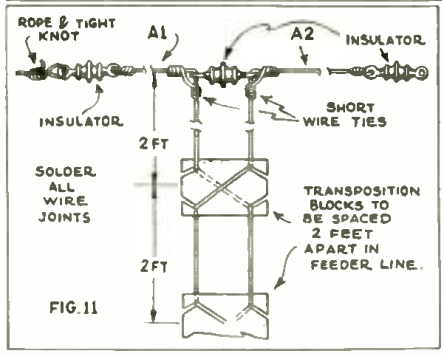

FIG. 11

Fig. 11. Details of transposition lead-in construction.

Short-Wave Antennas

By DON C. WALLACE

Mr. Wallace, winner of the Hoover Cup, gives some valuable hints on short-wave antenna construction in the accompanying article, especially with regard to the new transposition type lead-in.

(Many tests by competent radio experts have demonstrated the superiority of the transposition lead-in for short-wave reception. Many different methods of applying the transposition lead-in, together with the doublet antenna, are shown in the accompanying drawings. One of the most important points to remember in connection with the transposed lead-in is, that if the doublet or antenna wires proper are allowed to remain in the field of "noise producing" circuits, then you will still hear noise produced by such external magnetic or electrostatic fields in proximity to your antenna proper. The main purpose and function of the "transposed" lead-in is to carry the radio signal currents picked up by the doublet or wires branching out from the top of the transposition feeder, down along this feeder and safely into the receiving set, without interference caused by stray currents picked up along the route of the transposed feeder system.—Editor)

• • •

Short-wave receivers when used with ordinary single-wire antennas are "noise-collectors." The noise-level increases as the wavelength decreases, (or as the frequency increases). Unusual distance reception is possible only if the antenna is of the proper length required to allow it to resonate in some of the short wave bands. Resonance is attained by rotating the antenna tuning condenser, shown in practically all short-wave hook-ups. A quick-reference table is given for building antennas which resonate in the amateur bands, these being in harmonic relation with one another. If an antenna is wanted to receive short-wave broadcast stations, *five feet* must be added to each of the figures given for antenna lengths, A_1 and A_2. Likewise, 10 feet must be added to each of the feeder lengths given. This type of short-wave antenna, with tuned feeder system, is more noise-free than any other system yet devised. Because the system resonates at the frequency used by the transmitting station, it is obvious that maximum pick-up will be attained. Dealers and service-men will do well to erect one of these antennas at their places of business. They can be used with equal effectiveness for ordinary broadcast reception on standard channels.

Fig. 3

Another placement that is only fairly good, but which will give satisfactory results if space is at a premium. The proximity of the antenna to the power line again makes it difficult to entirely eliminate all pick-up from the lines, especially in such places where a multitude of wires is attached by the power line pole. A condition such as illustrated in this Figure is found only in congested localities. For those who are confronted with this problem it is suggested that the antenna be run to an adjacent house, if possible.

Fig. 4

Here you give the neighbor a helping hand by permitting him to use a perfect short-wave antenna of his own,

(Continued on page 429)

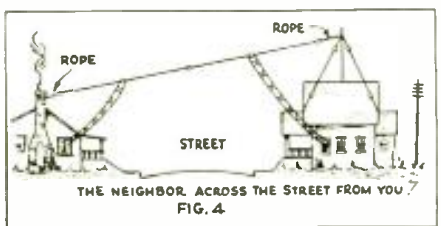

FIG. 4

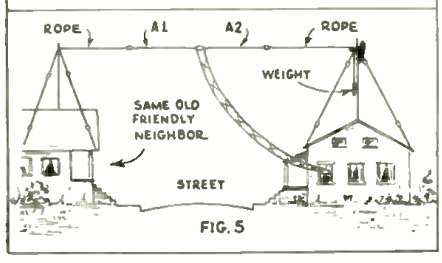

FIG. 5

Fig. 4—How two friendly neighbors may provide themselves with two ideal short-wave antennas. Fig. 5—How to erect a well isolated S-W aerial with the aid of a friendly neighbor.

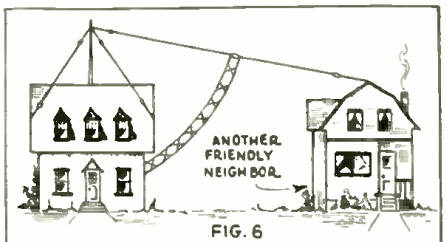

FIG. 6

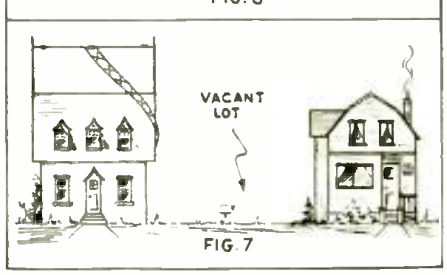

FIG. 7

Fig. 6—Shows short-wave antenna with transposed lead-in erected over vacant lot; Fig. 7—aerial construction where it has to be confined to the roof of your house.

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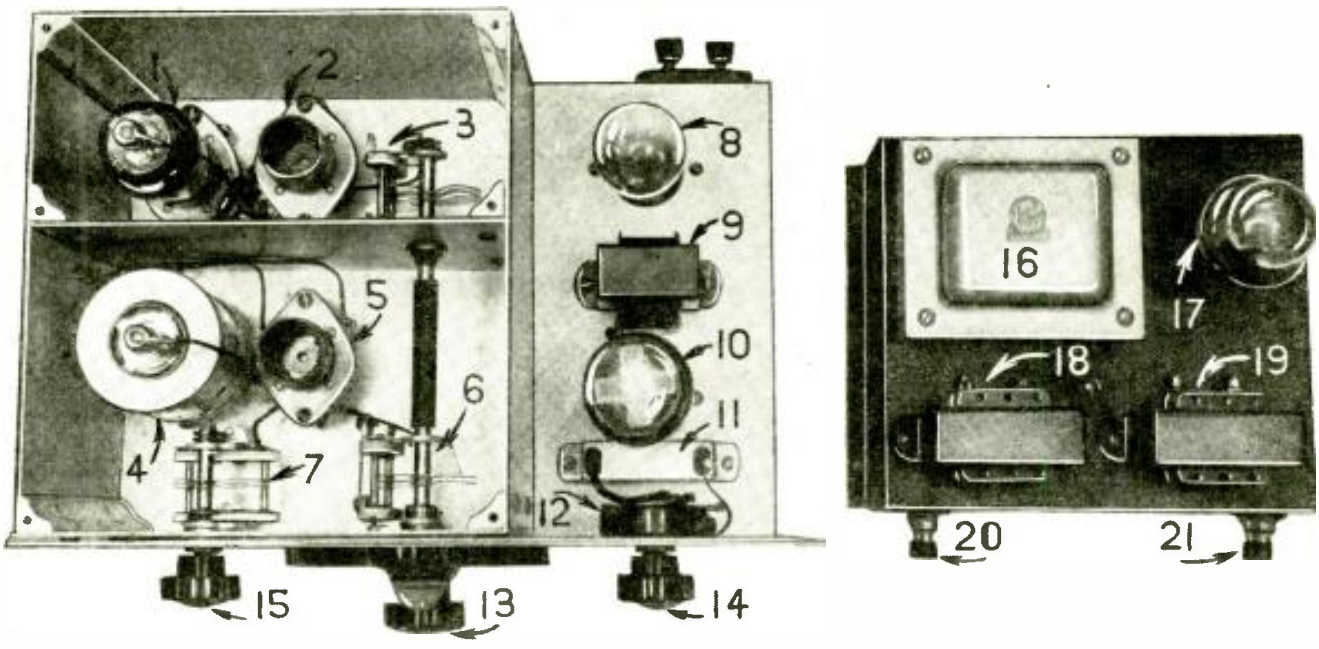


The parts numbered in the photo above are as follows: 1, '57 detector tube; 2, Detector coil; 3, Detector tuning condenser; 4, '58 R.F. tube with shield; 5, R.F. coil; 6, Shaft coupling unit for tuning condenser; 7, R.F. stage trimming condenser; 8, Type 56 interruption frequency oscillator tube; 9, Output transformer; 10, 2A5 audio amplifier; 11, By-pass condenser for regeneration control; 12, Regeneration control; 13, Main tuning control; 14, Regeneration control knob; 15, Knob for R.F. trimming condenser; 16, Power transformer; 17, 280 rectifier tube; 18 & 19, Filter chokes; 20, 2½ volt A.C. filament; 21, High voltage plus and minus.

set is only to be used on the ten meter amateur band and result in more difficult tuning. The recommended value is 20 mmf. for the ten meter band only; but with the increasing commercial activity such as television and police work on these frequencies, the larger value (35 mmf.) comes in quite handy, especially if one likes to experiment a bit with his receiver. A 20 mmf. condenser is used as the trimming adjustment in the R.F. stage, regardless of the size of the main tuning units. Each tuning condenser is mounted on the front section of compartments and the shafts coupled with a piece of insulating tubing or with a metal shaft, using flexible insulating couplings. All connections going to the chassis or B negative, can be connected at the most convenient point. But tuning condenser rotors *should be*

A 4-Tube "5 and 10" Meter Receiver—With Optional Super-Regeneration

(Continued)

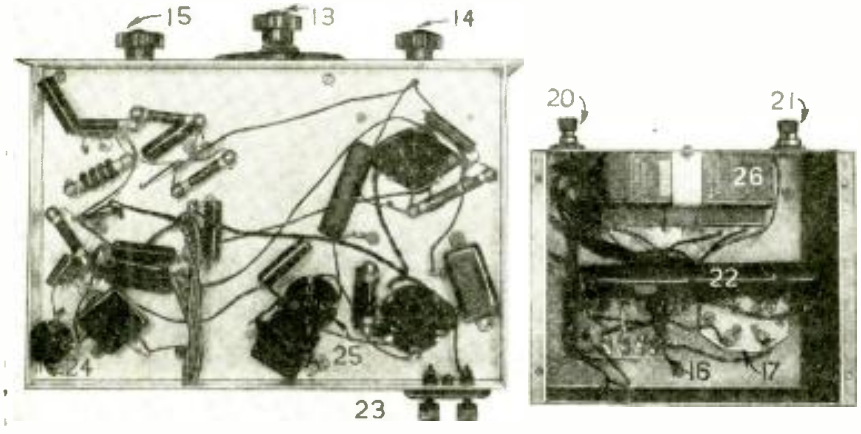
connected to the coil directly with wire, rather than depend entirely on the connection through the metal chassis.

Coils were only made for the 5, 10 and 20 meter bands and the winding data is given in the coil table. The coil forms used are of the National variety intended for ultra high frequency receivers.

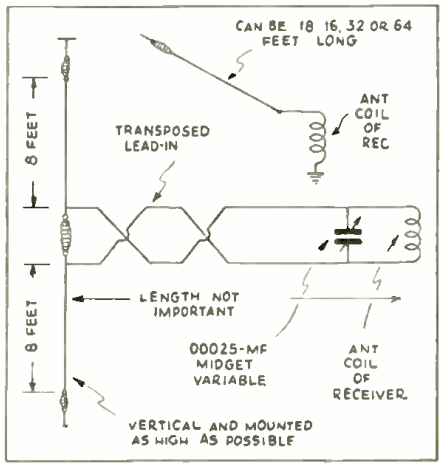
Tune Extra Slow!

There is no trick to operating this set other than *careful tuning*, and this must be emphasized, because it is very easy to pass right over a very loud signal without ever hearing it, if one glides over the band, as is the usual practice on the lower frequency bands, therefore, *tune slowly!!* This set can be operated either with or without the "super-regenerative" tube; *only modulated signals can be received with super-regeneration.* For continuous wave (CW) the 56 will either have to be removed from its socket, or switched off with the switch indicated in the diagram. When using super-regeneration the CW carrier will suppress the *hiss*, allowing only the modulation to come through. On a signal of fair strength the hiss will disappear entirely! The controls on the panel are

(Continued on page 431)



Above: 13, main tuning control; 14, regeneration control knob; 15, knob for rf trimming condenser; 16, power transformer; 17, 280 rectifier tube; 20, 2½ volt A.C. filament; 21, high voltage plus and minus; 22, bleeder resistor; 23, phone terminals; 24, 250 mh. radio frequency choke; 25, interruption frequency oscillator transformer; 26, three 8 microfarad electrolytic filter condenser



Details of the 5 and 10 meter antenna are given in the drawing above—the antenna for these wave lengths requires special attention.

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Receiver With Optional Super-Regeneration

By GEORGE W. SHUART, W2AMN

All sorts of ideas arose in the author's mind as to what would be the best form of 5 and 10 meter receiver to build—after considerable experimenting, the receiver here described was finally evolved and it proved that it could "roll in the stations" in the 5 and 10 meter bands in excellent fashion! A tuned R.F. stage is used ahead of a regenerative detector, the detector being "electron-coupled." Super-regeneration is optional and is available at all times. A 2A5 pentode is used as the output tube. This set is the berries—no fooling!

modulated signals, such as those from new police broadcasting systems now operating on about eight and one half meters. These signals are so broad during modulation that it is impossible to receive them on a straight regenerative detector. However, when using super-regeneration the signal sounds first rate.

A type 56 is used as the generator of the *interruption frequency* oscillations, which produce the super-regenerative effect. The plate of the 56 is directly coupled to the screen-grid of the detector tube, the screen voltage to the detector tube and the plate voltage to the low-frequency oscillator being fed through L4 and controlled by the 50,000 ohm potentiometer. The voltage to both tubes is adjusted at the same time, providing *very smooth operation*. A 2A5 pentode is used as the output tube and is resistance-coupled to the detector; the output coupling is taken care of with a (single pentode to voice coil) transformer, working either as an output choke, for magnetic speaker or earphone operation, or for a dynamic speaker.

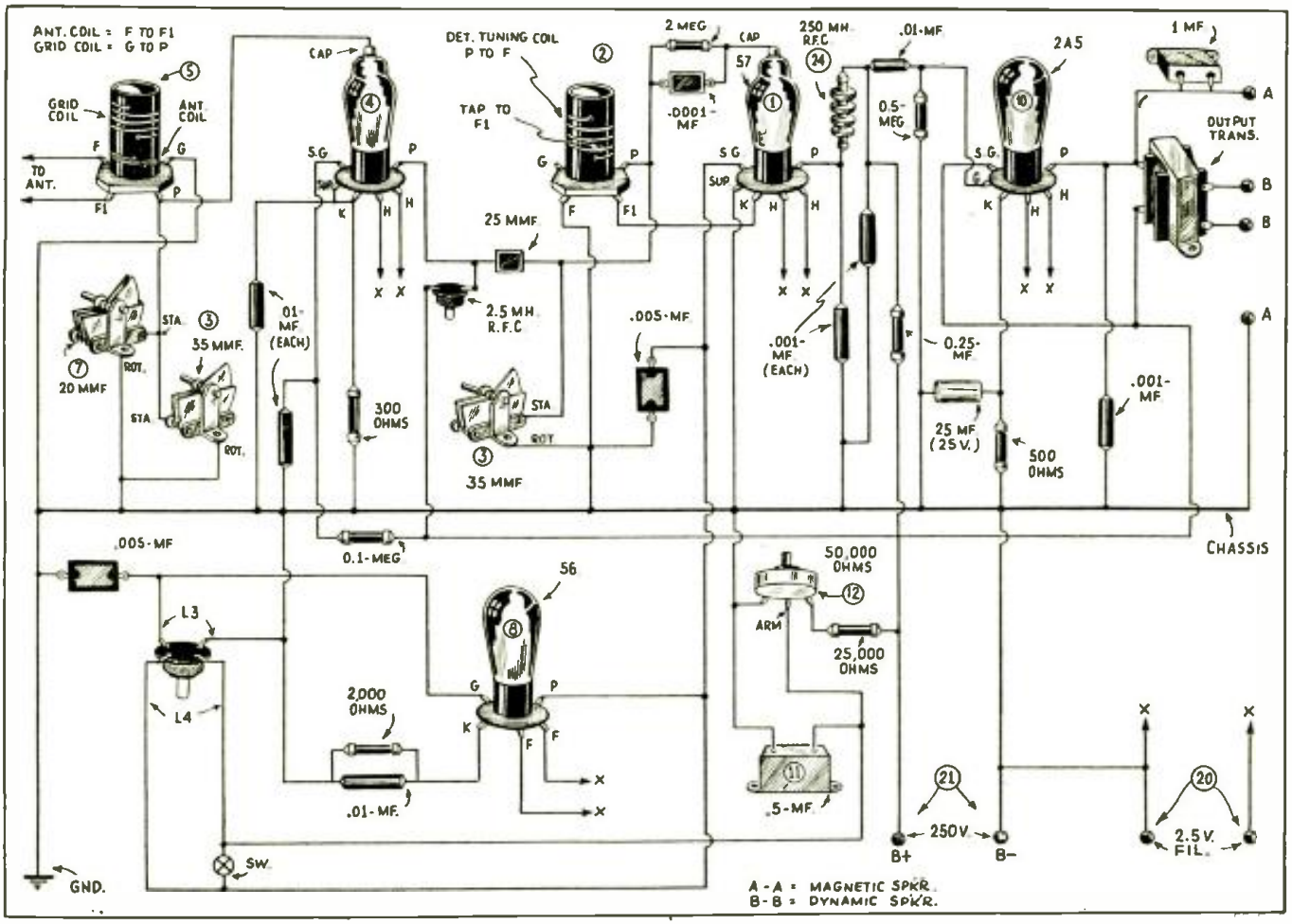
Bypass condensers were used quite freely in this receiver and are absolutely necessary at every point shown in the diagram, in order to obtain smooth and stable operation. This receiver will perform very nicely at frequencies as high as 60,000 k.c. and there is a decided gain present in the tuned R.F. stage, even at this frequency.

Short Leads and Good Insulation Imperative!

As can be seen from the photographs the tube sockets are mounted above the base, not below, as is the usual practice. This was done so that all leads could be made as short as possible; if this were not done it would be impossible to get the set to perform on the five meter band. Remember: *short leads* and *good insulation* such as isolantite, are of utmost importance in ultra-high frequency receiver design.

Layout and placement of parts plays another most important part in this type of receiver. It is not advised that the builder should try to use any type of bread-board and panel arrangement, if good results are to be expected. An arrangement similar to the one used in this receiver should be used; it may be a trifle more expensive in the beginning, but in the end it will pay higher dividends, as far as real results are concerned.

The tuning condensers used in this set are larger than necessary, if the



Picturized wiring diagram for the 5 and 10 meter receiver, which will make the construction of the set clear to even the uninitiated.

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A 4-Tube "5 and 10" Meter

● WITH the ten meter "amateur band" now made available for radiophone transmission, that is, the section from 28,000 to 28,500 kc., we can now expect to see great activity on this band and also a marked improvement in receiver and transmitter design.

Radio apparatus that will perform quite efficiently on the twenty meter band is liable to be entirely useless in the vicinity of ten meters. The requirements for a good ten meter receiver are stability, low background and set *noise level*, and adaptability to phone reception as well CW (telegraph code). The first thought naturally will be of the *superheterodyne*. This type of receiver if properly designed for the higher frequencies will no doubt prove to be by far the best.

The 5 and 10 meter receiver designed and built by Mr. Shuart is here seen in actual operation. Among other signals, police calls on the new 8 and 10 meter systems were heard.

But, on the other hand, the average superhet designed for general amateur use on the other bands may have a much higher noise-to-signal ratio than a well designed regenerative detector and one stage of audio combination. The author has, in many cases, seen the two tube set out-perform a seven or eight tube superhet; in fact the super fell down miserably on a signal that had a slight chirp or frequency change when being "keyed."

Tuned R.F. and Regen. Detector Preferred

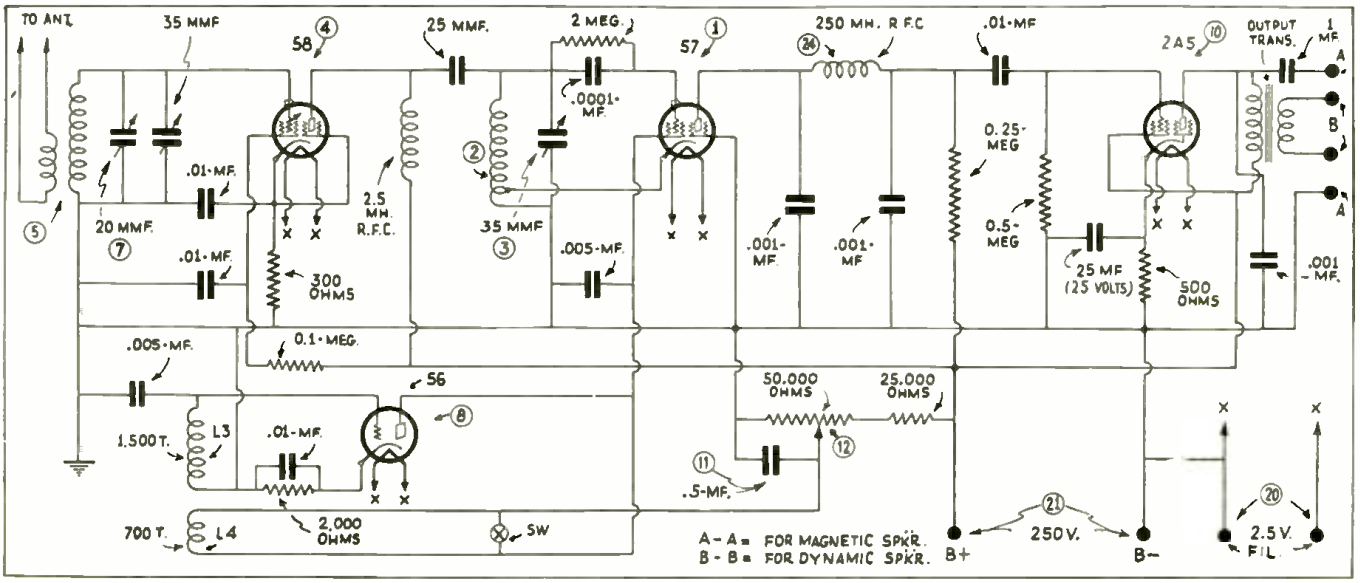
After using both kinds of receivers for several months at the author's station, it was finally decided to build a stage of tuned radio frequency ahead of the detector in the straight regenerative set.

Various methods of coupling the R.F. (radio frequency) stage to the detector were tried and the old reliable capacitive type of coupling was finally used, as it permitted less complication in circuit design and more effective coupling than that obtainable with the inductive method. The main objection to this system always has been that there was danger of the plate voltage of the R.F. tube leaking through the coupling condenser and getting to the grid of the detector tube, thus causing a failure of the set to function properly or else noisy reception. This was the case when the plate was attached directly to the grid coil, but gives no cause to worry when coupled through a condenser, because the grid condenser and coupling condensers are in series, which decreases this liability to practically zero. An alternative of course would be to use a low-capacity variable midget condenser or to construct a fixed air di-electric condenser. However, as stated before, if good mica condensers are used there will be no danger of any kind. The arrangement used in the receiver shown in the photographs was two 50 mmf. condensers in series, giving a total of around 25 mmf. and providing a third condenser between the plate of the R.F. tube and the grid of the detector tube.

The tubes used in the R.F. and detector stages are the type 57 and 58. The 58 being the R.F. amplifier and the 57 as regenerative detector, using the now famous *electron-coupled* circuit. These two stages are contained in the double-shield compartment mounted on the left-hand side of the base. Dimensions for constructing the shield and chassis are given in the drawings.

Super-Regeneration Added

An extra tube was added to the receiver to obtain *super-regeneration*, although this was not entirely necessary as very fine phone reception is obtained without it. The primary function of this addition is to enhance the reception of the very weak or broad



Above, we have the schematic wiring diagram of Mr. Shuart's 5 and 10 meter receiver.

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modulator and make sure it matches the R.F. amplifier. In order to find plate resistance of the R.F. amplifier divide the voltage by the current in milliamperes. Formula is $\frac{V}{MA}$. The load resistance of both must be approximately matched for maximum power transfer from modulator to R.F. amplifier.

In this installment of Mr. Victor's new series describing Amateur Transmitters—How to Build, Operate and Install them, the theory and particularly the construction of a reasonably priced yet efficient "modulator" is described. Those interested in building an up-to-date "Ham" transmitter should study the articles which appeared in the two previous issues, which provided important data.

Changes for 160 Meters

There are only a few slight changes to be made in the transmitter for 160 meter work. First, the coils: these are wound with bell wire, cotton covered, No. 18 or 20. The oscillator coil is wound with 30 turns, and the excitation tap is about one-third of the way up from the *cold*, or plate-blocking end of the coil. The exact turn must be determined experimentally, the idea being to keep it as near the *cold* end as possible, with the amplifier tube drawing only a few or no milliamperes, without the aerial connected. The amplifier coil has 35 turns, and is tapped at th center for the power supply clip. Both coils are wound on five-inch lengths of three-inch diameter tubing. The antenna coil is wound on a three-inch piece of the same diameter tubing, with 25 turns.

The Antenna

Next comes the antenna: For our purpose a very simple type of "sky-hook" is used. It should be a straight piece of wire, somewhere in the neighborhood of 150 feet in length, including the lead-in and ground lead. Ten feet more or less will make no real difference. The antenna is connected to the .00035 mf. aerial tuning condenser, the other side of which is connected to the 25 turn coil. The other end of the coil goes to *ground*. Try to get a good solid ground to a cold water pipe. This antenna ground arrangement is known as a Marconi system.

The antenna is coupled as follows: Tune the amplifier tank to the point where minimum current is drawn; then slowly turn the aerial condenser until there is a rise in current. Retune the tank for minimum again, which should be higher than before. Continue this until the set draws 40 mills (milliamperes) with the tank tuning at the minimum current point. This is the proper load point, as the amplifier is now drawing 12 watts; if the voltage has been set at exactly 300.

The bias resistor on the 46 tube should be changed to 20,000 ohms, or better still, use a 45 volt battery as bias. Connect the plus of the bias battery to B minus on the power supply, and the B minus to the grid R.F. choke, in place of the resistor. If a battery is used, slightly better results will be obtained; connect a .002 mf. mica condenser between the plus and minus of the battery.

The Modulator

A modulator is really an audio frequency amplifier, such as is connected to any receiver after the detector. However, for transmitting purposes the amplifier must be capable of delivering 5 or 6 watts, which would be sufficient to run several large loud speakers. The particular modulator used is one which your author bought a short while ago for "public address" work. It is an excellent unit, very low in price, not running much over the ten dollar mark, including tubes. Likewise the type of tubes used are easily available and are very low in price. This particular amplifier is a manu-

(Continued on page 439)

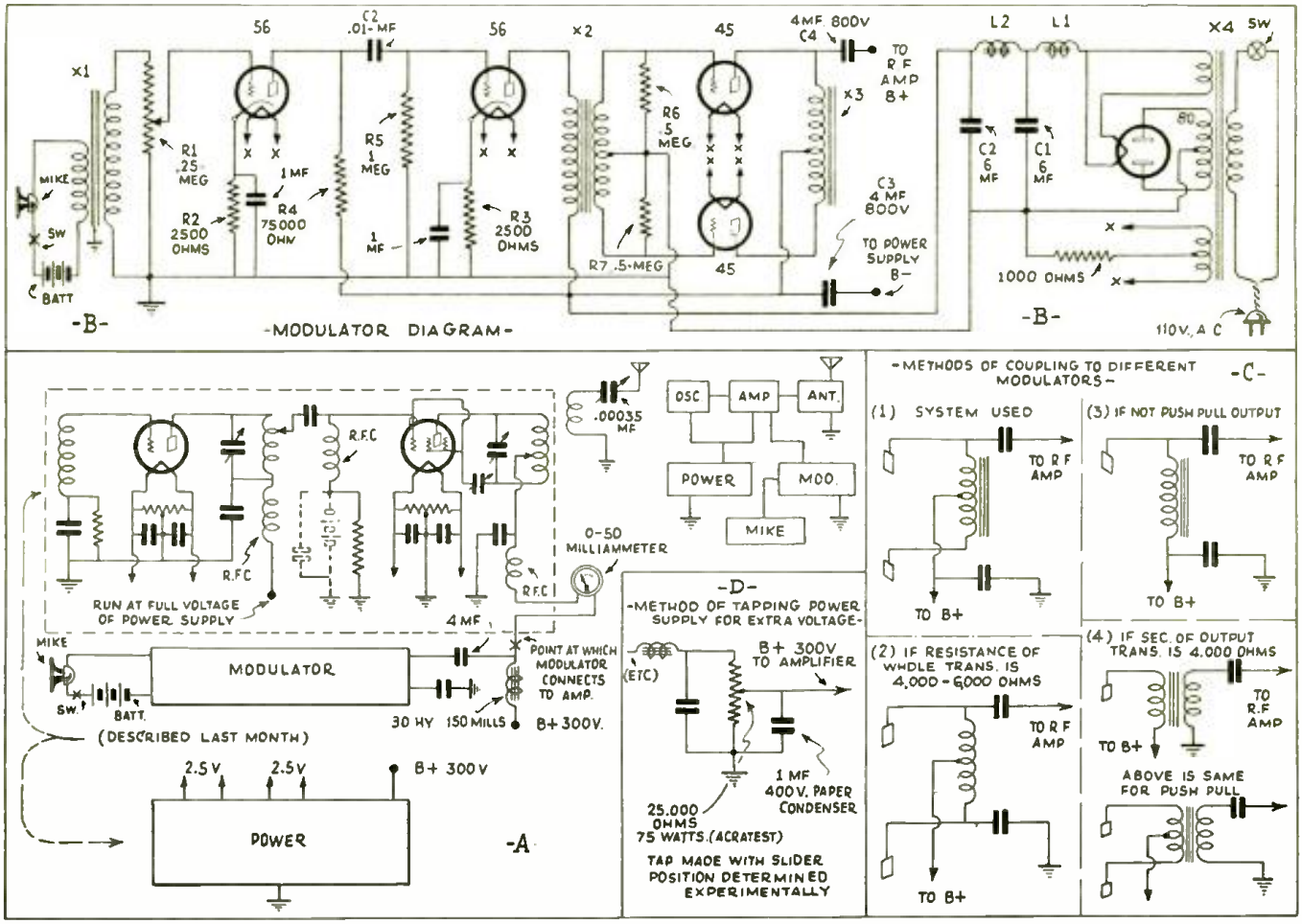

Fig. A shows block diagram with connection of modulator unit in the "Ham" transmitter set-up. Fig. B shows hook-up of the "modulator" unit here described. Fig. C shows possible methods of coupling a modulator to the R.F. stage. Fig. D, diagram showing method of tapping power supply to obtain exact voltage desired.

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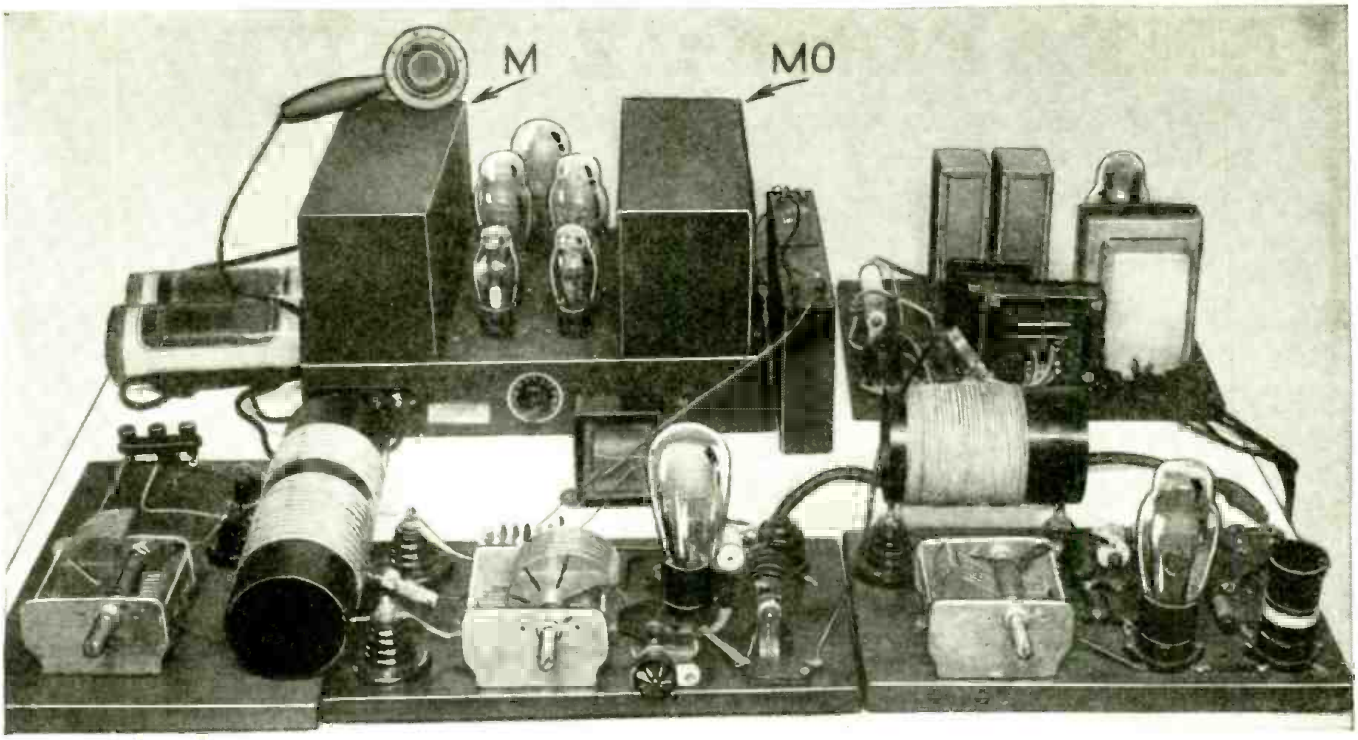

In this photo we see the complete "Ham" transmitter, comprising the oscillator and amplifier described in the last two issues, also power supply unit in upper right-hand corner; in the upper left-hand corner MO indicates the new modulator unit, described this month, with hand mike "M."

Amateur Transmitters

How to Build, Install, and Operate Them

By LEONARD VICTOR
W2DHN, W2DPT

● THE only phone bands open to the holder of a plain amateur license (Class B or C) are the 160, 10, and 5 meter bands. The 10 meter band, just recently opened for voice work, is still in a highly experimental stage, and necessitates the use of a different type of receiver than is commonly used for short-wave work. The 5-meter band likewise requires both different types of receivers and transmitters than the equipment used on regular short waves. Hence, this leaves only the 160 meter phone band for the fellow who wants to talk to "locals" within a few hundred miles. The fact that the Federal Radio Commission has recently widened the 2000 kilocycle phone band makes the prospects even more inviting. This being a low frequency band, electrically, operation is much easier than on higher bands. That is, receiving type tubes such as we are using in the "Beginner's Transmitter" will work with much higher efficiency.

From a technical viewpoint, *modulation*, (the application of voice to a transmitter), is one of the most intricate and involved subjects in radio. However, with an elementary understanding of the process of modulation, and by following a few simple rules, very good results can be obtained without recourse to six place logarithms.

How 100% Modulation Works

First, let us consider how an amplifier works when it is properly *grid-biased* for modulation (biased so the tube when tuned to minimum draws a very low plate current without antenna load). When the voltage on the plate of an amplifier is raised, the output is increased; conversely, when the voltage is lowered the output goes down. The function of the modulator is to vary the instantaneous plate voltage in exact proportion to the sound waves of the voice striking the microphone. To effect complete, or 100% modulation, it is necessary to vary the output from zero to twice the normal amplitude. Commonly the power output is varied by varying the voltage applied to the plate of the amplifier tube that is being modulated. Likewise for 100% modulation the output of the modulator must be at least one-half the value of the input to the radio frequency amplifier for best results.

The plate input in watts is the plate voltage multiplied by the plate current in amperes; for example, 300 volts x 40 milliamperes (.04 amperes) equals 12 watts. The modulator is really an audio output power-amplifier, using the transmitter as a load resistance, instead of a loud-speaker.

The final requirement is that the load resistance be correct for the particular modulator used. Every tube is so designed that it is supposed to deliver its maximum power output to a certain value of load resistance. The particular amplifier used works into a load resistance of 8000 ohms, but we divide this in two, without losing any appreciable power by coupling to the center tap of the audio output transformer and to the plate of one speech output tube instead of two. Hence we have an impedance of 4000 ohms, which works well into the 46 radio frequency amplifier. Here is a summary of the steps necessary to apply modulation to a transmitter:

1. Determine the power output in watts of the modulator (in this case 6 watts) by referring to the data charts supplied by the tube manufacturers, for the particular type tubes being used.

2. The plate power-input to the R.F. amplifier is twice this value; hence in our case it is 12 watts.

3. Ascertain the load resistance of

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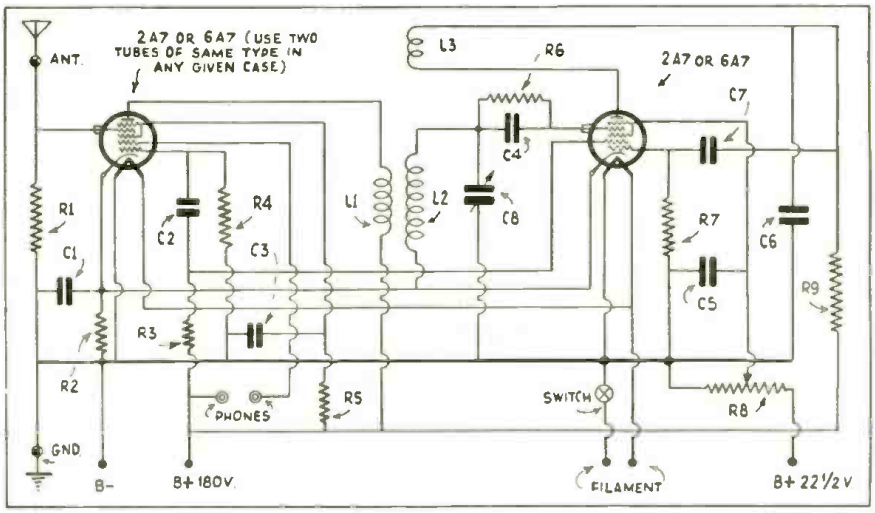
PENTAFLEX: 2 Tubes=4

By
J. A. WORCESTER, Jr.

can be noted from the photographs. The front panel consists of a 5" x 7" piece of No. 14 gauge aluminum. This is bolted to a chassis which is formed from a similar piece of aluminum 7" x 7" by bending 1" from either end as shown.

On the front panel are mounted the Hammarlund variable condenser, the 50,000 ohm potentiometer and the S.P.S.T. switch used to control the heater supply. At the rear are mounted the Eby twin binding post and speaker jack assemblies, while on top the National isolantite coil socket and grid condenser-leak combination are mounted as shown. The remaining apparatus, consisting of the Lynch resistors, tube sockets, and various fixed condensers, are mounted underneath the chassis. Battery connections are made directly to the proper points by means of a five-conductor battery cable.

Due to the large number of resistors and condensers mounted underneath the chassis it is desirable to cover all exposed leads such as resistor pigtails, etc., with spaghetti tubing wherever there is danger of possible grounds or other undesired connections.



Schematic wiring diagram for Mr. Worcester's 2-tube "Pentaflex" receiver. By reflexing the 2 tubes, they are here made to work as 4.

Operating Hints

In operating the receiver the regeneration control will exhibit certain peculiarities which, however, do not cause any inconvenience when thoroughly understood. For instance, it will be found that when the potentiometer is advanced to a point where the detector tube goes into oscillation a series of slow clicks will be produced. This will make the reception of C.W. signals impossible by the "beat" method, unless the potentiometer is advanced until the clicks stop. This will generally necessitate employing more tickler turns than is supplied with the manufactured coils and it is recommended that for best results with this circuit about 100% more tickler turns be added to the various coils. This circuit gives best results on modulated carriers and is not recommended if the set is desired for C.W. reception only.

It will also be found that if the potentiometer control is not advanced far enough a loud hum will be experienced. Between these two extremes, however, no peculiarities are experienced and this

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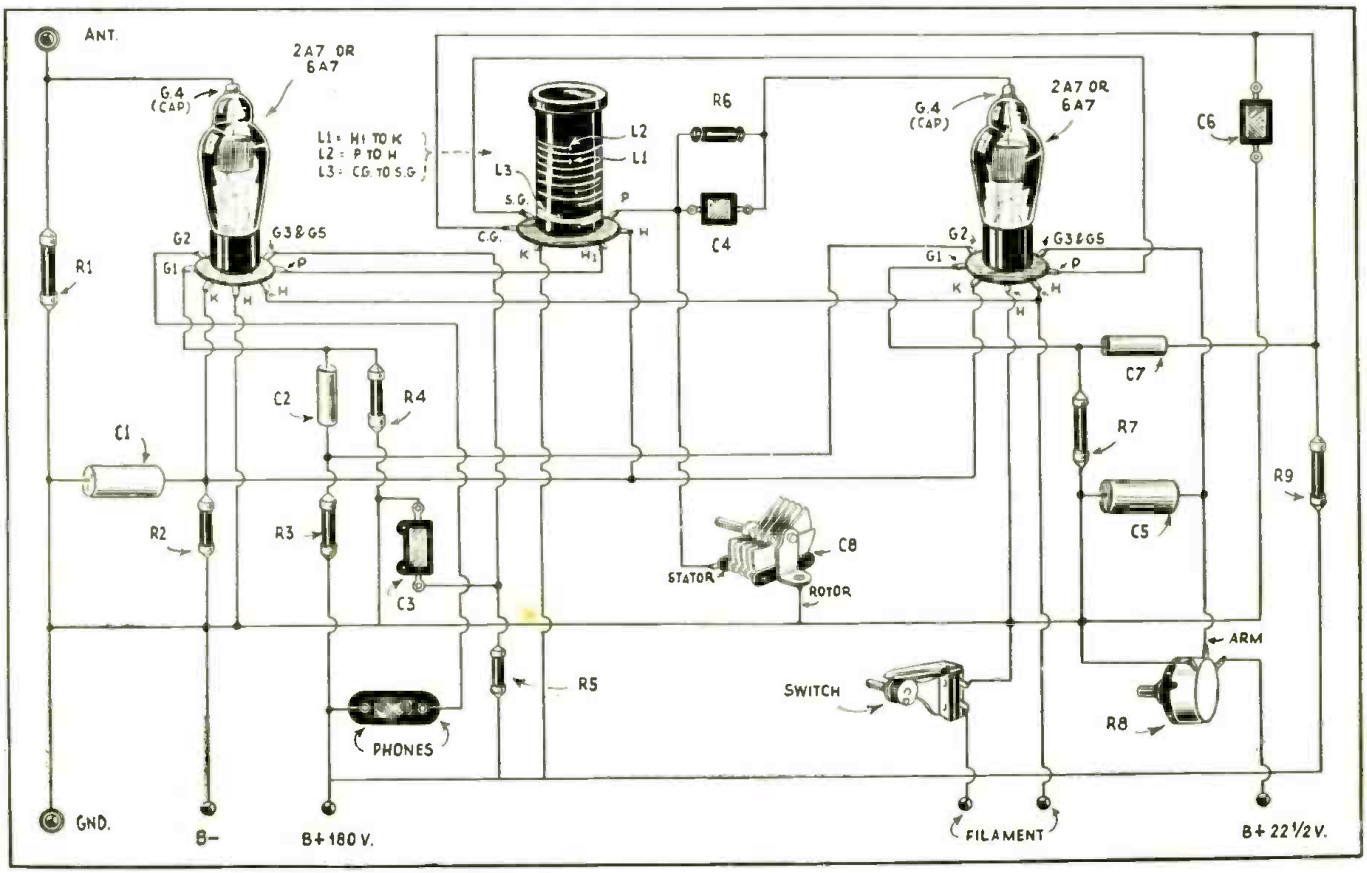

Physical wiring diagram for the 2-tube "Pentaflex" receiver which provides an R.F. stage, regenerative detector, and two resistance-coupled A.F. stages.

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The 2-Tube

Front view of the 2-tube "Pentaflex," which uses two 2A7 or 6A7 tubes.

Mr. Worcester, author of the present article and designer of the set described, was formerly a member of the Bell Telephone Laboratories technical staff. He has also established a name for himself for his origination of the popular "Oscillodyne" circuits described in recent numbers of SHORT WAVE CRAFT. In this very unusual circuit Mr. Worcester causes two tubes to work as four! In other words, with but 2 tubes of the 2A7 or 6A7 type, you actually obtain an R. F. stage, also detector and two A. F. stages.

● THE receiver described in this article should be of considerable interest to the readers of this magazine as it produces in effect the amplification of a four tube set with only two tubes of the pentagrid converter type. The circuit is similar to the one tube pentaflex in the October issue, with the addition of another tube, thus permitting one stage of radio frequency amplification, a regenerative detector, and two stages of resistance coupled audio frequency amplification. Needless to say, this construction permits an appreciable saving over the cost of the equivalent four tube set, as both the first cost and the upkeep are materially reduced.

Reference to the schematic diagram in Fig. 1 will indicate that the input to the radio frequency amplifier tube is produced across a 10,000 ohm resistor in the antenna circuit. Increasing the value of this resistance will not materially affect the voltage produced across it as the input impedance is largely determined by the reactance of the input capacitance which is only a matter of a few thousand ohms at high radio frequencies. Consequently, the value of this resistor is not very critical and any value between 10,000 and 50,000 ohms will be found satisfactory.

Freedom from "Dead Spots"

Although the use of an aperiodic stage of radio frequency amplification, such as is used in this receiver, will not result in any great amount of gain, particularly at the higher frequencies, there are other advantages which result from the isolation of the antenna system from the detector input that are not appreciated by the majority of short wave listeners. In the first place, *dead spots* caused by antenna absorption are almost entirely eliminated as the coupling tube quite effectively removes the antenna from the high gain detector circuit. A further advantage is that the detector can be operated in an oscillatory condition without the possibility of annoying one's neighbors. These advantages should be sufficient to justify the use of a radio frequency amplifier under most conditions.

Detector Action

The amplified radio frequency current flowing in the plate circuit produces a voltage across the detector input, due to the magnetic coupling existing between L_1 and L_2. Detection is produced by the conventional grid condenser and leak as shown. A portion of the radio-frequency current flowing in the plate circuit of the detector tube is fed back by the coil L_3 for regenerative operation. The radio frequency currents are then by-passed to ground through the condenser C_3. The audio frequency component of the detector plate current flows through the resistor R_1, producing a corresponding audio frequency voltage across it. This voltage is impressed on the first grid, which becomes the grid of the first audio frequency amplifier tube through the condenser C_2. The object of this condenser, of course, is to prevent the positive plate voltage from being impressed on the grid. R_2 prevents the grid from becoming "blocked" by a negative charge accumulating on this grid.

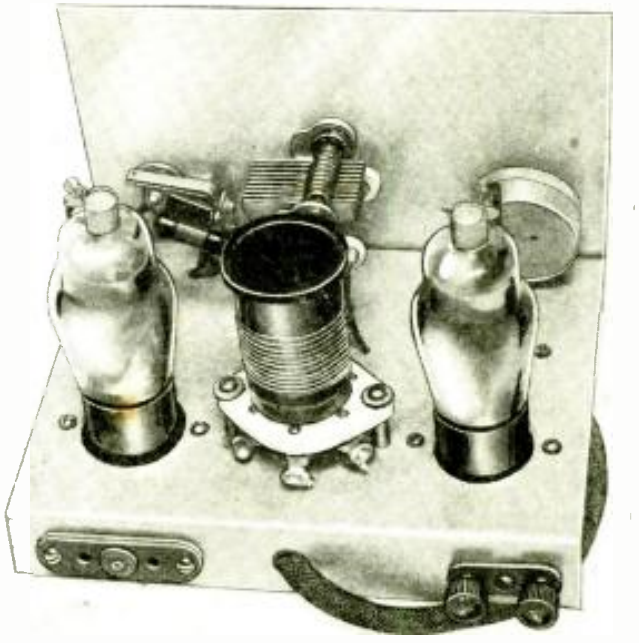
The amplified audio frequency current flowing in the second grid circuit, which becomes the plate circuit of the first audio frequency amplifier, flows through the resistor R_3 producing an audio frequency voltage across this resistor. This voltage is impressed on grid No. 1 of the first tube in the same manner as previously and the amplified audio frequency currents in the second grid circuit of this tube flow through the headphones as shown.

Grid Bias—How Obtained

Grid bias is obtained by the plate current of both tubes flowing through the resistor R_4. Regeneration is controlled by the customary method of varying the screen-grid potential by a 50,000 ohm potentiometer across a 22½ volt "B" supply.

Either 2A7 or 6A7 tubes can be used; the former requiring a 2½ volt heater supply while the latter operate from a heater supply of 6.5 volts. Plate potential can be obtained from either "B" battery blocks or a well filtered "B" eliminator.

The general layout of the apparatus



Rear view of the 2-tube "Pentaflex" receiver, designed by Mr. Worcester of "Oscillodyne" fame.

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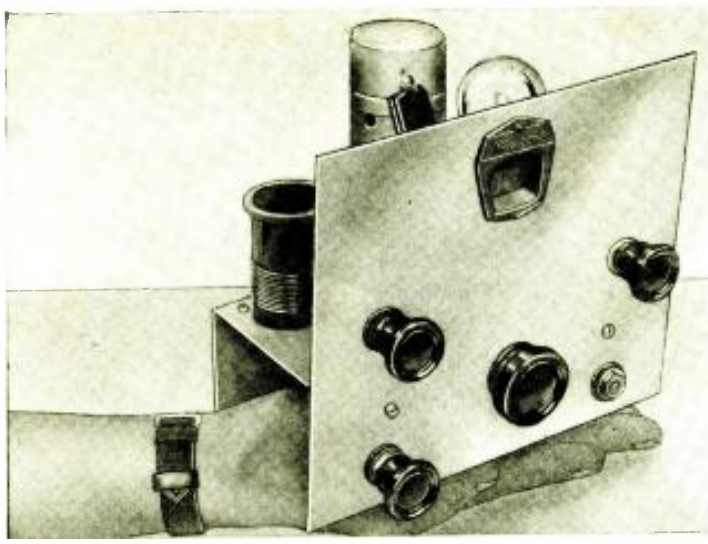

The small size of the "Pee-Wee" receiver is emphasized in comparison with the hand.

Rear view of the "Pee-Wee" 2-Tube Ham-Band Receiver, showing its extreme compactness.

Ham-Band "Pee-Wee" 2-Tuber

By LEONARD VICTOR, W2DHN and T. H. MITCHELL

This dandy little receiver realizes high efficiency, uses but two tubes of the latest type, and also provides "band spread" tuning. It is intended for phones, but on strong signals a sensitive loudspeaker can be used in conjunction with it. It has non-detuning regeneration control.

● QUITE a few of the letters received in connection with the articles on a "Beginner's Transmitter" contained inquiries as to what was the best type of receiver to use for DX code reception. After quite a bit of argument and brain-cudgeling, Mr. Mitchell and I reached an agreement on a circuit that meets all the following requirements:

1. A very high degree of stability.
2. Simple system of "band-spreading."
3. Latest type, most sensitive tubes.
4. Built in "voltage-divider," necessitating only four leads to the power supply.
5. Arrangement for the use of the quiet "doublet antenna" if desired.
6. Very small size.
7. Simple construction.
8. Non-detuning regeneration control.

The stability of the receiver is taken care of in two ways. First, high "C" is used; that is, the "band finding" condenser is at high capacity when tuned to the band, which makes for dynamic stability. Secondly, "electron-coupling" is used on the detector, and this is so steady that there is no change in an incoming signal, even though there is a considerable variation in plate voltage. The "band-spreading" arrangement is of the simplest type, using a very small capacity midget variable in parallel with the "band finding" condenser.

57 Used As a Detector

The set is designed to use the highly sensitive type 57 as the detector, "resistance-coupled" to a 56 audio stage. For battery operation which is used at our station, the efficient six volt counterparts, the 77 and the 37 are utilized. Efficiency is equally high with either the six or the two and one-half volt tubes. However, in actual operation the good old-fashioned storage and "B" batteries seem to work out just a trifle better. Others may have different opinions, as this is a subject that has been argued about for several years.

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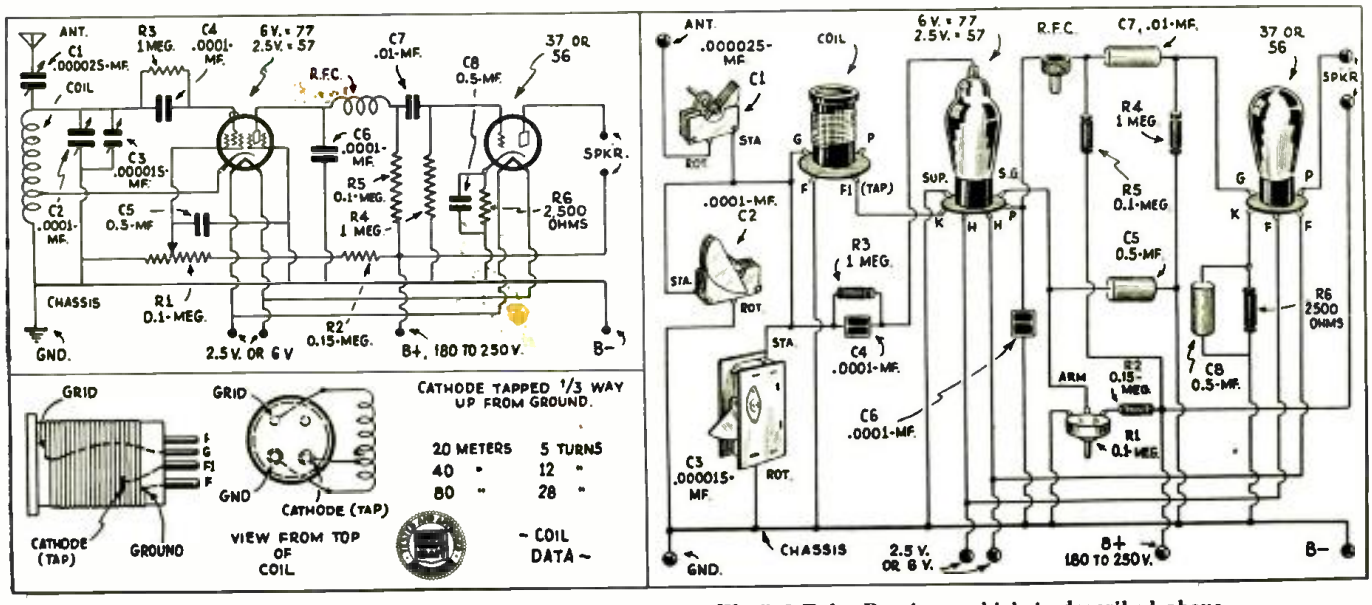

Schematic and physical wiring diagrams for the "Pee-Wee" 2-Tube Receiver, which is described above.

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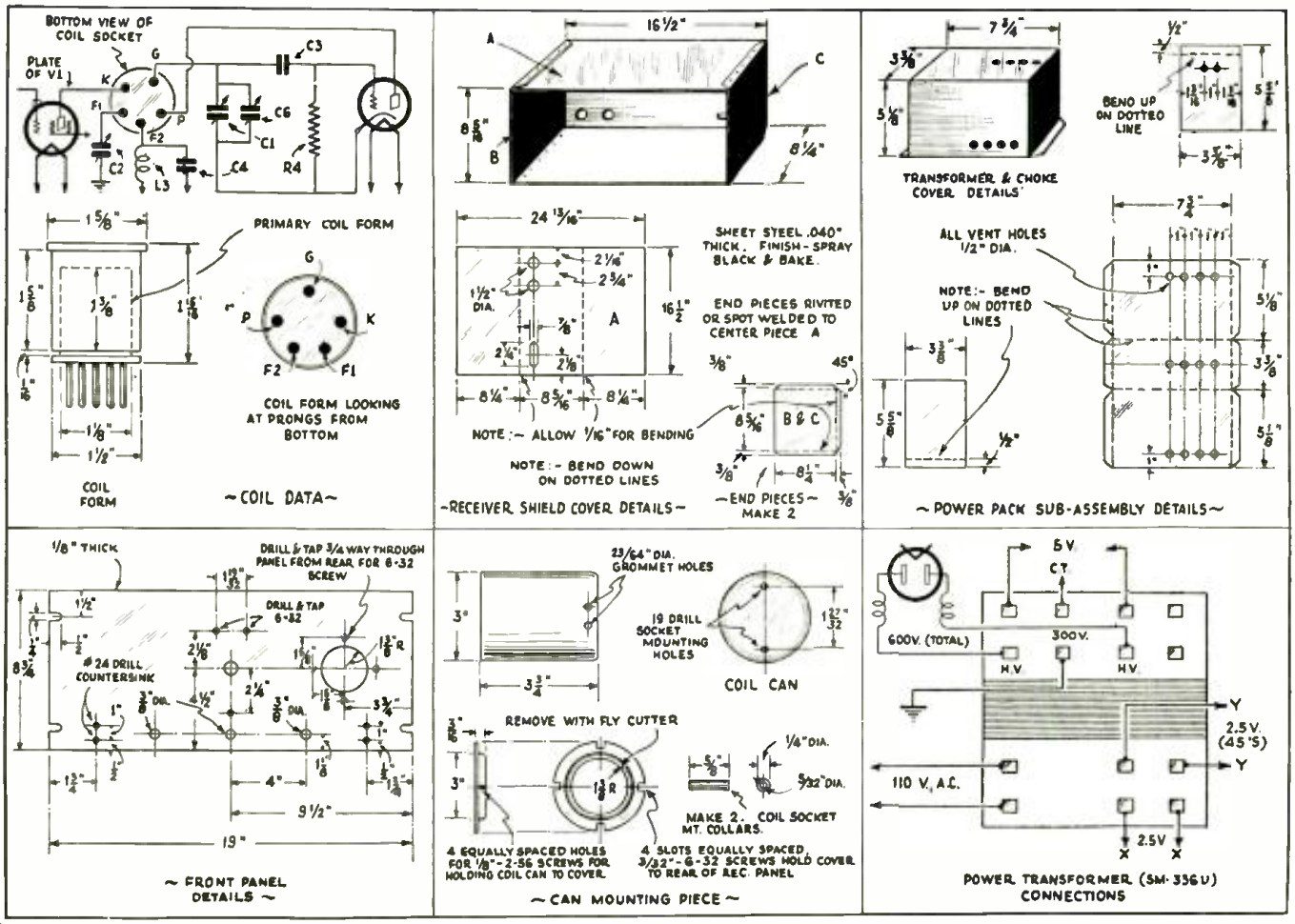
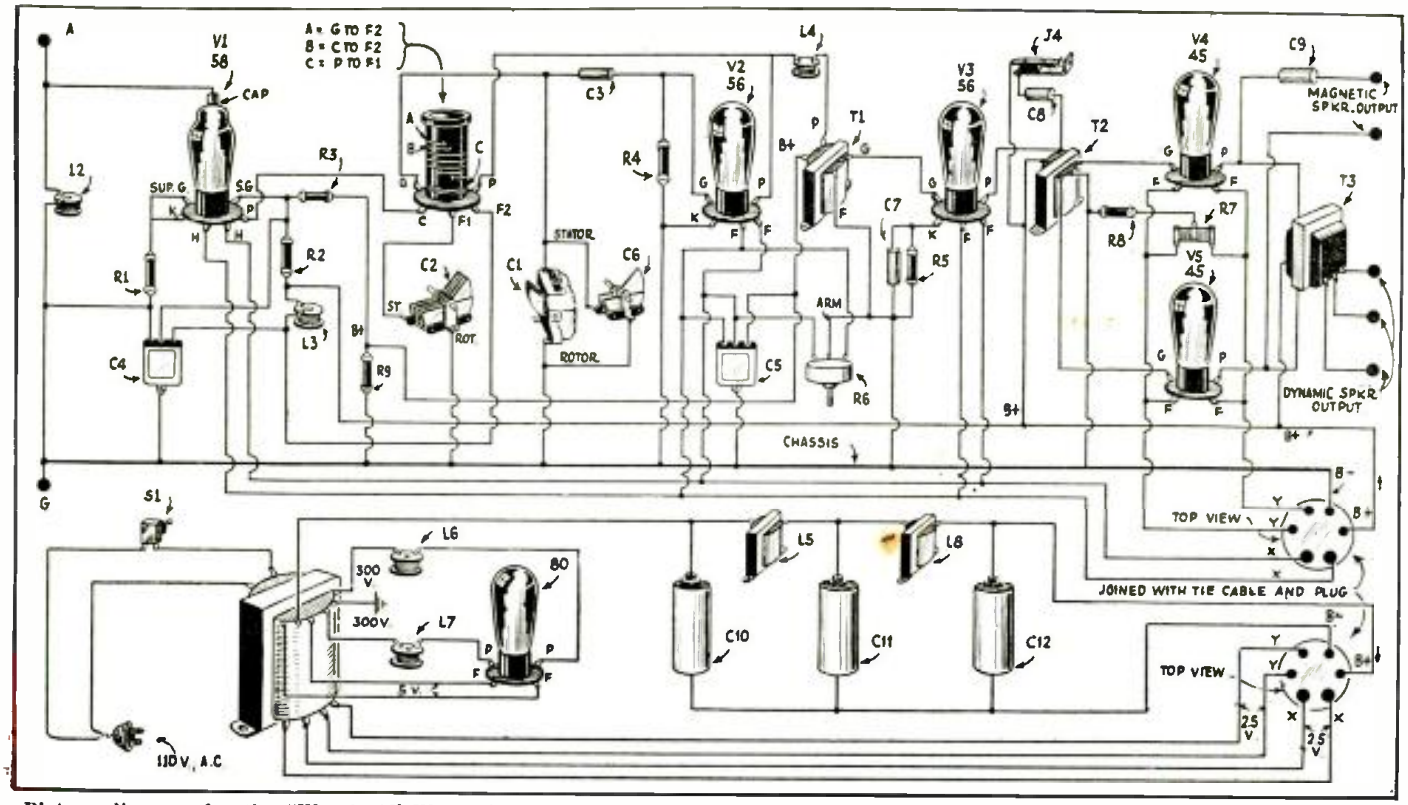
Further Details of the "Wyeth All-Wave 6" Receiver



The drawing above shows details for winding the plug-in coils, receiver shield cover dimensions, power-pack, sub-assembly details, coil shield details, front panel, and also power transformer connections.



Picture diagram for the "Wyeth All-Wave 6" Receiver, which makes it easy for the beginner to follow the connections to the various apparatus.

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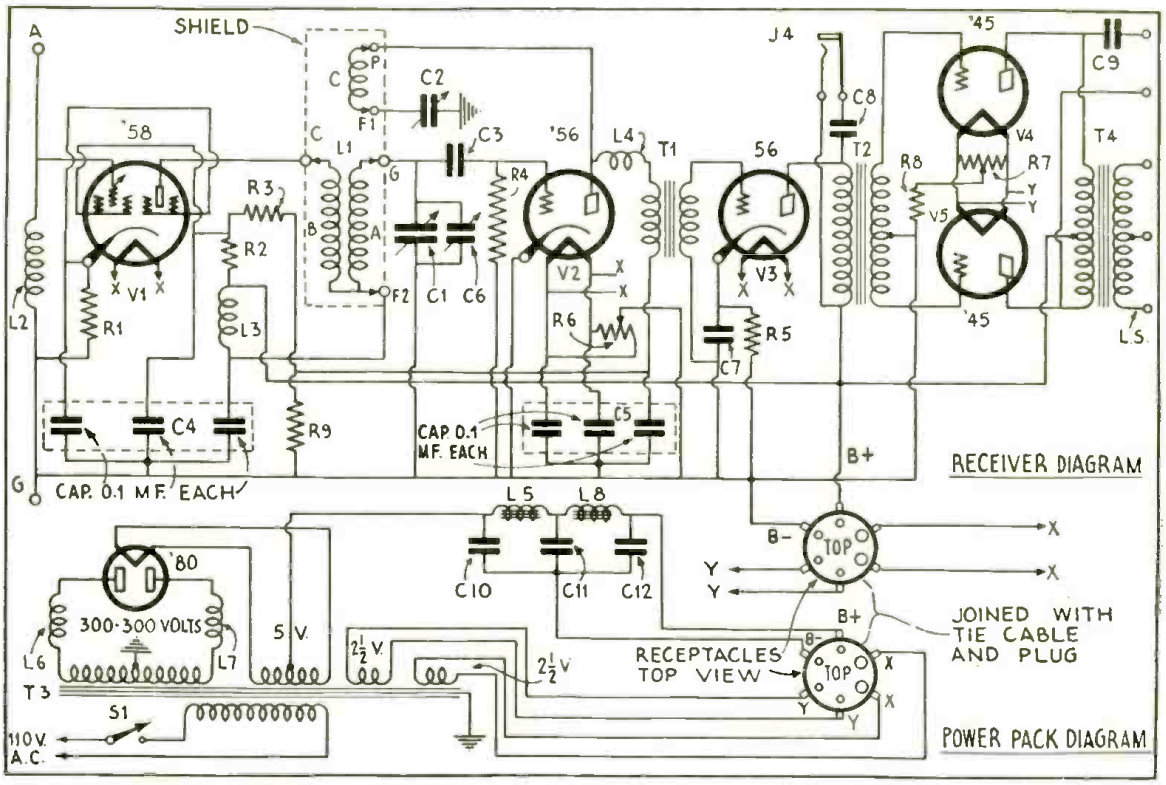
8¾ inches. Behind the panel it will be noticed are two brackets. The shield cover slides over the receiver from the rear and these brackets are for guiding and holding it firmly in place.

Looking at the receiver from the front, the left hand knob on the panel is the trimmer tuning control, the center dial is the main tuning condenser control, and the right-hand knob is the regeneration condenser control. In the lower center of the panel directly below the main tuning dial is a jack for connecting a pair of head phones.



Wiring diagram for the Wyeth "All-Wave" 6 receiver. Plug-in coils are used and the set is designed to give the highest electrical efficiency possible.

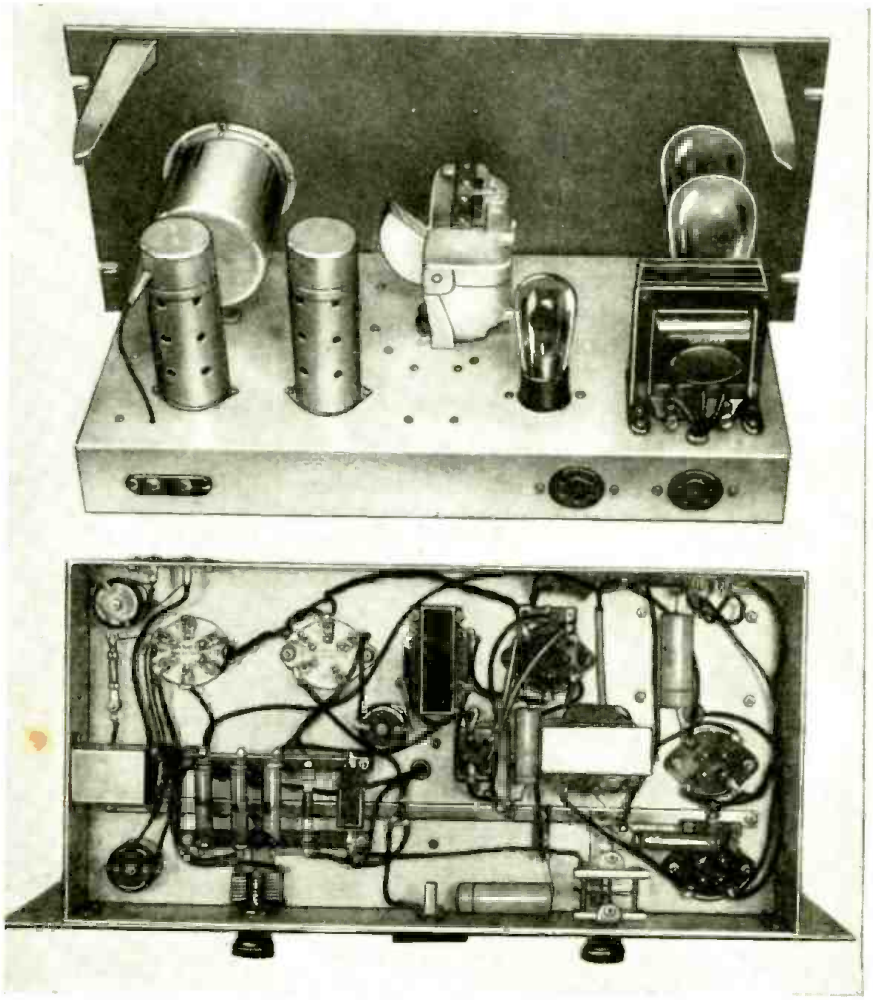
Placement of Parts

The top view of the set shows the placement of the parts on the chassis and rear panel. The R. F. 58 type tube is housed in the shield cover located directly to the rear of the coil shield can. Immediately to the left of this tube is the type 56 detector, also housed within a shield cover. The main tuning condenser is mounted on the transverse center line of the chassis. Between the tuning condenser and the output transformer is the first audio tube—type 56. At the extreme left end of the chassis are the two 45 output tubes and the output transformer. In some cases it may be desirable to utilize the transformer incorporated in the speaker, in that case it will be unnecessary to resort to a transformer on the chassis as shown. On the rear side of the chassis directly below the output transformer is the speaker plug receptacle, and adjacent to it is the receptacle for the power supply cable plug. The antenna and ground terminal strip is located to the right of these receptacles directly below the R. F. tube. Access to the antenna and ground terminal strip and the receptacles is made through suitable apertures cut in the rear of the receiver shield cover.

"Ground Bar" Improves Efficiency

The view beneath the chassis discloses two items of interest, one the brass *ground bar* running the entire length of the chassis to which all ground connections are made and two —the resistor and condenser assembly. The ground bar eliminates all ground connections from the chassis thus insuring perfect connections throughout, which is of the greatest importance in efficient short wave receiver design. In addition rigid brass strips run from the

(Continued on page 423)



Above: the top photo of the group shows top view of the Wyeth "all-wave" receiver, while the lower illustration shows bottom view of the receiver.

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This 6-tube all wave receiver looks very fine—and it works as good as it looks. It was designed and built by an engineer who has had many years experience in radio work. The panel of the set is ⅛" thick and allows the set to be mounted on a rack if so desired. A thinner panel may be employed if the set is to be used on a table with a cabinet. A large can or metal cover slips over the set from the rear when it is rack - mounted. This set uses 6 tubes, including the rectifier in the plate supply unit.

The WYETH All-Wave 6

By C. A. WYETH

● THIS receiver was constructed to fulfill certain requirements of design and operation not commonly found in the average short wave set. Several of the requirements of most interest are listed below:

(1) The receiver must cover all wave lengths between 20 and 600 meters.

(2) R. F. Stage to be untuned and but one plug in coil to be used at a time.

(3) Receiver must be designed for rack mounting and entire unit to be completely inclosed by conventional shield cover or other metal shield.

(4) Power pack to be separate from receiver. No audible power supply hum to be tolerated.

(5) Output stage of receiver to be type 45 tubes in push-pull.

(6) Output to match both voice coil of dynamic speaker and magnetic speaker.

Most of the radio parts used were taken from a commercial short wave receiver placed on the market some time ago. All mechanical parts however were designed particularly for the rack receiver, the details of which are given hereafter. The component parts listed were found to be entirely satisfactory, but if any parts specified are not readily available equivalent apparatus of other manufacture may be substituted with due regard, of course, to quality.

General Description

The receiver depicted herein was specially designed for mounting in a standard amplifier rack. The standard rack requires a panel length of 19 inches and a panel height which is a multiple of 1¾ inches—in this case

Mr. Wyeth, well-known consulting engineer, has outdone himself in building this beautiful "all-wave" receiver job. It looks and it works like a real "professional" set, and the interesting part of the story is that the cost of building the set need not be at all excessive. In fact, with the coil data given and the other specifications, the average set-builder will be able to make up this set from odd parts, plus a few new ones which he may not have on hand. The circuit used by Mr. Wyeth is a well-tried one, free from fancy frills. The signal is amplified with a minimum of distortion, and when it "hops out" of the push-pull 45 output stage into the loud speaker—Boy, hold on to your hat!

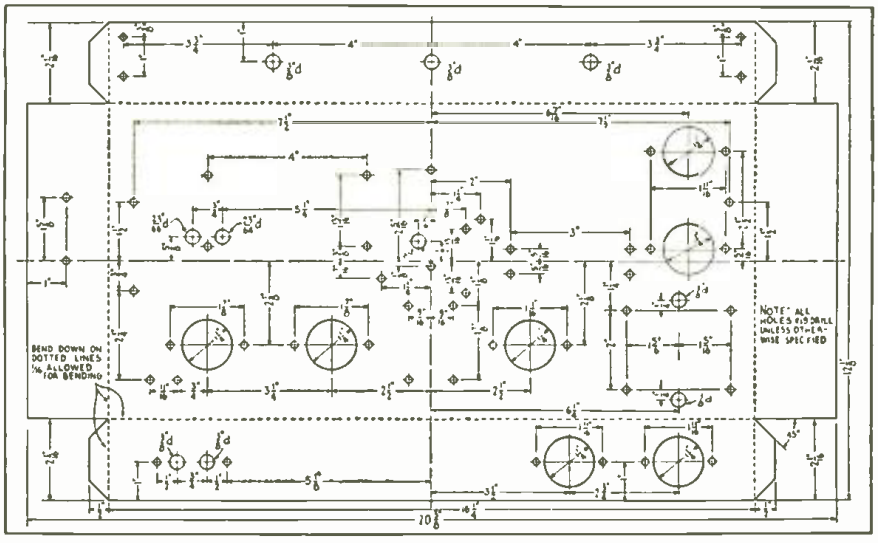

Diagram showing hole drilling, layout and dimensions of the receiver chassis.

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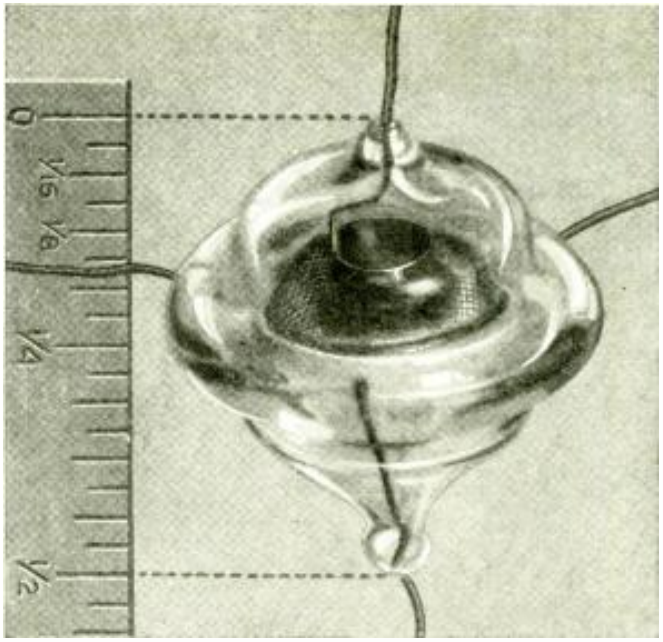
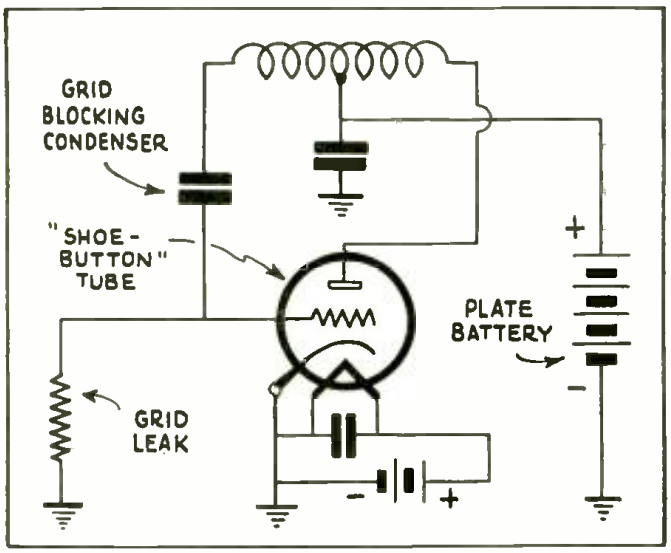
WORLD'S TINIEST TUBE

Measuring only one-half inch in height and but slightly more in diameter, here is probably the tiniest radio tube yet produced; it was evolved in the Research and Development Laboratory of the R. C. A. Radiotron Company and is especially designed for ultra short-wave work. The editors wish to emphasize that this tube is not on the commercial market but is purely an "experimental" model.



Note the extremely small size of the "Shoe-button" tube as shown by the ruler.

● FOR transmission and reception at wavelengths down to about 5 meters conventional types of tubes and circuits have been found satisfactory. At these wavelengths feed-back oscillators and tuned-radio-frequency amplifiers may be constructed, using standard receiving tubes. At wavelengths of less than 1 meter such tubes and circuits have been found unsuitable, because of the large inter-electrode capacitances and lead inductances of the tubes, and recourse has been had to the Barkhausen-Kurz type of oscillator, in which the wave-length depends on the time of transit of the electrons across the space in the tube. These oscillators have been used both for transmission and reception, operating in receivers as super-regenerative detectors or as heterodyne detectors. By means of these tubes much important study of the properties of these waves has been made possible. From the standpoint of practical use, however, these receivers are unsatisfactory, since they are insensitive, nonselective, unstable and noisy in general. In addition they require considerable power supply, and radiate energy from the receiving antenna.



An ultra-short-wave circuit devised for use with the new "experimental" tube.

In an attempt to produce more satisfactory receiving methods at these wavelengths an investigation has been carried out by B. J. Thompson and G. M. Rose, Jr., in the Research and Development Laboratory of the RCA Radiotron Company, Inc., of the performance of extremely small tubes operating on the conventional principles, that is, with *negative grid* and *positive plate*. Triodes and screen-grid tubes representing approximately a ten-fold reduction in dimension, as compared with conventional receiving tubes, have been made in the laboratory. The maximum overall dimension of these tubes is less than ¾ of an inch. It is found that these tubes approximate closely in all electrical characteristics the conventional size tubes, except that the interelectrode capaci- *(Continued on page 439)*

Marconi Hears Ultra-Short Waves Through Mountains!

● IN a recent dispatch from Rome, Italy, remarkable new results were announced by Guglielmo Marconi in which ultra short waves only 1½ feet long were caused to carry through or around physical obstacles such as mountains, buildings, etc. Extensive tests have been carried out by Signor Marconi between the inventor's yacht, the *Electra*, in the Tyrrhenian Sea and inland Italy. The tests included communication by radio telegraph, as well as radiophone, the land station being located at Santa Margherita, situated 94 miles inland. In some of the tests, a distance of 161 miles was spanned, the yacht having been anchored at Porto Santo Stefano, and in this case, code signals from the transmitter at Santa Margherita were picked up on board the yacht, the wavelength being 60 centimeters or about 24 inches. In this remarkable span of 161 miles there were two intervening mountainous promontories, so that this test really marks a new epoch in ultra short-wave history.

Signor Marconi stated that a newly devised short-wave combination transmitter and receiver was used in the test, the transmitter being rated at only 25 watts.

Signor Marconi amplified his statements to the extent that he hoped to considerably increase the span over which the ultra short-wave signals could be heard by the development of far more sensitive receiving apparatus.

Radio engineers have been quite skeptical of the practical application of these ultra short waves ½ foot or so in length as previous tests made with them have generally indicated that with these micro waves it was essential that the transmitter and the receiver be located on high towers or buildings, if necessary, so that they were within optical sight of each other. Recent tests made from the top of the Empire State Building in New York City with waves varying from 5 to 7 meters in length show that readable signals could be picked up at a distance of 260 miles and more, thanks apparently to the clear open space extending between the receiving station and the top of the Empire State Building, where the ultra short-wave transmitter was located.

However, in these tests, and regardless of the fact that the latest type ultra short-wave receivers were employed for making the field strength measurements, it was found that when the receiver was located inside of certain steel frame buildings, and also in other cases where the receiver was located behind the building (in a direction away from the transmitter) that the signal strength was markedly reduced and in fact in some cases became zero. As one of the engineers connected with these tests made in New York City and vicinity on the 5 to 7 meter waves said, it seemed to be quite a question *(Continued on page 443)*

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HAM and YEGGS

By W. H. FRASER

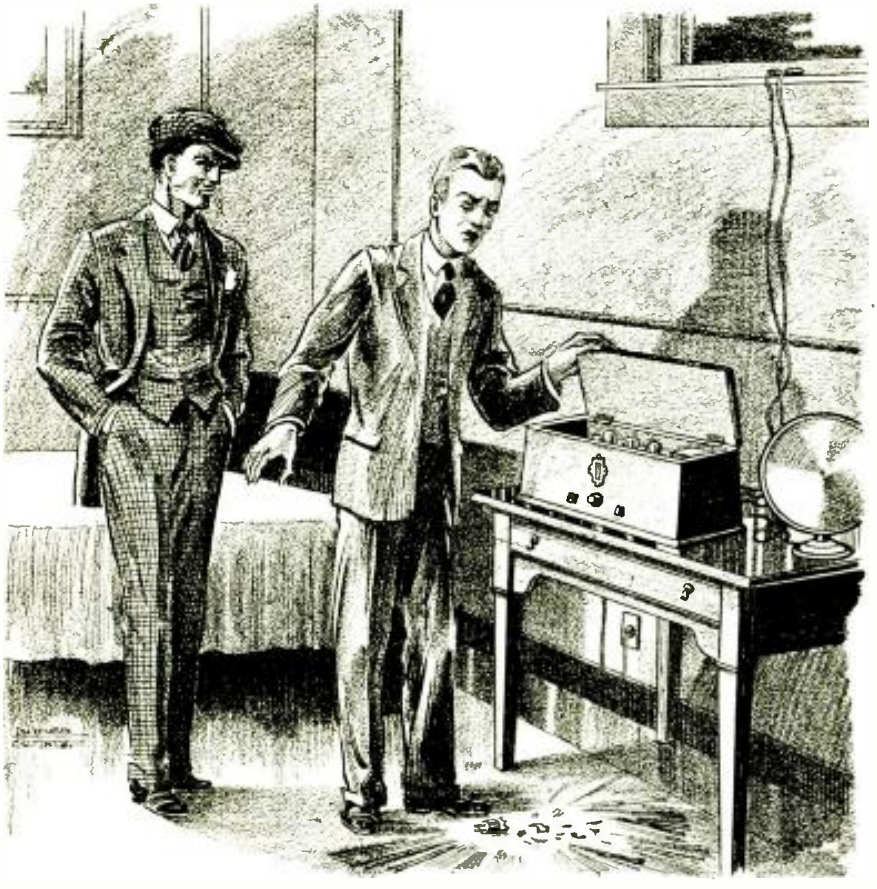
This is one of the cleverest pieces of short-wave fiction the editors have ever read, and we are sure that our readers will like the style in which this story by Mr. Fraser is written. It concerns the rescue by radio of one, Sam Quinn, who was kidnapped; you will be highly intrigued by the situation in which Sam Quinn finds himself held captive. We give you three guesses as to how he signaled to his brother "Hams" without his captors knowing it.

● IT was the first time that Sam Quinn had been snatched by gangland. He appeared to be properly impressed.

In thoughtful silence he sat between two stalwart adherents of the Smooth Racara mob. His thoughts veered idly—funny he had never been kidnapped before—this was surely a swell, high-powered sedan—guess the old man could afford a stiff ransom. . . .

"Take it easy, kid," the one addressed as Sleepy was advising.

"Do I looked worried, or did you look?" Quinn smiled.



"Some mechanic!" Smooth guffawed, viewing the wreckage. "Both sets dead! You should've been a radio man! Nighty-night!"

The two youths flanking the prisoner laughed quietly.

There were two others, silent and wary, sitting ahead. One, the driver, had not spoken since Quinn had been taken.

The ride had begun shortly before five in the afternoon. Over an hour passed. No stops. A lunch had been shared en route. Plenty of smokes.

Quinn felt Sleepy's body suddenly tense beside him, as the mobster glanced behind.

"Bike bull comin' up!" Sleepy hissed.

Friendly banter was silenced. The driver slowed just a trifle.

A rod, well hidden, rested firmly against Quinn's ribs.

"No squawk, now," the guest was warned by Sleepy. "Or else . . ."

The cop drew alongside, signalled a stop. The gang driver simulated surprise, as he obeyed.

"Yuh tail lamp's smashed," the law stated. "Wondered if yuh knew. Be nearly dark when yuh hit th' next burg."

"Thanks, bud," the sedan pilot was polite. He gave the officer a broad, easy smile. "I didn't know—some sap tried to park too close, I guess. Have it fixed next garage we see."

"Okay." The public guardian sped on ahead.

"What a snappy uniform," Sleepy chirped.

* * *

Repairs to the tail light and wiring wasted some time. Then shortly they swung from the highway. The rough side-road checked their speed. Semi-darkness disclosed the journey's end, evidently once a farm home. They had taken three hours since starting. Quinn judged it over a hundred miles from town.

"Third floor, front," one of his captors ordered Quinn.

It was a small bedroom. Quinn sensed that at least one guard was on duty beyond the door; knew it was locked from outside. The single window was high up in the smooth wall. No use. Quinn slept soundly.

* * *

In the morning, at an excellent breakfast, he met Smooth Racara. The notorious gang leader was slim, dark, of foreign birth. But he spoke without accent.

"Mornin', Moneybags," Smooth gave greeting.

"Hi, yourself," Quinn was indifferent.

"Sleep well?"

"Sure. Didn't you?"

"Hit the festive board, then. We can't starve you."

"How long may I stay?" Quinn asked.

"Three—four days, likely. We allow two days for the old folks at home to get into the proper spirit. Then—we give 'em the needed figures and directions. I don't think fifty grand will be too much, do you, Moneybags?"

"I've never thought myself worth a penny less."

"Oke. Any idea where we are?"

"North of town, two hundred miles?" Quinn ventured.

"Wotta bum guesser! Not over a hundred ten. And just eleven west of Spagton. No secrets, see?"

"No music with meals?" Quinn complained.

Smooth reached to a partly hidden mantel radio, snapped a switch. Dance recordings made a pleasing river of harmony. Smooth had the rare good taste that does not demand full volume from the loudspeaker.

"Yeh, this was the old Manners country place," he told Quinn, "before the old boy merged with the alleged depression. Just suits us—quiet, y'know—only one other place between here and Spagton, and it's empty."

"I see," Quinn smiled lazily.

The musical broadcast was followed by Late News Flashes: "Nothing new has been reported on the disappearance of Samuel Quinn, Junior. He is believed to have been kidnapped. No demand for ransom has yet been made. The parents are suffering from the uncertainty and suspense. They desire persons knowing anything of the young man's whereabouts to establish communication at once with the Quinn home. Late yesterday—"

(Continued on page 428)

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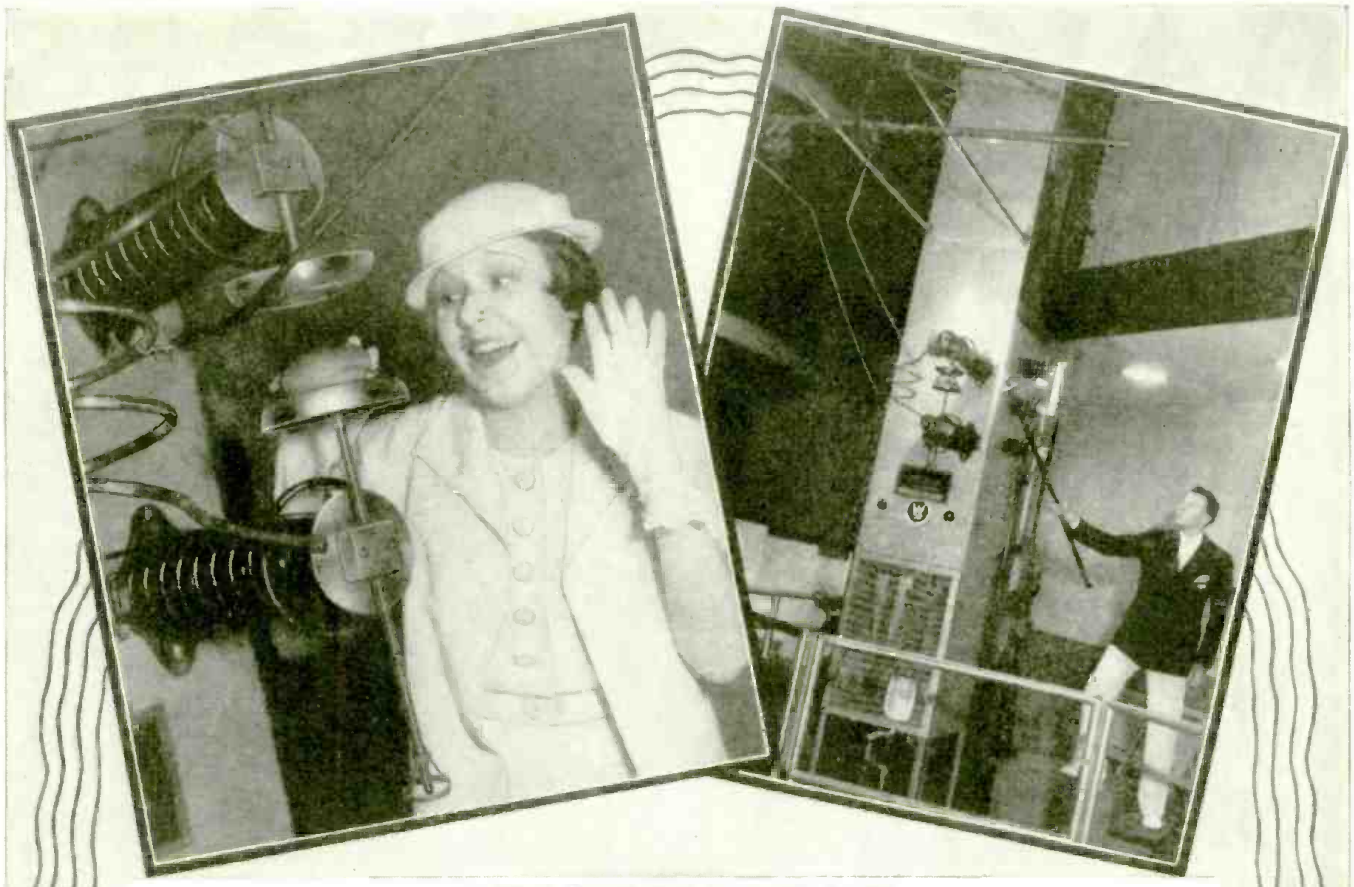
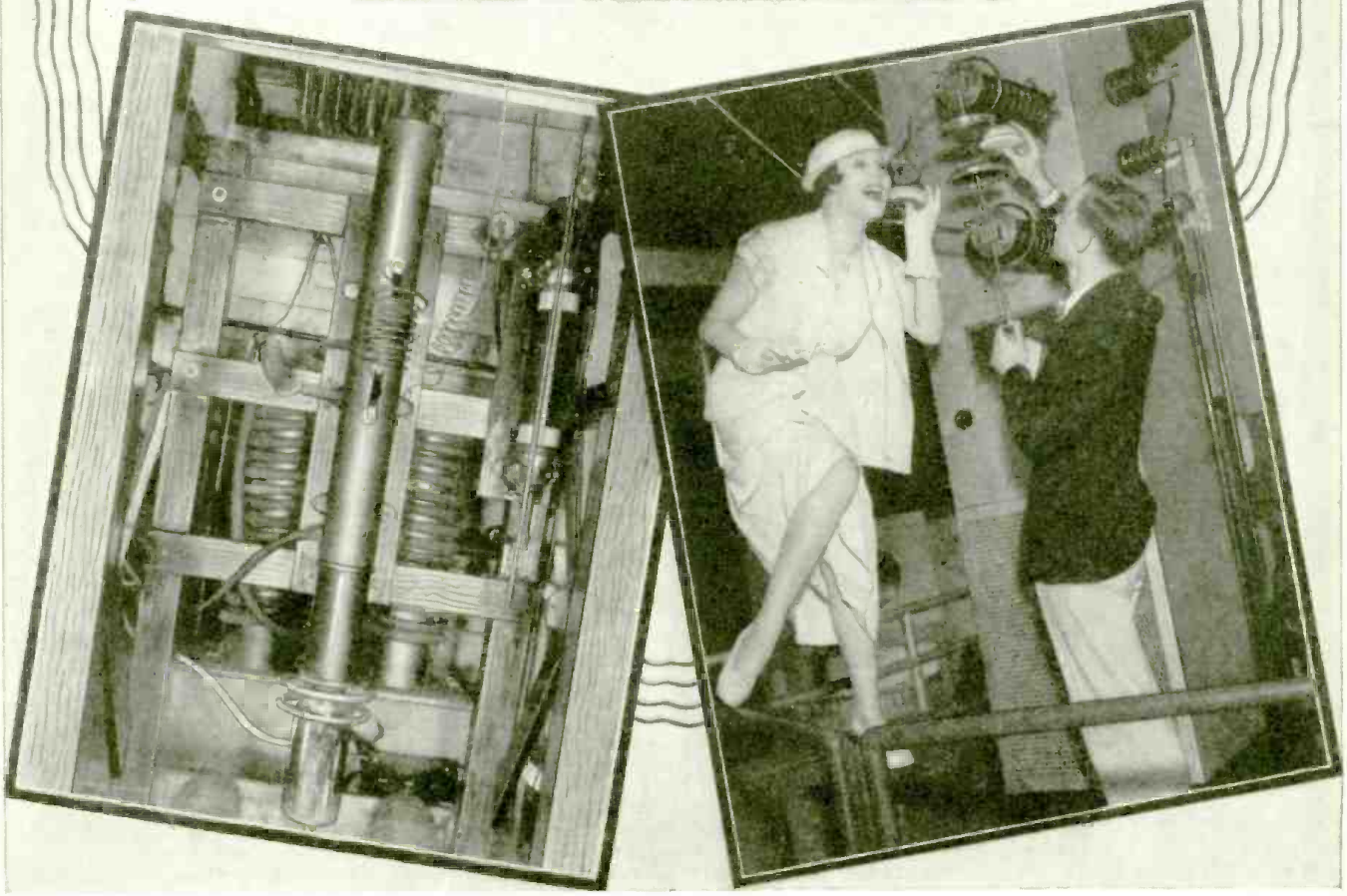


TOASTING SANDWICHES BY SHORT WAVES

Fifi D'Orsay, screen star, assisted engineer G. R. Severance, demonstrate this new method of "cooking by short waves." Cheese and ham sandwiches were cooked by placing them between two electrodes, directly in the path of the 6-meter high frequency currents generated by the oscillator. Bread may be toasted in six seconds; steaks and potatoes require several minutes. Oddly enough, food overdone by cooking on the radio transmitter does not have a burnt taste. This apparatus also delivers long arcs as photo at top right shows. Lower left photo shows close-up of the powerful oscillator tube. "Powercasting" enables engineers to run motors and light lamps by radio.



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Cooking With SHORT WAVES

First we had radio fevers induced by short-wave oscillations in the neighborhood of six meters. Now, as our cover shows, we have "Cooking With Short Waves" with us. Before we know it we shall probably be ordering our steak broiled on 7 meters, the eggs boiled on 4 meters, etc. Here's good news for our young cooks—when food is burned by "short-wave cooking," the taste does not reveal this fact! Among the other marvels performed by the new high frequency oscillator here described are the operation of lamps and motors by "radio power transmission"—and it even produces a "short-wave cocktail!"

• SENDING power through the empty air, long a dream of scientists, was demonstrated recently for the first time by research engineers of the famous Westinghouse company in a demonstration at their exhibit at the "*Century of Progress*" Exposition in Chicago.

Only yesterday, anyone so indiscreet as to assert that *power* in *usable quantities* would soon be sent through the air without the use of wires would have been considered a dreamer of the Jules Verne type. Yet for the past several years, Westinghouse research engineers have been quietly working on their "*powercaster*" but delayed announcing their achievement until a suitable occasion presented itself. The World's Fair, dedicated to progress, they deemed worthy.

Transmitting ½ H.P. On 5 Meters!

Radio broadcasting employing ultra short wavelengths is used to send the power through space. The "powercaster's" wavelength is only five meters, far below ordinary broadcast wavelengths. Radio receivers in homes pick up only two or three micro-watts but the "powercaster's" receiver picks up more than *one-half horsepower*, 160,000,000 times as much electrical energy!

At the recent demonstration in Chicago the audience saw radio power from an antenna 30 feet away drive a ¼ horsepower electric motor attached to a two-bladed propeller! They not only saw mechanical work done by this radio power, but they also saw and actually felt the physical effect of the high intensity electric field in the vicinity of the "powercaster."

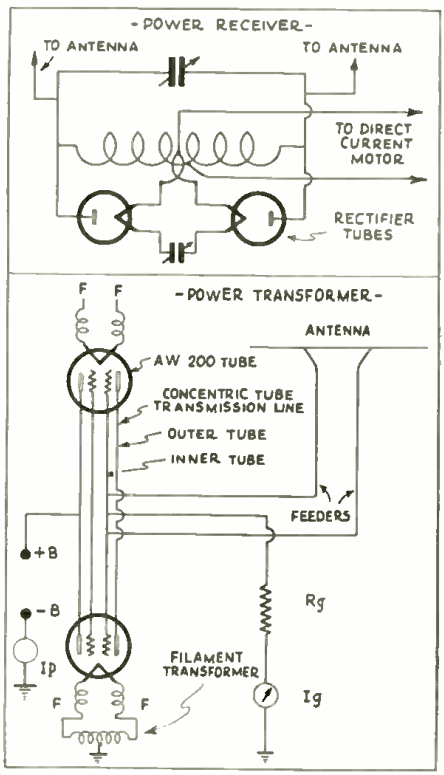
The audience saw electric lights become incandescent and burn brightly when brought into the highly charged field; *saw food cooked* between two pan-shaped electrodes, which remained at room temperature throughout the cooking operation; saw energy-searing arcs drawn from the wild-looking antenna; felt their bodies become hot with artificially induced fever when they exposed themselves to the more concentrated area of the field.

The heart of the "powercaster" is a standing wave oscillator, an intricate two-headed vacuum tube that is the only device in existence capable of generating huge volumes of power at ultra short radio wavelengths. The "powercaster" was invented on "Miracle Hill," on which are located the Westinghouse research laboratories, by I. E. Mouromtseff, research scientist in charge of ultra short wave development, and his associate, H. N. Kozanowski.

The demonstrations were held under the direction of E. H. Sniffen, and the demonstration was conducted by G. R. Severance, official demonstrator of the apparatus for the duration of the Fair.

The "Short-Wave Cocktail"

Among the unsual effects noticed in the "powercaster's" field, Mr. Mouromtseff believes the "radio cocktail" to be the most outstanding. When a person exposes his body to the ultra high frequency field he experiences an exhiliration that may be called a synthetic radio "jag." Over-exposure to the powerful field brings on a depressed feeling or "hangover."



The two diagrams above show respectively the hook-up of the special 5 meter high-power radio transmitter or oscillator, and also the "power receiver" which picks up sufficient power to operate a ¼ H.P. D.C. motor!

The physical effect of the field is intensified many fold if the person improvises an aerial by holding a short piece of metal in each hand. His body immediately becomes noticeably warm.

In tests made under conditions of maximum heat, the body temperature was found to increase by one degree at the end of the first minute and to 105 degrees in about an hour. However, no one has continued the experiment beyond dangerous fever limits.

The "powercaster" is able to produce artificial fever because of the body's resistance to passage of ultra short wave currents. It is thought by some medical men that these induced fevers may be valuable in the treatment of many diseases. Experiments to determine its practical value are now being conducted in a large Pittsburgh (Pa.) hospital.

Power In Antenna Shown by Arcs

The antenna, although harmless looking, surges with destructive power. To demonstrate the presence of the 10 kilowatts, nearly 14 horsepower, of electrical energy in the antenna's eight-foot length of copper pipe, arcs can be drawn from the antenna by means of a metal-tipped, insulated pole.

The arc burns slowly with a wicked, sibilant sound. Once started, it is maintained by the high voltage and ultra high frequency of the radio power.

Different chemicals can be put in the path of the arc to show that the arc is similar in its properties to other types of flame. Copper causes a green-colored arc, aluminum a brilliant blue, iron a white, sodium a brilliant yellow, and cadmium, calcium and strontium, red arcs.

"Radio Power" Lights Lamps

An ordinary light bulb held in the hand becomes incandescent when brought into the field of the 5 meter oscillator. It burns much brighter if a short piece of aerial wire is attached. When held close to the antenna, the lamp burns with several times its usual brightness.

Although the regular current is turned off, lamps in all lighting fixtures within 30 feet of the apparatus become incandescent when the ultra short radio wave are broadcast. Those nearest the antenna burn the brightest.

Cooking by Ultra Short Waves

Food can be cooked by means of the ultra short wave radio transmitter. The food is heated by internally passing high frequency current through it.

This is probably the only basic advance in the art of preparing food for human consumption since cavemen, thousands of years ago, first burned meat over a fire and heated vegetables in crude vessels of boiling water.

For cooking, *the ultra high frequency current is made to pass from one pan-shaped electrode to another.* The uncooked food is placed between two electrodes, directly in the path of the radio transmitter's power.

Bread is toasted in a half dozen seconds or so. Steaks, potatoes, and other solid meats and vegetables require several minutes, as does the boiling of water for making coffee or cooking vegetables.

Oddly enough, food overdone by cooking on the radio transmitter does not have a burnt taste. For instance,

(Continued on page 429)

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The SHORT WAVE SCOUTS

By Hugo Gernsback

● AS I mentioned briefly editorially in the October issue, the time is now considered ripe to launch a new short wave movement, which will be known under the name of SHORT WAVE SCOUTING, or, if you wish, SHORT WAVE SCOUTS. I explained in my editorial in the last issue that the art of short-wave radio now needs a movement of SHORT WAVE SCOUTS to bring to headquarters reliable information on the operation of the various short-wave stations of the world.

Inasmuch as there are now 8,500 short-wave stations in the world, naturally a mere few short-wave listeners cannot hope to listen to all of the transmissions; and for that reason a much broader movement is required.

An organization of SHORT WAVE SCOUTS would seem to fill this need; and SHORT WAVE CRAFT, as the largest short-wave magazine in the world today, would seem to be naturally the logical medium to report SHORT WAVE SCOUTING regularly.

There is nothing more annoying to the short-wave listener to try and "log" a station which is either definitely *off the air*, or even temporarily discontinued, or which may have changed its call letters, etc. As I explained last month, in the preparation of any magazine sixty days (as a rule) elapses between the editorial *closing date* and the time when the magazine gets to its readers either by mail or on the newsstands.

What then, is required, is quick and accurate *reporting*. This, I believe, can be done better by the thousands of readers of SHORT WAVE CRAFT who are sufficiently interested in the purely scientific pursuit of the art, to be instrumental in advancing radio. As I also remarked before, new stations spring up unannounced, transmitters are changed, power is changed, all without notification to anyone! Some of the stations in the smaller countries particularly violate these rules—if they *are* rules—constantly. They issue no piece of literature or, if they do, it is usually many months late. Naturally, here is where the SHORT WAVE SCOUT comes in because he gets his information instantaneously, and he can do a lot to help make the lists published in SHORT WAVE CRAFT, and in the OFFICIAL SHORT WAVE LOG AND CALL BOOK, as accurate as it is humanly possible to make it.

Moreover, short wave enthusiasts are proud of their work. It is a sport or a game more interesting than golf or bridge. It certainly is far more thrilling, for when you come to think of it, while you are pursuing this endeavor, you are actually helping to develop the art. This factor of service always gives you an additional thrill.

And now, to make the endeavor of even more interest to SHORT WAVE SCOUTS, the publishers of SHORT WAVE CRAFT will donate to this cause every month, a very handsome trophy under the rules formulated below. Originally, it was intended to award this trophy only once in three months; but, upon consulting a number of short-wave enthusiasts, and after they had seen the actual trophy, we were prevailed upon to make it a monthly award.

Here is the SHORT WAVE SCOUT Trophy. It stands 22½ inches high; the diameter of the globe being 5 inches. Engraved in the globe is a SHORT WAVE SCOUT with earphones sitting in front of his radio set. The western half of the hemisphere is shown. The lower part of the trophy is engraved with the winner's name.

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

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

The trophy will be awarded every month, and the winner will be announced in the following issue of SHORT WAVE CRAFT. The winner's name will be *hand engraved* on the trophy. The lettering on the wide lower silver band reads as follows:

Presented to
SHORT WAVE SCOUT
John Dough
For his contributions toward the advancement of the art of Radio
by
SHORT WAVE CRAFT
Magazine

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

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

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

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

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

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

6.—Inasmuch as not all stations will verify reports, or send out verification letters or verification cards, each contestant is entitled to report not more than 10% of station calls for which no proper verification card is submitted. For example, if you should submit a list of 100 stations, with 90 verifications, the judges would allow the 100 stations; provid- *(Continued on page 427)*

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8 Meter WAVES Help Police Catch Criminals

The photo above shows 8.6 meter combination "transmitter-receiver" installed in police car.

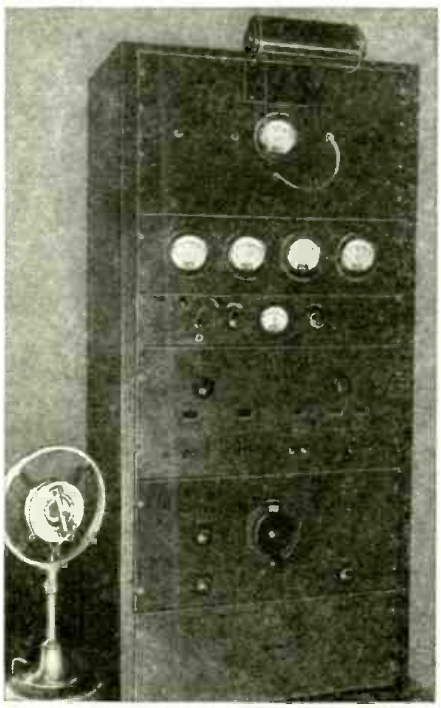
Police short-wave broadcasting is now occurring on 8 meters. The police of several cities are having fine results with it; among other features there is no static and its range can be limited to a small area.

• A BRAND new epoch in radio police communication has just been introduced. Instead of broadcasting police orders on wavelengths of 120 to 175 meters wavelength, which many people have heard by means of short-wave converters and "all-wave" receivers, a remarkable new ultra-short wave police system is in operation in several cities, including Bayonne, N. J., and Eastchester, N. Y. These radiophone police orders are being broadcast to police cars on a frequency of 34.6 megacycles or 8.6 meters. In Bayonne, about ten police cars are fitted with combination "transmitter-receivers," and also two patrol cars.

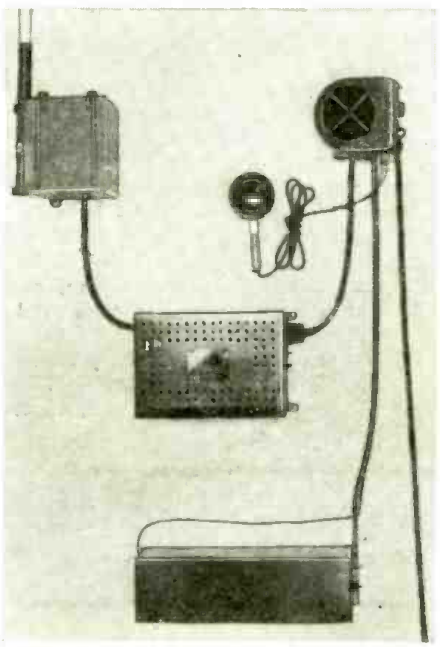
The police department of Eastchester, N. Y., have two police cars fitted thus far with the new 8.6 meter trans-receivers. Conversation can be carried on between police officers in two different cars, or they can also talk to the police headquarters station, from any one of the cars equipped with this latest apparatus. One point which proved valuable and which has aided in the capture of a band of thieves in Bayonne, is the fact that two cruisers can carry on a conversation between them, which at the same time is being heard in headquarters.

The usefulness of being able to communicate with headquarters from the cruising car was demonstrated in a recent storm. One of the Bayonne cars which was cruising was tied up with a high tension wire, so much so that the two patrolmen did not move and were fearful of leaving the car, which would have meant positive contact with the line wire. A call for help broadcast from their 8.6 meter transmitter - receiver immediately brought the emergency crew to their rescue. The dual action apparatus, per-

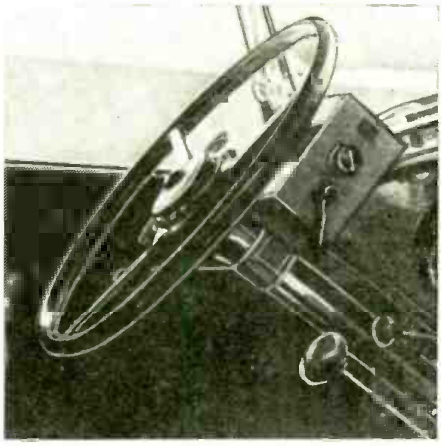
(Continued on page 441)



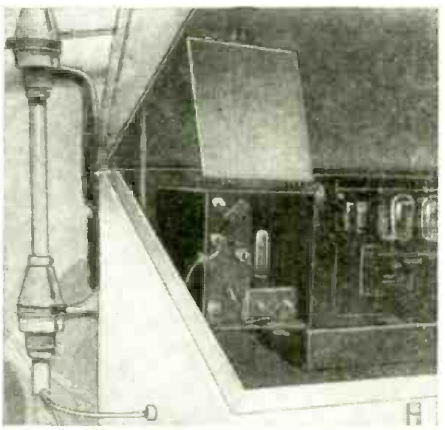
"Police headquarters" is now sporting this new 8-meter wave broadcasting apparatus.



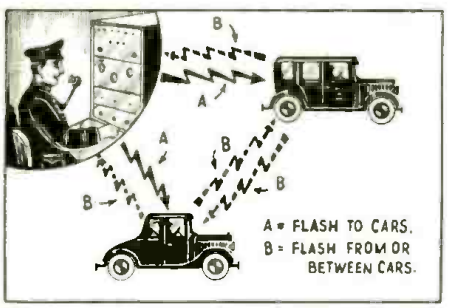
Complete car apparatus is shown above.



Control box mounted on steering column; loud speaker, volume control and "send-receive" switch located on box.



8.6 meter "transmitter-receiver" apparatus "shock-proof" mounted on car.



The new 8-meter police system provides transmission to and from the cars, as well as between cars.

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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Unknown Short Waves

An Editorial By HUGO GERNSBACK

● WE ARE apt to talk quite glibly about short waves—day in and day out. We use the instrumentality of short waves to receive music and talk from the Antipodes, and we use them for dozens of our other requirements, day in and day out; but, when it comes to the waves themselves, practically nothing is known about them! They are still a book sealed tight with seven seals.

So far, most of our experimental and research work has been concerned with the generation and the effect of short waves; but what happens to these waves between the transmitting antenna and your receiving set is still a deep mystery.

While we know in a general way that waves are reflected by the so-called Kennelly-Heaviside and Appleton layers, which gives rise to "skip effects," very little is known outside of this fact. We do know that the upper rarefied atmospheric strata reflect the radio waves, somewhat as a curved mirror would reflect light; still, this statement does not always hold true either, and other things are happening, most of which we do not understand as yet.

For instance, only recently, Signor Marconi on his yacht "Electra" did some constructive experimental work upon a 3/5-meter band. Normally, the effect of such a wave should not go beyond the horizon; because at these ultra-short wavelengths, as scientists think, the waves assume the physical characteristics of light, and therefore cannot go beyond the horizon, any more than a searchlight can go around the curve of the earth.

It is true that, as Marconi pointed out, light waves suffer a certain amount of refraction; so that you actually can see them a little below the horizon, but not much. This, however, does not explain how Marconi could send and receive short waves over a distance of 160 miles, when a light beam would not go more than fifty miles at the most.

We are, therefore, face to face with a new mystery of short waves; since they do not seem to behave "according to Hoyle." Something else happens here that we do not understand. The chances are that at this point our good friend Dr. Nikola Tesla steps into the breach. For many years, this illustrious savant, the most distinguished living inventor of today, has claimed that all radio transmission, whether on long or short waves, *is not done by free waves in space at all, but that it is done by currents transmitted through the earth!* Asked by me some years ago, how he explains transmission from an airplane to the ground, Tesla stated that this is nothing but a *condenser* or capacity effect, wherein the ground was one plate and the plane another. This is not at all illogical, when it is considered that submarines can send and receive radio messages while totally submerged; always providing that their aerials are highly insulated and are not short-circuited by the salt water. The same is the case in exploration of the deepest caves that have, as yet, been reached by man. There is no trouble in signalling to these caves, and transmission and reception is always remarkably easy.

When Marconi, therefore, now transmits ultra short waves beyond the horizon, you may be sure that the ground effect, or the so-called *ground-wave*, has a lot to do with it; and future experimental and scientific research into this field will no doubt affirm or reject the theory.

There is still a tremendous amount of experimental work to be done in the exploration of radio waves. It has always been a source of wonder to me why short-wave experimenters have not tried their hand at "underground reception." This means of reception was first tried out on a large scale by the late Dr. James Harris Rogers of Hyattsville, Md. All during the war, by means of buried insulated cables, which rested in trenches anywhere from 3 to 6 feet below the surface of the earth, Dr. Rogers was able to receive regularly European stations, *with an almost total absence of static.* He could even receive such stations when a thunderstorm was raging overhead!

For those experimenters who reside in the country, I would suggest that they try their hand at *underground reception* for short waves. The trick is rather simple; all that is necessary is to bury a rubber-covered wire in the ground, after digging a trench some 20 to 50 feet in length, and then cover the cable. This then is your new aerial. It should even be possible, today, to use a transposition aerial with two feeder lines running in each direction, and bring the twisted cable into the set. This would do two things: it would no doubt improve reception, and it would certainly do away with a lot of natural static as well as "man-made" static.

Here is an extremely interesting field for the experimenter who wishes to accomplish something worthwhile and who wishes to leave the beaten track. The editors would be pleased to hear from those who have made experiments in short-wave underground reception, and the results will, of course, be published for the benefit of all.

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

This is the November, 1933, Issue—Vol. IV, No. 7. The next Issue Comes out November 5th

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IT IS always the well-trained man who wins out over the horde of thousands of superficially trained and incompetent men. You are reading this magazine because you are interested in radio. Sooner or later, the time will come when you will wish to cash in on your knowledge. Your chance may come over night, and then the big and vital question will be, "How well equipped am I to fill the job?" You are in radio because you like it. You also realize that, at the present time, there are many branches of the radio art which you do not know as thoroughly as you should. Knowledge, these days, can be gotten cheaper than ever before. It isn't necessary for you to go to college to become proficient in radio. Start today, to build a REAL radio library and become acquainted with all branches of this great and growing art. In this page are listed the world's best radio books. We have combed the market for the really important books in radio; so that, no matter what branch you are interested in, you can pick out the best books that are now printed. Start, now, to build a complete radio library. You do not have to get all the books at once, but make up your mind to get one book a month; so that, when your chance comes, you will be fully equipped to win out over the others not so well equipped.

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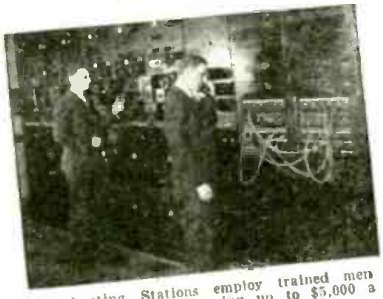

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Type		Volts		Amps.
2A3	Power Amplifier Triode	2.5	AC or DC	2.5
2A5	Power Amplifier Pentode	2.5	AC or DC	1.75
2A6	Detector Diode Triode	2.5	AC or DC	.8
2A7	Pentagrid Converter	2.5	AC or DC	0.8
2B7	Duplex Diode Pentode	2.5	AC or DC	0.8
5Z3	Full Wave Rectifier	5.	AC	3.
6A4	Amplifier Pentode	6.3	AC or DC	.3
6A7	Pentagrid Converter	6.3	AC or DC	0.3
6B7	Duplex Diode Triode	6.3	AC or DC	0.3
12Z3	Half Wave Rectifier	12.6	AC or DC	.3
25Z5	Rectifier Doubler	25.	AC or DC	0.3
30	Detector Amplifier	2.	DC	0.06
31	Amplifier	2.	DC	0.13
32	R. F. Amplifier S. G.	2.	DC	0.06
33	Amplifier Pentode	2.	DC	0.26
56	Triode Amplifier Detector	2.5	AC or DC	1.0
57	Amplifier Detector S. G.	2.5	AC or DC	1.0
58	Control Amplifier S. G.	2.5	AC or DC	1.0
59	Amplifier 3 Grid	2.5	AC or DC	2.0
77	3 Grid Detector Amplifier	6.3	AC or DC	0.3
78	3 Grid Control Amplifier	6.3	AC or DC	0.3
80	Full Wave Rectifier	5.	AC	2.
82	Full Wave Rect. Mer. Vap.	2.5	AC	3.
83	Full Wave Rect. Mer. Vap.	5.	AC	3.

We make *all* tubes which are *needed* for replacement in *millions of sets in daily use.*

You can order these tubes of *your local dealer* who may obtain them through their jobbers. Providing you cannot obtain these tubes from your local distributor write us direct for prices or location of our nearest agency.

All tubes manufactured by us are unconditionally guaranteed.

Write for our circular, prepared by competent engineers which will give you valuable technical information regarding the various types of tubes now being used. Don't delay. Get educated on the most important part of your radio set.

Gold Seal Manufacturing Co., Inc.

East Newark, N. J.

The Oldest Licensed Tube Manufacturers Under R. C. A. Patents

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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

Wyeth • Victor • Worcester • Shuart • Wallace • Palmer

SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

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A "5 and 10" Meter Push-Pull Pigmy Transmitter—using a single 53 tube! by George W. Shuart, W2AMN.

More About the Amateur Transmitter and How to Use It, by Leonard Victor, W2DHN.

Crystal Control for the Lean Purse, by Bernhard Stahl.

Practical Measurement of Ultra Short Waves, by C. C. Whitehead.

Certified Circuits

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

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

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

OUR COVER

One of the very latest innovations in the realm of short waves—"Cooking With Short Waves"—is illustrated and described on page.... 394

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• • • SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE • • •

THE following list of short wave essentials has been prepared from the suggestions to the LEAGUE by its members. A number of months were consumed in creating these short wave essentials for members of the SHORT WAVE LEAGUE. All essentials listed are approved by headquarters of the LEAGUE.

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

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

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

One of the aspirations of the SHORT WAVE LEAGUE is to enhance the standing of those engaged in short waves. To this end, the SHORT WAVE LEAGUE supplies members with membership letterheads and other essentials. As soon as you are enrolled as a member, a beautiful certificate with the LEAGUE'S seal will be sent to you, providing 10c in stamps or coin is sent for mailing and handling charges.

Another consideration which greatly benefits members is that they are entitled to preferential discounts when buying radio merchandise from numerous firms who have agreed to allow lower prices to all SHORT WAVE LEAGUE members. The radio industry realizes that, the more earnest workers there are who boost short waves, the more radio business will result therefrom; and a goodly portion of the radio industry is willing, for this reason, to assist SHORT WAVE LEAGUE members by placing them on a professional basis.

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

All the essentials listed on this page are never sold to outsiders. They cannot be bought by anyone unless he has already enrolled as one of the members of the SHORT WAVE LEAGUE or signs the blank on this page (which automatically enrolls him as a member, always provided that he is a short wave experimenter, a short wave fan, radio engineer, radio student, etc.).

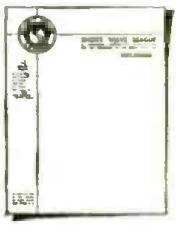
If, therefore, you order any of the short wave essentials without filling out the blank (unless you already enrolled as a LEAGUE member), your money will be returned to you.

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

SHORT WAVE LEAGUE LETTERHEADS

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

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



A—50c per 100

OFFICIAL SHORT WAVE LEAGUE LOG AND CALL BOOK

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

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

B—25c per copy

RADIO MAP OF THE WORLD AND STATION FINDER

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

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

GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

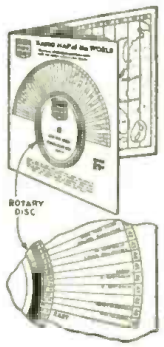
D—Globe of the World ..... Prepaid **$1.25**

SHORT WAVE LEAGUE LAPEL BUTTON

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

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

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



C—25c each

SHORT WAVE LEAGUE SEALS

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

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

SHORT WAVE MAP OF THE WORLD

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

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

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

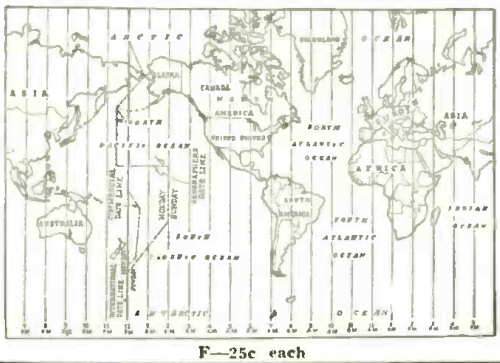
Send all orders for short wave essentials to SHORT WAVE LEAGUE, 98 Park Place, New York City.

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

SHORT WAVE LEAGUE, 98 Park Place, New York, N. Y.

D—$1.25 each

G—15c for 25



F—25c each

E—35c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE (11-33)
98 Park Place, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

SHORT WAVE LEAGUE, 98 Park Place, New York, N. Y.
Gentlemen:
I am already an enrolled member in the SHORT WAVE LEAGUE ☐
I am a new member and attach my application to this coupon ☐
Please send me the following short wave essentials as listed in this advertisement:

.....

.....

.....

.....

.....

.....

for which I enclose $..... herewith.
(The LEAGUE accepts money order, cash or new U. S. Stamps in any denomination. Register cash and stamps.)

Name .....
Address .....
(11-33) City and State .....
Country .....

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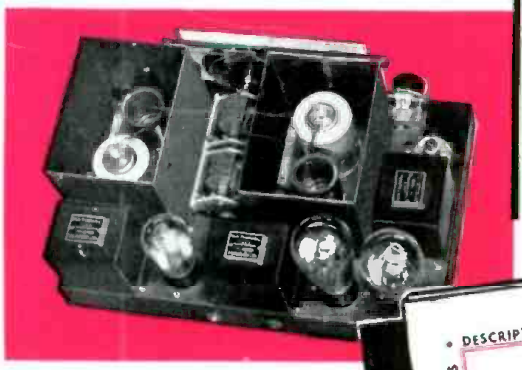
PRECISION H. F. PARTS

for Amateur, Experimenter and Constructor

ACSW-58 RF TUNER



To those who prefer TRF, the ACSW-58 offers extremely low background noise and high usable sensitivity, together with unequalled flexibility and ease of control. The thoroughly engineered circuit employs five tubes with push pull output. A D.C. model, Type SW-34, is available.

AIR DIELECTRIC SHIELDED PADDING CONDENSER

Almost as small as a walnut, the National Air-Dielectric Padding Condenser is designed to replace the inefficient mica condensers commonly used. Isolantite insulated, and thoroughly shielded, it occupies a space 1¼ inches in diameter and 1¼" high. It is described on Page 15 of the General Catalog No. 220.

PRECISION TYPE IN SHORT WAVE DIAL

One phrase, "Precision High Frequency Dial" describes the character and purpose of this thoroughly engineered product. "Precision," because of its accuracy makes tuning easy and calibration authoritative, and "High Frequency," because every detail has been designed to fit it for this most difficult service. Thoroughbred in appearance as well as action, it will improve the appearance of your receiver as much as it will improve the accuracy of your wavemeter.

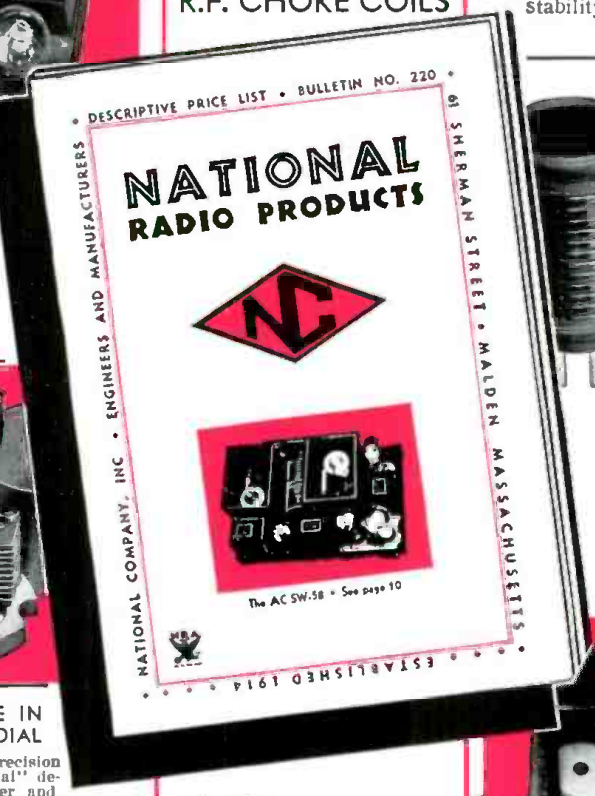
FRONT-OF-PANEL-CHANGE COIL FORMS AND SOCKETS

Bring your short-wave receiver up to date with coils wound on NATIONAL Regular and Band-Spread Coil-Forms with grounded and shielded cast-metal handles, and built-in-air-dielectric padding condensers:—as used in FB-7 and FB-X Receivers. These forms are made to fit the NATIONAL special 6-prong front-of-panel coil-socket with aluminum shield and external terminal strip.

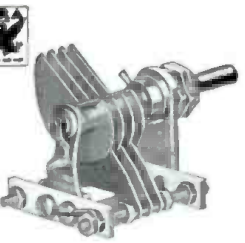
COIL AND TUBE SOCKETS

These new NATIONAL Isolantite sockets, designed specifically for short-wave service, will reduce losses at this point to a minimum. Made with convenient prong-guiding channel, and in 4, 5, 6 and 7-prong styles.

R.F. CHOKE COILS



MIDGET H.F. CONDENSERS



National Co. makes a full line of 52 different models of short-wave and ultra-short-wave variable condensers. All midgets have Isolantite Stator insulation, no shorted-turns, constant impedance rotor-connections to eliminate crackle and noise, mechanical rigidity and electrical stability. Fully listed in Catalog No. 220.

STANDARD R-39 FORMS

These forms are made of R-39, the special high-efficiency dielectric for short-wave work. Reduces losses—will not deteriorate. Made in 4, 5 and 6 prong models. Fit NATIONAL sockets.

FB-7 SHORT-WAVE SUPER

When you see and operate the FB-7 you will understand why this seven-tube short-wave superheterodyne receiver has become so popular not only with the experienced amateurs, for whom it was designed—but with short-wave broadcast listeners everywhere. Two stages of high-gain I.F. amplification (six tuned circuits) give very high sensitivity and selectivity. Class A Pentode audio output assures ample volume and quality. Full range 9 to 200 meters. Our catalog gives all the features—many of them exclusive—of this outstanding receiver.

TYPE R-100 R.F. CHOKES

And completing the NATIONAL line of High Performance R.F. Chokes, the type R-100 is particularly effective for short wave receivers.
Rating: 125 milliamperes, 2½ millihenries, 50 ohms D.C. resistance.

SEND COUPON TODAY

Clip the coupon below. It will bring the NATIONAL General Catalog No. 220, containing complete information and prices on National radio products.

NATIONAL COMPANY, INC., 61 Sherman St., Malden, Mass.

Gentlemen: Please send me your new catalog No. 220, giving prices and particulars of NATIONAL RADIO PRODUCTS. I enclose 6c in stamps to cover mailing costs.

Name ..... Address SWC-11-33

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Never Seen Equal
"Logged several Central American and Mexican stations, short and long wave. Get FYA, France. Never seen anything to equal this new Midwest-16 for tone fidelity and consistent sensitivity."—T. N. Stewart, Vero Beach, Florida.

Beyond Expectations
"You certainly know how to build All-Wave Radios. I am pleased beyond all my expectations; have been listening for two hours to GSB in England, 12RO, and Pontoise, France."—Dayton H. Lasher, 267 Sylvan Ave., Waterbury, Conn.

No Other Set Compares
"The Midwest 16-Tube Radio is all you said and more (a world-wide receiver). I don't believe there is another set on the market today with the tone and selectivity of a Midwest 16-Tube Radio."—Mr. C. L. Gietl, 415 E. S. Grand Ave., Springfield, Ill.

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"I am well pleased with the Midwest-16 and have had some fine results with it. Sunday afternoon we were listening to a Rugby game between Ireland and England, being broadcast from London."—B. J. Hart, 41 West St., Cromwell, Conn.

THOUSANDS ARE *Enthusing* OVER THIS

Amazing New SUPER *Deluxe* 16-Tube ALL-WAVE Radio

9 TO 2,000 METERS

30 DAYS FREE TRIAL

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MIDWEST startles radio world by offering this 16-tube De luxe ALL-WAVE radio... finest development of its 14 years of experience as leading radio manufacturer ...at sensationally low price of only $49.50. Buy this bigger, better, more powerful, clearer-toned radio... direct from Midwest Laboratories... at a positive saving of 30% to 50%. Brings in broadcasts from stations 10,000 miles and more away. Gives complete wave length coverage of 9 to 2,000 meter (33 megocycles to 150 KC).

This powerful, super-selective, radio has FIVE distinct wave bands ... ultra short, short, medium, broadcast and long ... putting whole world of radio at your finger tips. Now listen in on all U. S. programs ... Canadian, police, amateur, commercial, airplane and ship broadcasts ... and world's finest stations as: DFA, Nauen, Germany—REN, Moscow, Russia—EAQ, Madrid, Spain—12RO, Rome, Italy—VK2ME, Sydney, Australia. Never before so much radio for so little money. Don't buy any radio until you learn about this greatest of radio values. Send today for money-saving facts!

TERMS AS LOW AS $5.00 DOWN

WORLD'S GREATEST RADIO VALUE

$49.50 *with New Deluxe Auditorium Type* **SPEAKER**

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The new, big Midwest catalog shows a complete line of beautiful, artistic, de luxe consoles ... in the new modernistic designs ... and priced to save you 30% to 50%. Hand made by Master Craftsmen, they lend distinction and dignity to any home. Mail coupon today.

40 NEW 1934 FEATURES

Try this Midwest radio... in your own home... for thirty days before you decide. See for yourself the 40 new 1934 features that insure amazing performance. For example—Automatic SELECT-O-BAND (exclusive with Midwest), simplifies short wave tuning, instantly pointing out the wave length of the station.

Other features include: Amplified Automatic Volume Control, New Type Tubes, 16 Tubes, Balanced Unit Superheterodyne Circuit, Velvety Action Tuning, Super Power Class "A" Amplifier, 29 Tuned Circuits, New Duplex-Diode-High Mu Pentode Tubes, No-Image Heterodynes, Full Rubber Floated Chassis, Variable Tone Blender, Centralized Tuning, 7 KC Selectivity, New Thermionic Rectifier, Totally scientifically shielded (coils and switch catacombed), etc. These and many additional features are usually found only in sets selling from $100 to $150.

DEAL DIRECT-WITH LABORATORIES

Increasing costs are sure to result in higher radio prices soon. Buy before the big advance... NOW, while you can take advantage of Mldwest's amazingly low prices. No middlemen's profits to pay! You save from 30% to 50% when you buy direct from Midwest Laboratories — you get 30 days FREE trial— as little as $5.00 down puts a Midwest radio in your home. Satisfaction guaranteed or your money back! FREE catalog shows sensational radio values. Write TODAY!

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We will send you copies of letters like those illustrated at top of page. They'll convince you that Midwest radios are sensational values! They prove you can order your Midwest radio by mail with as much satisfaction as if you were to select it in our great radio laboratories.

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MIDWEST RADIO CORP.,
Dept. 315
Cincinnati, Ohio.

Without obligation on my part send me your new 1934 catalog, and complete details of your liberal 30-day FREE trial offer. This is NOT an order

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