THE RADIO EXPERIMENTER'S MAGAZINE

SHORT WAVE CRAFT

September

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Edi
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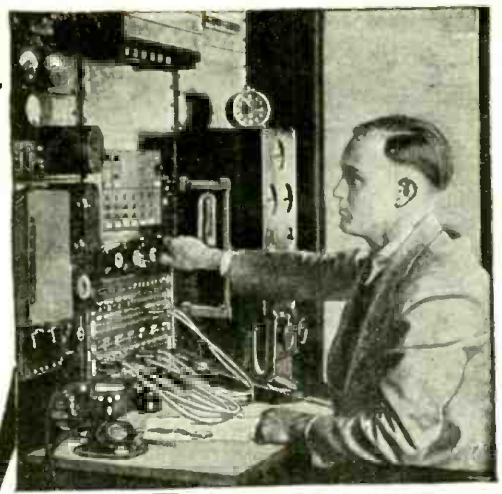

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IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS

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SHORT WAVE CRAFT

HUGO GERNSBACK
Editor

H. WINFIELD SECOR
Managing Editor

Contents for September, 1933

FEATURES IN NEXT ISSUE

Second of the series—AMATEUR TRANSMITTERS—"How To Build the Power Amplifier" and also "How To Calibrate the Monitor," by Leonard Victor, W2DHN.

The "53 Twinplex," by J. E. Worcester, Jr.

The Miller 7-Tube Short-Wave Superhet.

The RT Low-Cost 15 to 30 Watt Phone & C.W. Transmitter (For All Amateur Bands), by George W. Shuart, W2AMN, W2CBC.

The Measurement of Ultra Short Waves. by C. C. Whitehead.

Results of Test With Empire State Building U. S. W. Transmitter.

The 5-Tube Portable S-W Superhet, by Clifford E. Denton.

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

OUR COVER

• OUR cover picture illustrates "Her Slave's Voice," a paraphrase on the famous Victor slogan, "His Master's Voice." We don't know who the fortunate young lady is who has for her beau the radio amateur who is throwing kisses to her over his radiophone transmitter, but we imagine that this scene would be oft repeated if the young lady in question happened to be as comely as the one whose likeness appears in the picture, who happens to be Miss Jane Froman, "N.B.C." radio star, who has been called the "most beautiful star on the air."

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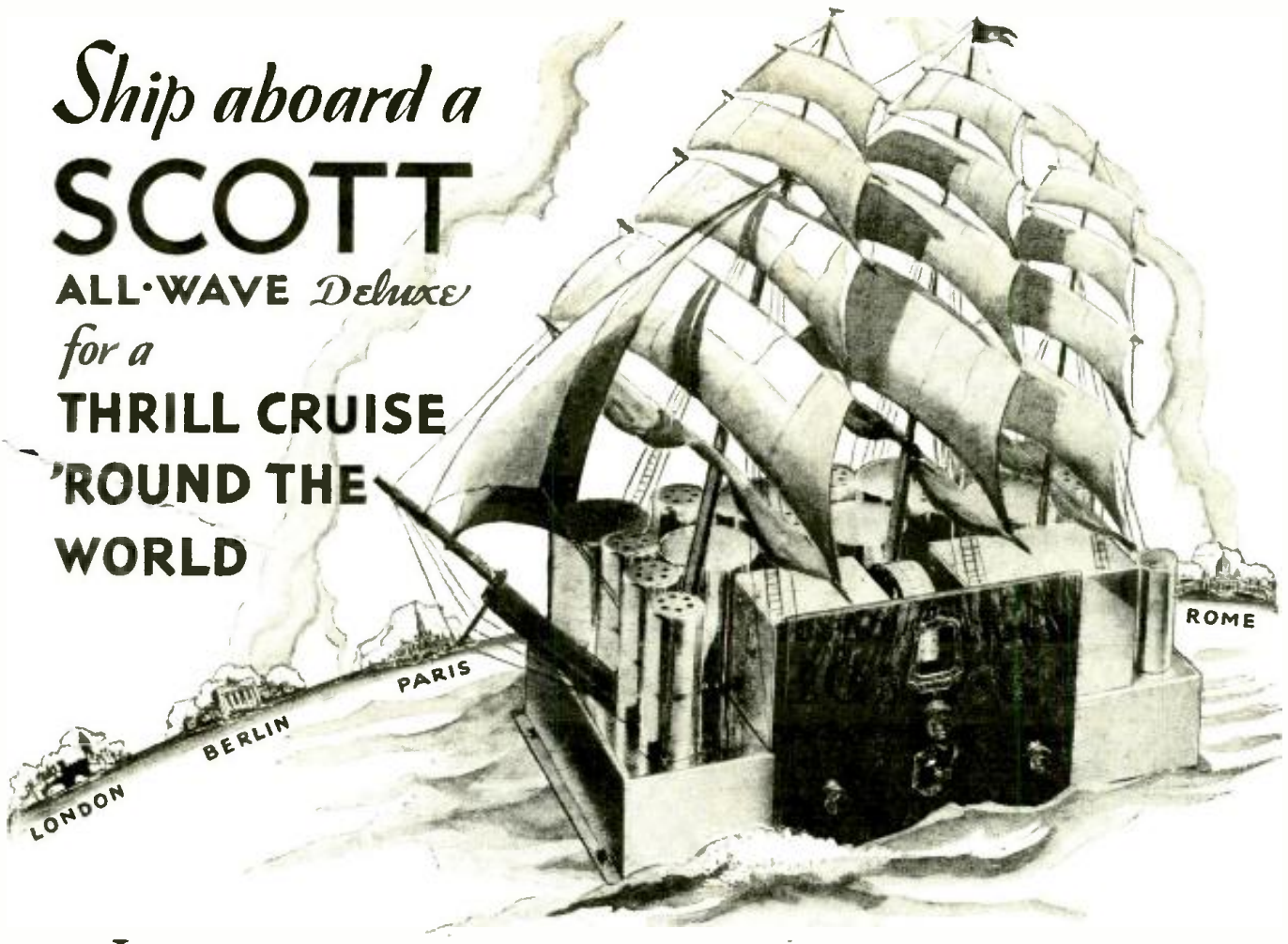

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Then set your mind at ease! For such performance is actually possible . . . we gladly prove it to you, and back the proof by an iron-clad guarantee of consistent foreign reception.

Laboratory technique, employing the world's most skillful, specially trained engineers and craftsmen in custom-building a receiver constructed to the highest standards of perfection known in radio, makes possible the super-performance of the SCOTT ALL-WAVE *Deluxe* for any radio-user, regardless of his experience or skill in operating. In this set top efficiency is coupled with absolute simplicity of tuning.

Prohibitively high priced? Not at all! You can have a SCOTT, and enjoy the supreme thrill of mastering the air-waves of all the world, at moderate cost.

Get Complete Details—Mail Coupon!

Because the SCOTT ALL-WAVE *Deluxe* is one of the truly fine things of the world, custom-built for those discriminating people who demand the best, it is not distributed broadcast, to be casually picked up here, there, or anywhere. To get full particulars regarding it, absolute PROOF of its performance, and all the information you require, simply send the coupon below direct to the modern scientific laboratories where it is built.

E. H. SCOTT RADIO LABORATORIES, INC.
4450 Ravenswood Ave., Dept. S.W.C.-93, Chicago, Ill.

Tell me how I can have a SCOTT ALL-WAVE *Deluxe* to take me radio world-cruising. Include all technical details, proofs of performance, and complete information.

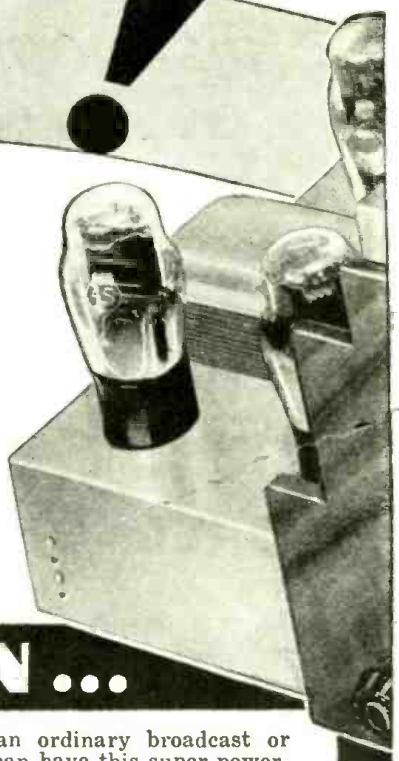
Name.....

Address.....

City.....*State*.....

NEW!

SUPER Deluxe 16-TUBE ALL-WAVE RADIO



WORLD-WIDE RECEPTION...

BUY your radio direct from the Midwest Laboratories and save from 30% to 50%. This Super, Deluxe 16-Tube ALL-WAVE Radio makes it easy to secure clear, loud-speaker reception from stations 10,000 miles and more distant. It gives you complete wave length coverage of 9 to 2000 meters (33 megocycles to 150 KC)—enabling you to secure almost magical radio performance! Midwest users regularly log such stations as: GSC, London—VK2ME, Sydney, Australia—JIAA, Tokio, Japan—RW50, Moscow Russia—DJB, Berlin, etc. Never before so much radio for so little money! Send coupon today!

Why be satisfied with an ordinary broadcast or "dual" wave set when you can have this super-powerful 16-Tube Deluxe ALL-WAVE Midwest radio? It puts the whole world of radio at your finger tips. It has FIVE distinct wave bands—ultra short, short, medium, broadcast and long—all tuned with a single dial! You can switch instantly from U. S. programs—Canadian, police, amateur, commercial airplane and ship broadcasts—to the finest short wave programs from Australia, Japan, Russia, Italy, Germany, France, England, South America, etc.

40 New 1934 Features

These sensational new features give you amazing performance, perfect realism, new beauty of tone, new wealth of power, fractional microvolt sensitivity, better than 7 KC selectivity. For example—Automatic SELECT-O-BAND (exclusive with Midwest) simplifies short wave tuning by instantly pointing out wave length of station. Amplified AUTOMATIC VOLUME CONTROL keeps volume at pre-determined level over wide range of signal inputs, prevents "fading" and interstation "blasting." Some of the other features include:

- Automatic Select-O-Band Indicator
- All-wave 9 to 2,000 meter tuning range (33 megocycles to 150 KC)
- Five Full Wave Bands
- Illuminated Frequency Indicator
- Station Group Locator
- Dial Frequency Calibration in Kilocycles and Megocycles
- Balanced Unit Super Heterodyne Circuit
- Slow Motion, Velvety action Tuning
- Positive Amplified Automatic Volume Control, Fully Delayed
- New and Improved Electro-dynamic Auditorium Speaker
- Latest Type, Higher Efficiency Tubes
- 7 KC Selectivity, Automatically Adjusted
- Scientifically Shielded (Coils and Switch Catacombed)
- Positive Signal Control
- Litzendraught I.F. Transformers, R.F. Coils, and Oscillators
- Stat-O-Mit Interstation Silencer
- Super Power Class "A" Audio Amplifier
- 29 Tuned Circuits . . . 10 in Cascade—3 Variable
- All Police and Airplane Bands
- New Duplex—Diode—High Mu Pentode
- All short and Ultra Short American and European Bands.
- Fractional Microvolt Sensitivity
- Perfect Tone Quality . . . at low volume levels (Low Volume Compensator)
- 16-Tubes . . . Equivalent to 18 tubes
- New Thermionic Rectifier
- Simplified, Centralized Tuning—No Vernier. No Auxiliary Tuning.
- Absolute Minimum of Background Noises
- Low Operating Cost

New Style Consoles

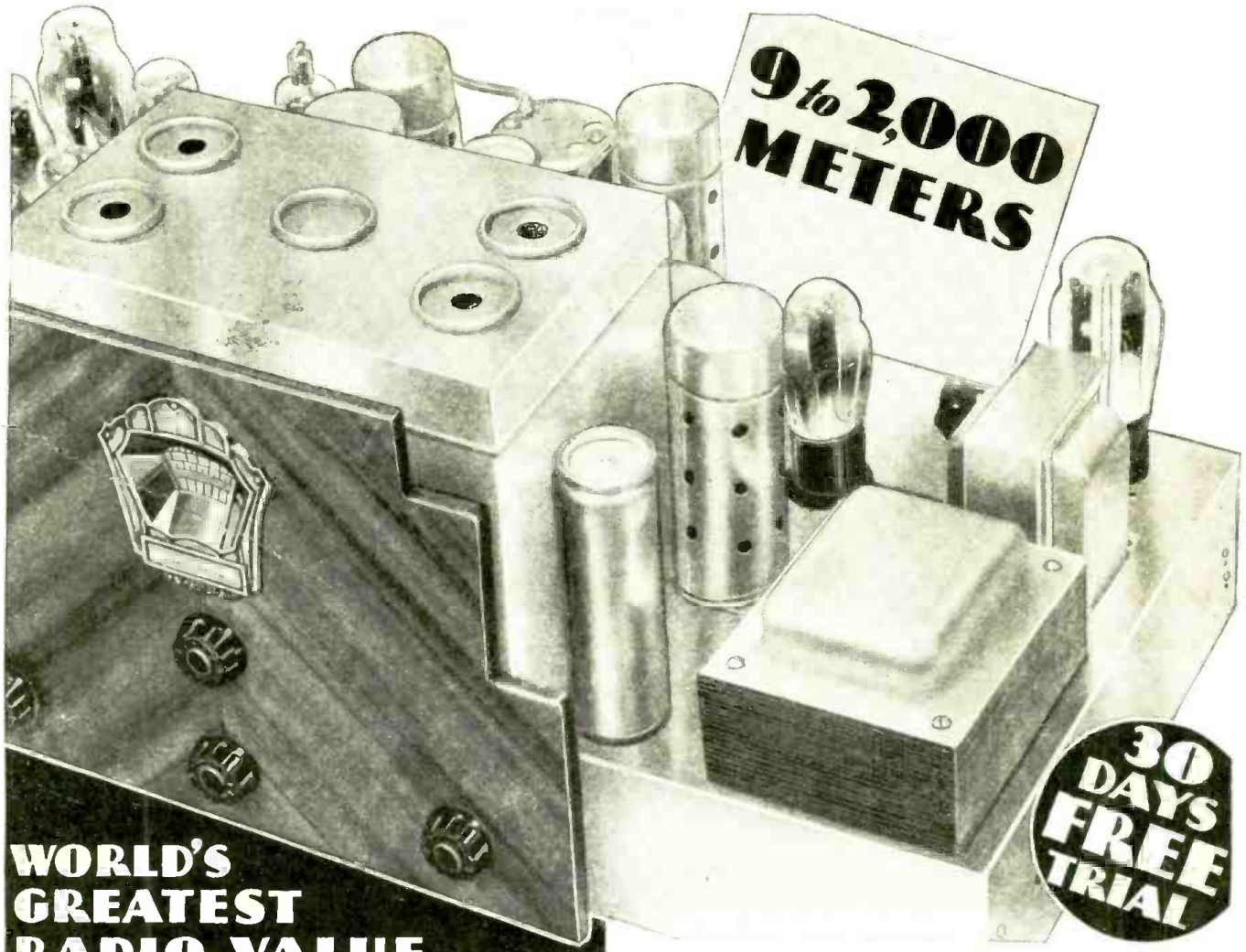
The new, big Midwest 1934 catalog shows a complete line of beautiful artistic, de luxe consoles . . . in the new modernistic designs. Hand made by Master Craftsmen, they lend distinction and dignity to any home. Save 30% to 50% by ordering direct from Midwest Laboratories. Mail the coupon today.

The new Super Deluxe 16-Tube Midwest ALL-WAVE radio positively gives you more features and more advantages than sets selling in stores at two to three times Midwest's sensationally low price! Don't try any radio until you get all the facts! Write for the new Midwest 1934 catalog. You'll be amazed at the unbelievably low direct-from-Midwest Laboratories Prices. They save you from 30% to 50%.

"OUT-PERFORMS $200.00 SET"

"Am writing this unsolicited letter in regard to my Midwest radio. It is more than you claim for it in many regards. It is more selective than any radio that I have come in contact with. It will whip or out-perform any set even above the $200.00 class and it must be great when your competitor owns up that it is superior to any machine that he sells. I have received South American stations and European stations during the short time that I have had the set. I consider that the Radio is worth three times what you ask for it."—L. E. Wallace (Member I.R.E.), 1521 S. W. 7th St., Miami, Fla.

MIDWEST RADIO CORP.



WORLD'S GREATEST RADIO VALUE ...

$49.50* with New Deluxe Auditorium Type SPEAKER

Midwest guarantees your satisfaction by permitting you to try any Midwest set—right in your own home—on 30 days FREE trial. Thousands upon thousands of delighted Midwest owners all over the U. S. and in many foreign countries are daily enjoying the world's finest radio programs because of Midwest's revolutionary policy of selling direct from the laboratory at rock-bottom prices—and on easy terms. But don't judge quality by price. Even though we offer unbelievably low prices, Midwest Radios are of the very highest quality and positively guaranteed. When you buy from Midwest, you deal with one of the old-established, pioneer radio builders who has been selling quality sets all over the world for more than fourteen years. Mail the coupon or write us a postal for new 1934 catalog, easy terms and low laboratory prices.

Terms AS LOW AS $5.00 DOWN

Get All the Facts NOW!

Deal Direct with Laboratories

SAVE UP TO 50%

Get a bigger, better, more powerful, clearer-toned radio—at a positive saving of from 30% to 50%. Buy now while you can take advantage of the tremendous values Midwest offers you. No middlemen's profits to pay. Present inflationary legislation is sure to result in higher prices. Try any Midwest Radio for 30 days—FREE—before you decide. As little as $5.00 puts a set in your home. Satisfaction guaranteed or money back! Just sign and mail coupon—or send name and address on postcard.

*(*Canadian Prices Slightly Higher.)*

RUSH THIS COUPON FOR AMAZING 30-DAY FREE TRIAL OFFER AND NEW 1934 CATALOG

Midwest Radio Corp.,
Dept. 239,
Cincinnati, Ohio.
Without obligation on my part send me your new FREE 1934 catalog, and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

Name.....

Address.....

City.....

State.....

AGENTS! Make Easy Extra Money
Check Here For Details ( )

DEPT. 239 — CINCINNATI, OHIO, U. S. A.
Established 1920 Cable Address Miraco. ABC 5th Edition

.... SHORT WAVE ESSENTIALS

FOR MEMBERS OF THE SHORT WAVE LEAGUE ....

THE following list of short wave essentials has been prepared from the suggestions to the LEAGUE by its members. A number of months were consumed in creating these short wave essentials for members of the SHORT WAVE LEAGUE. All essentials listed are approved by headquarters of the LEAGUE.

A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

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

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

One of the aspirations of the SHORT WAVE LEAGUE is to enhance the standing of those engaged in short waves. To this end, the SHORT WAVE LEAGUE supplies members with membership letterheads and other essentials. As soon as you are enrolled as a member, a beautiful certificate with the LEAGUE'S seal will be sent to you, providing 10c in stamps or coin is sent for mailing and handling charges.

Another consideration which greatly benefits members is that they are entitled to preferential discounts when buying radio merchandise from numerous firms who have agreed to allow lower prices to all SHORT WAVE LEAGUE members. The radio industry realizes that, the more earnest workers there are who boost short waves, the more radio business will result therefrom; and a goodly portion of the radio industry is willing, for this reason, to assist SHORT WAVE LEAGUE members by placing them on a professional basis.

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

All the essentials listed on this page are never sold to outsiders. They cannot be bought by anyone unless he has already enrolled as one of the members of the SHORT WAVE LEAGUE or signs the blank on this page (which automatically enrolls him as a member, always provided that he is a short wave experimenter, a short wave fan, radio engineer, radio student, etc.).

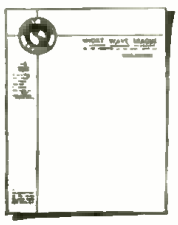
If, therefore, you order any of the short wave essentials without filling out the blank (unless you already enrolled as a LEAGUE member), your money will be returned to you.

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

SHORT WAVE LEAGUE LETTERHEADS

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

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



A—50c per 100

OFFICIAL SHORT WAVE LEAGUE LOG AND CALL BOOK

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

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

B—25c per copy

RADIO MAP OF THE WORLD AND STATION FINDER

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

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

GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

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

SHORT WAVE LEAGUE LAPEL BUTTON

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

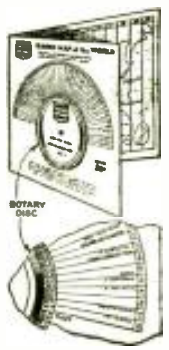
E—SHORT WAVE LEAGUE lapel button ..... Prepaid **35c**

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

SHORT WAVE LEAGUE SEALS

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

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



C—25c each

SHORT WAVE MAP OF THE WORLD

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

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

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

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

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

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

D—$1.25 each

G—15c for 25

F—25c each

E—35c each

Application for Membership SHORT WAVE LEAGUE

SHORT WAVE LEAGUE (9-33)
98 Park Place, New York, N. Y.

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

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

I own the following radio equipment:

Transmitting .....

Call Letters .....

Receiving .....

Name .....

Address .....

City and State .....

Country .....

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

SHORT WAVE LEAGUE, 98 Park Place, New York, N. Y.
Gentlemen:
I am already an enrolled member in the SHORT WAVE LEAGUE ☐
I am a new member and attach my application to this coupon ☐
Please send me the following short wave essentials as listed in this advertisement.

.....

.....

.....

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for which I enclose $..... herewith.
(The LEAGUE accepts money order, cash or new U. S. Stamps in any denomination. Register cash and stamps.)

(9-33)

Name .....
Address .....
City and State .....
Country .....

OPPORTUNITIES *are many* for the Radio Trained Man

Don't spend your life slaving away in some dull, hopeless job! Don't be satisfied to work for a mere $20 or $30 a week. Let me show you how to get your start in Radio—the fastest-growing, biggest money-making game on earth.

Jobs Leading to Salaries of $50 a Week and Up

Prepare for jobs as Designer, Inspector and Tester—as Radio Salesman and in Service and Installation Work—as Operator or Manager of a Broadcasting Station—as Wireless Operator on a Ship or Airplane, or in Talking Picture or Sound Work—HUNDREDS OF OPPORTUNITIES for a real future in Radio!

Ten Weeks of Shop Training

Pay Your Tuition After Graduation

We don't teach by book study. We train you on a great outlay of Radio, Television and Sound equipment—on scores of modern Radio Receivers, huge Broadcasting equipment, the very latest and newest Television apparatus, Talking Picture and Sound Reproduction equipment, Code Practice equipment, etc. You don't need advanced education or previous experience. We give you—RIGHT HERE IN THE COYNE SHOPS—the actual practice and experience you'll need for your start in this great field. And because we cut out all useless theory and only give that which is necessary you get a practical training in 10 weeks.

TELEVISION *and* TALKING PICTURES

And Television is already here! Soon there'll be a demand for THOUSANDS of TELEVISION EXPERTS! The man who learns Television **now** can have a great future in this great new field. Get in on the **ground-floor** of this amazing new Radio development! Come to COYNE and learn Television on the very latest, newest Television equipment. Talking Picture and Public Address Systems offer opportunities to the Trained Radio Man. Here is a great new Radio field just beginning to grow! Prepare NOW for these wonderful opportunities! Learn Radio Sound Work at COYNE on actual Talking Picture and Sound Reproduction equipment.

PAY FOR YOUR TRAINING After You Graduate

I am making an offer that no other school has dared to do. I'll take you here in my shops and give you this training and you **pay your tuition after you have graduated.** Two months **after you complete** my course you make your first payment, and then you have ten months to complete your payments. There are no strings to this offer. I know a lot of honest fellows haven't got a lot of money these days, but still want to prepare themselves for a real job so they **won't have to worry** about hard times or lay offs.

I've got enough confidence in these fellows and in my training to give them the training they need and pay me back after they have their training.

If you who read this advertisement are really interested in your future here is the chance of a life time. Mail the coupon today and I'll give you all the facts.

ALL PRACTICAL WORK At COYNE in Chicago

ALL ACTUAL, PRACTICAL WORK. You build radio sets, install and service them. You actually operate great Broadcasting equipment. You construct Television Receiving Sets **and actually transmit your own Television programs over our modern Television equipment.** You work on real Talking Picture machines and Sound equipment. You learn Wireless Operating on actual Code Practice apparatus. We don't waste time on useless theory. We give you the practical training you'll need—in 10 short, pleasant weeks.

MANY EARN WHILE LEARNING

You get Free Employment Service for Life. And don't let lack of money stop you. Many of our students make all or a good part of their living expenses while going to school and if you should need this help just write to me. Coyne is 33 years old. Coyne Training is tested—proven beyond all doubt. You can find out everything absolutely free. Just mail coupon for my big free book!

H. C. Lewis, Pres. RADIO DIVISION Founded 1899

COYNE Electrical School

500 S. Paulina St., Dept. 63-2K, Chicago, Ill.

Mail Coupon Today for All the Facts

H. C. LEWIS, President
Radio Division, Coyne Electrical School
500 S. Paulina St., Dept. 63-2K, Chicago, Ill.

Dear Mr. Lewis:— Send me your Big Free Radio Book, and all details of your Special Offer.

Name.....

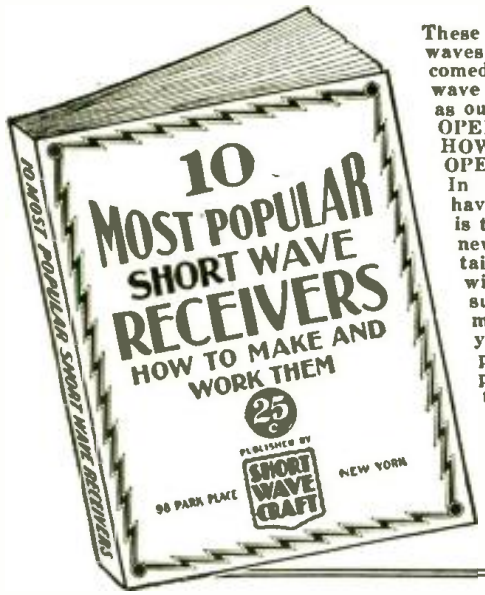
Address.....

City.....*State*.....

NOW READY

The Two NEW SHORT WAVE BOOKS

Here is Great News!



These new books contain everything on short waves worth knowing and the books will be welcomed by all short wave experimenters, short wave fans and short wave enthusiasts, the same as our former two books HOW TO BUILD AND OPERATE SHORT WAVE RECEIVERS, and HOW TO BECOME AN AMATEUR RADIO OPERATOR.

In conformity with the times these books have been priced at 25c instead of 50c, which is the price of our other books. Yet the two new 25c volumes that we are offering, contain a tremendous amount of information, with the type and illustrations chosen in such a manner as to give you almost as much for your 25c as you received for your 50c before. Only by increasing the press run enormously and making other printing economies has it been possible to price these books at such a low, popular price.

You make no mistake in getting either or both of these new and popular books and we know from our many years of experience with short wave enthusiasts that you will thank us for having made these books possible.

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

This new volume is a revelation to those who wish to build their own short wave receivers. The editors of SHORT WAVE CRAFT over a period of years have learned to know what short wave experimenters and set builders want. They have selected ten outstanding short wave receivers and these are described in the new volume. Everything worthwhile about every one of the ten receivers is described in the text. Each receiver is fully illustrated with a complete layout, pictorial representation, photographs of the set complete, hookup and all worthwhile specifications. Everything from the simplest one tube set to a 5-tube T. R. F. receiver is presented. Complete lists of parts are given to make each set complete. Select any or all receivers and know beforehand that you will be able to successfully build and operate such a receiver and not waste your money. You are shown how to operate the receiver to its maximum efficiency.

CONTENTS

IMPORTANT

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

PRICE 25c PREPAID 40 PAGES
OVER 75 ILLUSTRATIONS

The Short Wave Beginner's Book

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

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

After reading this book, you will never be at a loss for short wave terms, or will have to consult other text-books or dictionaries. The editors of SHORT WAVE CRAFT who have edited this book have seen to it that everything has been done to make this volume an important one that will be used as reference for years to come.

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

Partial List of Contents

PRICE 25c PREPAID 40 PAGES
OVER 75 ILLUSTRATIONS

Mail Coupon Today!

SHORT WAVE CRAFT SW-9-33
96-98 Park Place, New York City.
Gentlemen:

☐ I enclose herewith 25c, for which please send me prepaid, a copy of your new book "Ten Most Popular Short Wave Receivers. How to Make and Work Them."

☐ I enclose herewith 25c for which please send me prepaid, a copy of your new book "The Short Wave Beginner's Book."

☐ I enclose 50c for which please send me, prepaid, your two books, "Ten Most Popular Short Wave Receivers. How to Make and Work Them," and "The Short Wave Beginner's Book."

(Send money order, check, cash or new U. S. stamps. Register letter if it contains currency or stamps).

Name .....

Address .....

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

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

The Short-Wave Amateur

An Editorial by HUGO GERNSBACK

● SHORT-WAVE amateurism originally started in the United States away back in the old days, long before the word "radio" was known; it was "wireless" in those days, and there was no "broadcasting." Wireless enthusiasts conversed with each other exclusively by means of the dash and dot method. Experimenters transmitted on any wavelengths they felt like using, as there was no law restricting them in any way. At that time—in 1908—I published the world's first radio magazine, MODERN ELECTRICS, which was the mouthpiece of the transmitting amateurs.

Soon it was found necessary to promulgate laws to regulate all radio transmission, and the United States, along with other countries, began to formulate such laws. All the bills introduced into Congress were antagonistic to the amateur, and either completely ignored him or made no provision for him remaining in radio at all. The writer, almost single-handedly, fought the cause for the amateur by making many trips to Washington and talking to various Senators and other lawmakers in order to uphold the rights of the amateur. This was particularly the case with the Alexander Bill, which made its appearance on December 11, 1911. The rights of the amateur, as outlined in that bill, were not acceptable to the writer, and steps were taken to bring about a satisfactory amendment. This was clearly stated in the writer's editorial in the February, 1912, issue of MODERN ELECTRICS. In that editorial is also to be found the first recommendation that if a wireless law were framed it should restrict the amateur from using a higher power than one kilowatt and his wavelength should be kept below 200 meters. When finally Congress passed the "Wireless Act of 1912," which was in force 15 years, the writer's recommendations were accepted in full, and thus the radio amateur came into his own.

It was thought at that time by the lawmakers, as well as by technical experts, that wavelengths below 200 meters were unfit for use, and that is perhaps the reason why the provision was made at all! Strange to say, the wavelengths below 200 meters are now the world's most important ones, because in the bands below 200 meters all the short-wave stations of the world are grouped.

Since that time (1912), wireless amateurism, all over the world and particularly in the United States, has shown constant progress. At this time of writing, there are actually 40,000 licensed transmitting amateurs in the United States alone. By the end of this year, it is conservatively estimated that there will be at least 44,000 U. S. amateurs, who are more popularly called "hams."

Amateurs are licensed by the Federal Radio Commission. Under the present law, the Radio Act of 1927, they must take an examination showing that they can transmit and receive Continental Code at the rate of 10 words per minute. They must, of course, know something about the technical side of radio as well. They can transmit by code or by voice.

Amateurs, as the word applies, cannot take commercial business. No business concern can send messages between two amateur stations for pay. If, however, you wish to get a message to your aunt 2,000 miles away, and you know a transmitting amateur, he will gladly take your message, transmitting it for nothing. Then, the "ham" in the distant city who receives the message will deliver it free of charge to your aunt. Amateurs communicate with each other at all times of the day and night. Distances all around the world are covered daily.

Nor do amateurs use a great deal of power to so converse half way around the globe. It is frequently done with less energy than is consumed by a single small electric light bulb! Most amateur transmitting tubes consume not more than 5 to 10 watts, unbelievable as this sounds. Nor is the apparatus expensive. Frequently, the "ham" who has only modest means will build his transmitter from so-called "junk" and cover respectable distances with such apparatus.

It is of considerable interest to note that under new government regulations, which will go into effect at once, new channels are set aside for amateur radio phone use. These channels will embrace 1800 to 2000 kilocycles (166.7 to 150 meters), 28,000 to 28,500 kilocycles (10.53 to 10.71 meters) and 400,000 to 401,000 kilocycles (74.81 to 75 centimeters). This is in line with a recommendation which the writer outlined in his editorial entitled, "Wanted, a Short Wave Phone League" in the December-January, 1931-1932 issue of SHORT-WAVE CRAFT.

At that time he pointed out that there were thousands of amateurs who wished to converse with each other without the necessity of taking a code examination. While the new regulations, as yet, have not dropped the code requirements, it is to be hoped that such regulations will come about in the ultra-short wave field sooner or later.

At the time the writer made the recommendation, a number of amateurs evidently did not read it right through, because they had an idea that the writer favored unlimited phone transmission in the higher wave bands, which, of course, he did not, as a perusal of that editorial will quickly reveal. The point is that in the ultra short wave regions, below 6 meters, you cannot transmit phone emissions beyond the horizon. In other words, 20 or 30 miles is as far as the wave will reach before going out into space. Therefore, there will not be a tremendous amount of congestion or confusion because the phone transmission will only be used *locally*. It will be impossible to accomplish, at least at this stage of the art, long distance transmission. There will, therefore, be no confusion.

Contrary to the opinion of many "dyed-in-the-wool" radio amateurs, there are quite a large percentage of experimenters who, try as they will, can never learn the code.

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3½ Inch Waves

Twenty miles on a wavelength of 9cm., or about 3½ inches, is predicted by Dr. Mouromtseff and repeated tests have been made where phone and other signals have been clearly received over distances more than a mile apart. Phone conversation on 3½ inch waves is being demonstrated at A "Century of Progress."

I. E. MOUROMTSEFF, Electronic Division Elec.

●

3½ inch (9 cm.) receiving apparatus, with reflector to concentrate the signals, set up for test. These 3½ inch wavelength signals are not disturbed by atmospheric noises, fogs, sleet, or rain.

●

● RADIO waves of various lengths are transmitted in quite different manners. Those ranging from extremely long ones of 20,000 meters, down to the ordinary broadcast range around 300 meters, fill out and travel through the space between this world and an upper layer of "ionized" air high above the earth. Radio "short waves," from 100 to 7 meters, such as used by police and radio amateurs, are reflected back and forth between the earth and the upper ionized strata like a beam of light between two long parallel mirrors. Ultra-short waves, or those under 7 meters, travel only in straight lines, their range being essentially limited by the curvature of the earth.

9 Centimeter Waves Demonstrated

In the Westinghouse exhibit at Chicago's "Century of Progress" is probably the first practical equipment ever built for ultra-short wave or "beam" transmission on such a short wavelength as 9 cm (9/100 of 1 meter). Never before, outside of small technical groups, has this scientific advance been demonstrated to the public at large.

Ultra-short radio waves unlike the ordinary variety, will not follow the curvature of the world; will not even, like ordinary "short-waves", be reflected back and forth between the surface of the earth and the mysterious "Heaviside layer" which hangs like a giant reflector, miles up in the sky. Instead, like a runaway locomotive, the ultra-short waves "jump the track," and leave the earth entirely at the first curve, and go shooting off, who knows where, into interplanetary space.

For the present, investigators are aiming at targets closer than radio power; use like a searchlight beam for communication in fog; to signal the approach of icebergs; to project radio paths for aviators to follow. And more interesting still; the use of high frequency to treat disease, for which Westinghouse has supplied a 35-centimeter apparatus. And perhaps, sometime, will come radio power.

Since ultra-short waves travel in straight lines, together with the possibility of focussing and projecting them at a distance in narrow beams by means of parabolic reflectors, similar to those used for searchlights, suggested for them the name "quasi-optical," which signifies "like-optical."

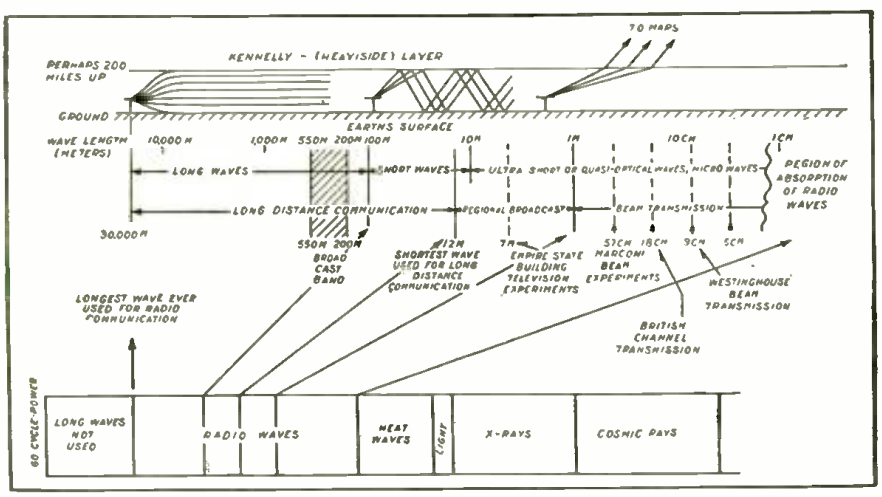


Chart showing graphically the various wavelengths.

Vital Uses for Ultra Short Waves

From the basic properties of quasi-optical waves, it is clear that they cannot be used for "long distance" communication. But whenever communication, or signalling must be established between the points "directly seen" to each other, quasi-optical waves possess considerable advantage, both over visual light signals and over regular radio waves. When used instead of, or parallel with, light beacons, they surpass them in the ability of penetrating through fog, mist, rain and similar atmospheric obstacles, because they are neither absorbed, nor scattered even by the heaviest cloudhurst. In addition, quasi-optical waves allow voice and sound communication. Also, unlike light signals, the same apparatus can be used day and night with equal convenience. In contrast to the longer radio waves, quasi-optical waves can be efficiently projected in narrow beams without building costly directive antenna arrays; require insignificant power; are not disturbed by atmospheric noises; and bring about a considerable degree of secrecy of communication. In addition, being sharply limited in range by the curvature of the earth, quasi-optical waves allow for sharply defined regional broadcasting. They are also very suitable for television carrier, because they can easily be modulated by frequencies of several hundred kilocycles; this also allows for simultaneous modulation by several broadcast frequencies, thus increasing the efficiency of communication on a quasi-optical beam. Generally quasi-optical beams are very suitable in numerous cases of sea and air navigation and for military purposes, even to their use on the battlefield, in trenches.

Increasing the Range of U. S. W's.

Due to the rectilinear propagation, quasi-optical waves, as has already been mentioned, have a very small range limited by the distance of "direct vision," or essentially by the geographical horizon. This usually does not exceed a few miles. However, one can increase the reach of a beam if the transmitter, or the receiver, or both, be raised above the ground, the higher the better. This simultaneously contributes to the elimination of absorption and field distortion due to the proximity of the ground. Therefore, the tops of high buildings, towers, the hilltops, or an elevated seashore will be the most suitable locations for quasi-optical beam stations. Houses, trees and other intervening objects between a transmitting and receiving station can absorb and dissipate en-

Now Practical

Wherever signalling must be established between two points "directly seen" to each other, these quasi-optical waves show considerable advantage over light signals and radio waves of ordinary length; the ultra short-waves surpass these older mediums in their ability to penetrate through fog, mist or rain.

Research Laboratories, Westinghouse Mfg. Co.

"Beamcasting" on 3½ inch waves. During trials of this apparatus at East Pittsburgh, speech and music were transmitted over one mile and reception is believed possible over 20 miles.

ergy of a beam, and therefore, must be avoided.

3½ Inch Waves Pierce Rain and Fog

A very important factor, emphasizing the usefulness of quasi-optical waves, is their ability to pierce such obstacles as fog, rain, and so on, which are sometimes completely opaque to the most powerful beams of light. In this respect, some calculations show that radio waves about 5 cm actually are not in the least affected by the atmospheric barriers; however, below this limit, absorption increases very rapidly, so that waves of two or three centimeters cannot be used at all for practical purposes. On the other hand, the shorter the waves, the easier and more efficient is the construction of the optical part of the beam transmission equipment, because the smaller are the reflectors and the sharper is the beam. The problem is: how to generate such extremely short waves. Fortunately, the absorption limit, 5 cm, almost coincides with the shortest waves which actually can be generated by means of vacuum tubes.

20 Mile Range

At the *Century of Progress*, the "beamcasting" demonstration is made from one end of the Westinghouse exhibit's long curved balcony to the other end, a distance of several hundred feet. However, the apparatus has been successfully tested many times at Pittsburgh between points more than a mile apart. There is every indication that it can be successfully used between points located *20 miles and more apart!*

That the radio waves have the straight line characteristics of light rays was shown in the demonstration in which the radio waves from the sender are reflected off a flat sheet of material to the beamcaster's receiver, just as light rays are reflected by a flat mirror or shiny surface.

The rays can be deflected by any flat material placed directly in the path of the beam. Metals reflect the radio beams almost completely, while non-metallic substances absorb part of the energy. Part of the demonstration was devoted to showing the degree of absorption of various materials such as asbestos board, wood and cardboard.

Our engineers have so developed their transmitter that the radio waves are polarized horizontally. A screen, consisting of wires, about three to the inch and running parallel to the direction of polarization, when placed in front of the beam, does not allow the waves to pass through it, but reflects them just as a solid sheet of metal does. However, when the wires are placed at right angles to the direction of polarization, the rays pass through unhindered.

Direct Measurement of the Wave

One of the most interesting points in the demonstration was a direct measurement of the wavelength. A metal sheet, placed in front of the transmitter, combined the direct and reflected waves into standing waves. At certain points along the beam, no oscillation can be detected while other points have a maximum oscillation, or the distance between two adjacent points of minimum oscillation or between two adjacent maximum points is exactly half the wave length—or four and one-half centimeters, slightly less than two inches. A metric rule is used to show this measurement.

Power generated in the "beamcaster" at the nine-centimeter wavelength approximates one watt and has never been approached by any other generator at such a low wavelength. It even exceeds the power used in short-wave transmission at 18 centimeter (7 inch) wavelength across the English channel.

(Continued on page 299)

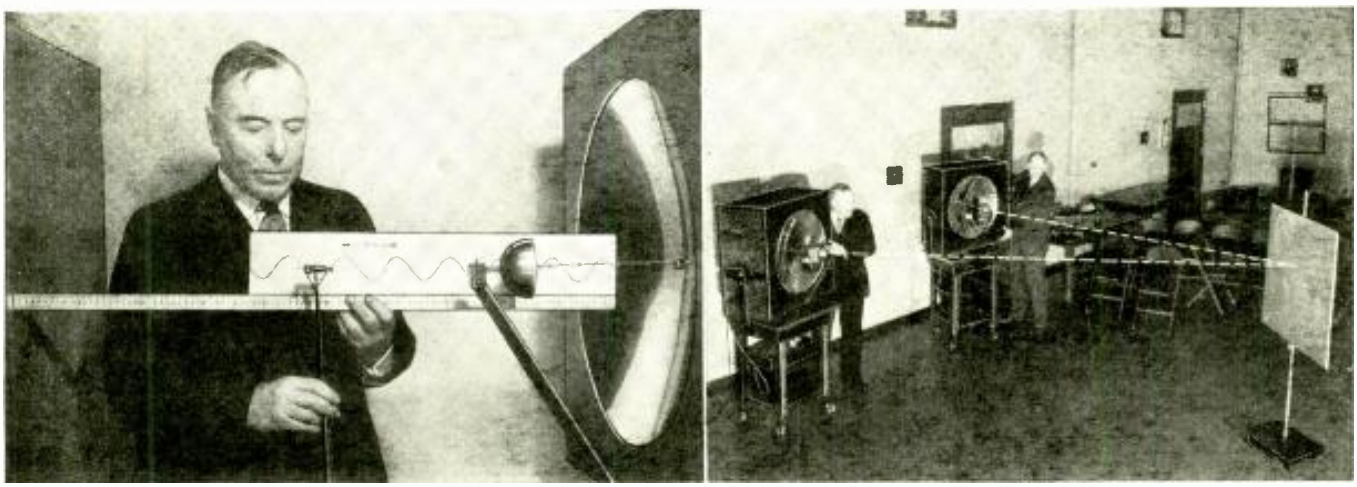


Illustration above at left shows S. M. Kintner, vice-president of the Westinghouse Company, in charge of engineering, actually measuring the length of a 9.1 cm. wave on a rule. Photo at right shows how these ultra short-waves can be deflected like light by flat material. Metal reflects the beam almost completely, while other material like asbestos board, wood, etc., absorb some of the energy.

The PENTAFLEX

By J. A. WORCESTER, Jr.

"Two tubes for one"—that's what you actually achieve with this newest concoction of Mr. Worcester's, who is well-known to our readers for his "Oscillodyne" receivers. By utiiizing the new 6A7 (or 2A7) pentagrid-converter tube in a reflex circuit, the author has indeed discovered a very remarkable combination. George Shuart, W2AMN, took a whirl at the dial and admitted that this was the "greatest" one-tuber yet.

Words fail us when it comes to telling about the results the editors obtained and which you can also obtain, without a doubt, with the "Pentaflex"—the latest brain-child of J. A. Worcester, Jr., originator of the Oscillodyne receivers described in previous numbers. By exercising great ingenuity Mr. Worcester combined the many new features of the new 6A7 tube with a reflex circuit—and is it a wow?! !

● THE receiver described in this article is so named because it utilizes the new 6A7 pentagrid converter tube in a reflex circuit. With this connection it is possible to obtain the equivalent of a two tube receiver employing a screen grid detector and one stage audio with only one tube; thus enabling an appreciable saving in space, equipment and power consumed.

In actual practice, this circuit has even proved superior in regard to volume to the conventional two tube circuit. This is probably due to the construction of the tube for its intended purpose whereby there exists a certain amount of electron coupling between the two circuits, thus producing a small amount of audio frequency feedback and a consequent increase in signal strength. The writer has tuned in GSA, Daventry, and DJC, Germany, every night for more than a week with this small set and although the volume appeared to fluctuate considerably from night to night, it was possible on all occasions to bring these stations in with sufficient volume to readily understand the announcement. On some occasions the volume was actually too great for comfortable earphone reception.

Description of the Circuit

Referring to the schematic wiring diagram, it will be noted that the input circuit is of a conventional nature. Inspection of the plate circuit, however, will reveal that the R. F. currents after passing through the tickler winding are by-passed to ground through the condenser C6. The audio frequency component of the plate current passes through the resistor R5, causing an audio frequency voltage drop across this resistor. This voltage is impressed on the first grid through the blocking condenser C5. The resistor R4 prevents a negative charge from accumulating and blocking the grid. The amplified currents flowing in the second grid circuit, which becomes the plate of the triode amplifier, pass through the earphones as shown.

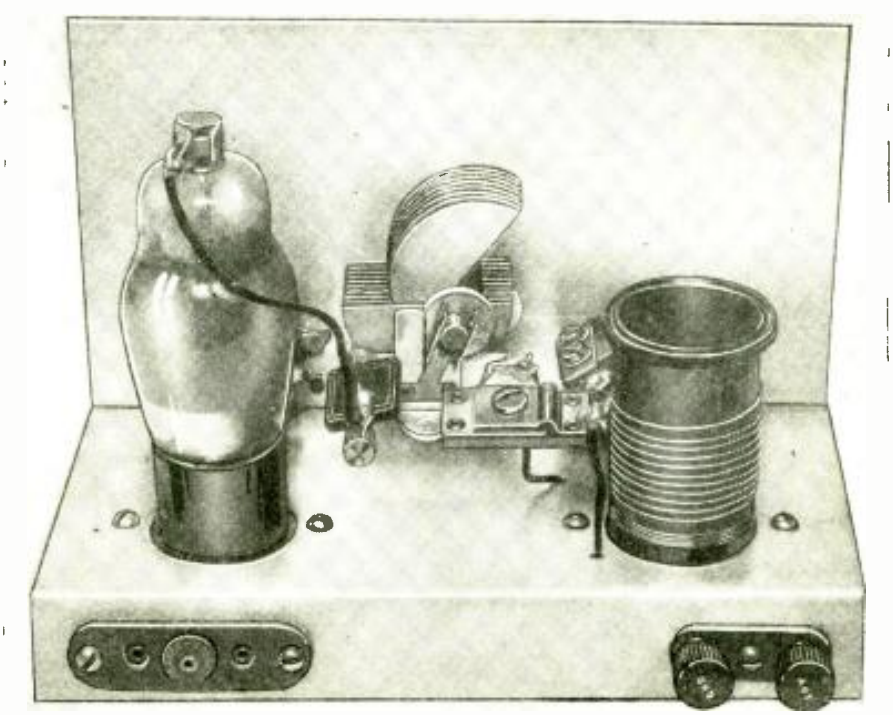
Regeneration is controlled in the usual manner by varying the screen grid voltage with a 50,000 ohm potentiometer.

The resistor R2 provides bias for the triode grid, while the return of the control grid is made directly to the cathode.

The heater current is turned on and off by a double-pole, single-throw switch which also breaks the potentiometer return, thus preventing plate current drain through the potentiometer winding when set is not being used.

Batteries or A. C. Can be Used

Either a 6A7 or 2A7 tube may be used, which are identical except for the heater characteristics. The 6A7 requires a heater voltage of 6.3 volts at .3 amperes, while the 2A7 requires 2.5 volts at 1 ampere. Both tubes are designed for either A. C. or D. C. operation. If it is desired to use dry cells, it will probably be found more convenient to use the 6A7 with four dry cells connected in series, while if a 2½ volt A. C. source is available,



Yep! Only one tube to buy, a 6A7 or a 2A7 pentagrid-converter, plus a little simple wiring, and you have a sensitive receiver which has an output equivalent to "two" tubes—thanks to the reflexing.

In Which 1 Tube=2

the sturdy 2A7 tube can be used.

The front panel consists of a 5" x 7" piece of 14 gauge aluminum while the subpanel is formed by bending a 7"x5" sheet to a depth back of the panel of 3 inches and a height of 1 inch. The panel is fastened to the subpanel by three machine screws.

Mounted on the front panel are the Hammarlund variable condensers, the switch and the potentiometer.

Underneath the subpanel are mounted the bypass condensers, the .0005 mf. by-pass and the resistors. All of these parts are mounted by their pigtails and wherever it becomes necessary to expose any appreciable length of same, they are covered with spaghetti tubing for insulation purposes. The sockets are also mounted under the subpanel, although there is no objection to mounting them above if facilities for cutting the holes required are not available. It might be pointed out, in this connection, that there are two sizes of 7 prong sockets, having different pin circle diameters. The smaller size, having a .75" pin circle diameter, is the one that takes the 6A7 tube.

The twin binding post strip and the twin speaker jack assembly are mounted at the rear. Battery connections are made by connecting a five conductor cable directly to the required points.

The equalizing condenser and the grid condenser and leak are mounted directly on the Hammarlund variable condenser, as shown.

Coil Data

The coils can be obtained ready-wound, but specifications are furnished below for winding the coils on blank forms, if desired. The data furnished are for the manufactured Alden coils, but if these coils are constructed it is recommended that about fifty to a hundred per cent more tickler turns than those specified be employed. This is because this tube when used in this circuit requires more feedback than that required for the usual screen-grid tube.

Although all the manufactured coils will oscillate by decreasing the capacity of the antenna condenser sufficiently, the use of more tickler turns is recommended in that it permits closer antenna coupling with consequently increased input.

Coil specifications:

Coil Winding Data

Band Meters	Grid Coil Turns	Tickler Coil Turns	Space between 2 Coils
10- 20	4¼ T. No. 22 Wound 6 T. per inch	4 T. No. 31 Close wound	3/32"
20- 40	10¾ T. No. 22 Wound 12 T. per inch	6 T. No. 31 Close wound	3/16"
40- 80	22¾ T. No. 22 Wound 16 T. per inch	7 T. No. 31 Close wound	3/32"
80-200	51¼ T. No. 22 Wound 40 T. per inch	15 T. No. 31 Close wound	3/16"
200-350	68¾ T. No. 28 Close wound	28 T. No. 36 Close wound	3/16"
350-500	131¾ T. No. 32 Bank wound in 2 layers	32 T. No. 36 Close wound	3/16"

Data for Na-Ald coils form 1¼ inches dia. by 2½ inches long (4 pin).

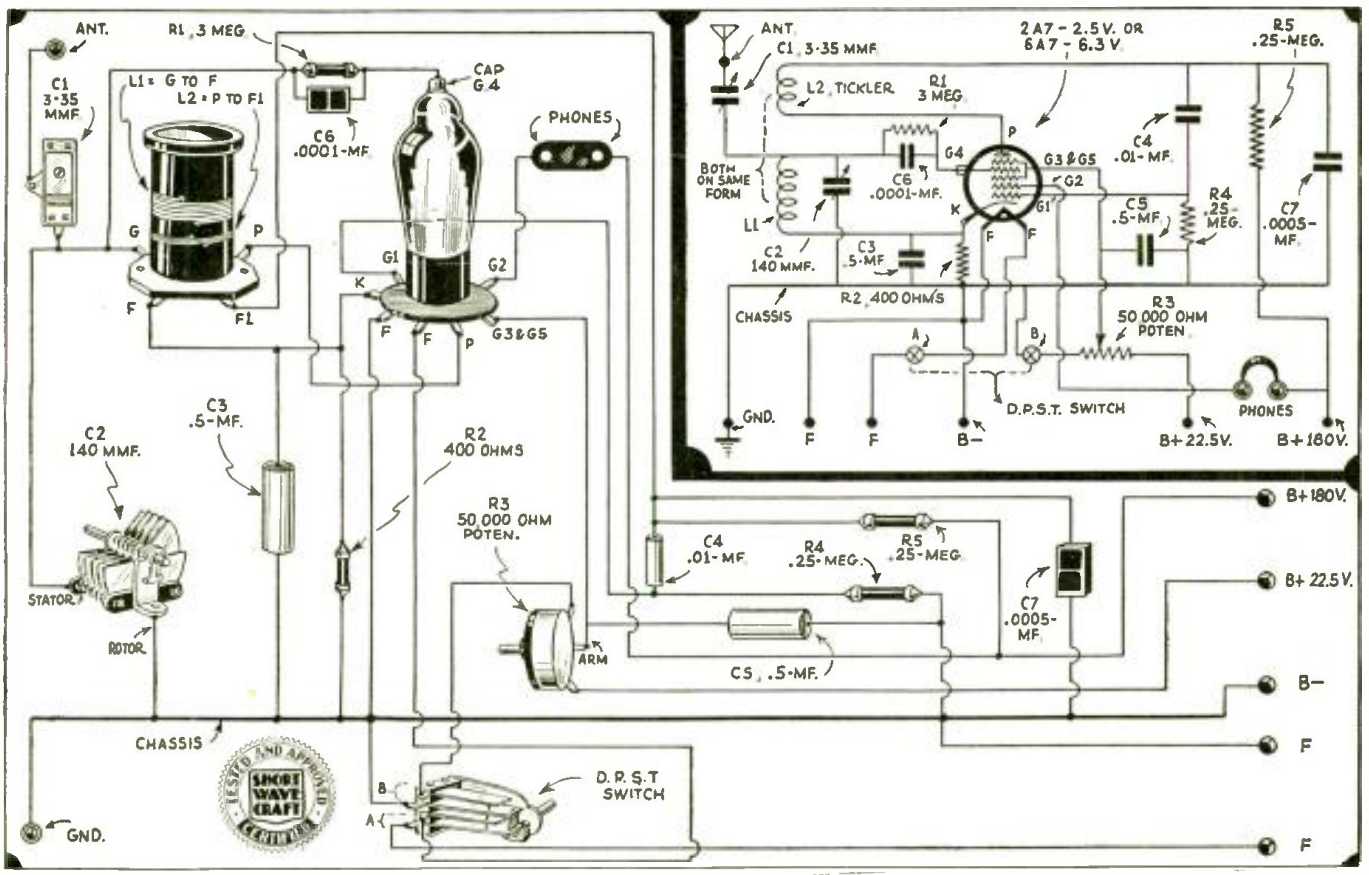
Operating Features

The operation of this receiver is no different from the usual screen grid detector and one step with the following exception. As the feedback is increased to a point where oscillation begins, a series of regular clicks will sometimes be heard which vary slightly in frequency with the feedback employed. As these interfere with reception when receiving C. W., it is necessary to increase the feedback still further until the clicks stop. Outside of this one eccentricity at some positions of the tuning condenser, it will be found that the regeneration control is generally not as critical as in the usual regenerative receiver.

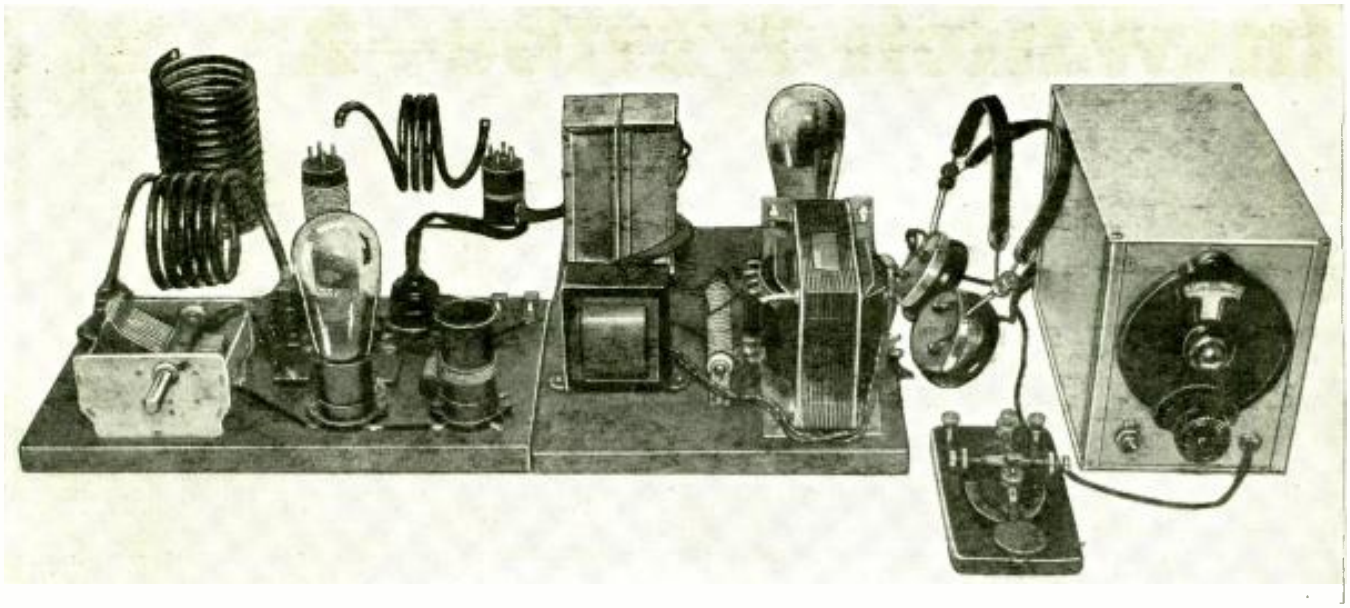
PARTS REQUIRED FOR THE "PENTAFLEX"

C1—Hammarlund Equalizer EC-35 (3-35 mmf.)
C2—Hammarlund 140 mmf. midget condenser (MC-140-M)
C3, C5—.5 mf. tubular condenser, 200 D. C. W. V.
C4—.01 mf. mica condenser, 200 D. C. W. V.
C6—.0001 mf. pigtail mica condenser
C7—.0005 mf. pigtail mica condenser

(Continued on page 306)



One tube does all the work—either a 6A7 or a 2A7, plus the really few and inexpensive parts shown in the above picture diagram. Anyone can build this "one-tuher," which really gives the same output as a "2-tuhe receiver," due to the reflex circuit used, as verified hy Mr. Shuart, well known to our readers.



Front view of the C.W. (code) amateur transmitter, which is here described in detail by Mr. Victor, together with its power supply unit.

Amateur Transmitters

How to Build, Install, and Operate Them

By LEONARD VICTOR, W2DHN

The editors have been fairly deluged with requests for more articles on the subject of amateur short-wave *transmitters*. We are pleased, therefore, to present herewith the first of a series of articles by Leonard Victor, well-known licensed owner and operator of an amateur short-wave station. Mr. Victor also explains, in an accompanying article, how to build and use a *monitor* for checking the frequency of the transmitter after it has been built. In the articles which are to follow in future numbers of SHORT WAVE CRAFT, Mr. Victor will explain, in easily understood fashion, just how to add *phone* to the transmitter.

● THIS transmitter was designed and constructed with three objects in view. First, it had to be an *all-band* outfit, very easy to build and operate, because it is intended as a "first transmitter" for the chap who has just obtained his "ham ticket," or who hopes to get it in the near future. Secondly, the cost of the outfit had to be very low, and last, but not least, despite the simplicity of the "rig," it had to be highly efficient and capable of working some real DX (distance).

As a test of its constructional simplicity, a friend of the author's, who had never built a set before in his life, was given all the parts, plain instructions, and shown the transmitter. He completed a perfect working duplicate, unaided, in an hour and a half! The cost is slightly less than that of a two-tube regenerative receiver, and will vary according to how much material can be found in the junk box.

As far as DX is concerned, during the week the set was under test (which was poor, owing to summer conditions) more than two dozen perfect contacts were made from New York, with England and Brazil as the furthest worked.

The outfit is divided into three parts, the tube transmitter, the power supply, and the antenna. This transmitter can be used with any four-prong tube, from a 30 with 90 volts of "B" battery up to a 10 with 500 volts from an A.C. power pack. For battery operation a 71A or an 01A with 180 volts will give very good results. The model illustrated uses a 45 tube for the oscillator and an 80 for the rectifier; because both of these are receiving type tubes which can be purchased very cheaply, but still will put out a very healthy, respectable signal.

Briefly, the transmitter operates as follows. The power transformer steps up the alternating current, which is rectified by the 80 tube and changed to a pulsating direct current. This current is then led through the filter, which consists of the filter choke coil and the two filter condensers, where the remaining pulsations are smoothed out so that the current becomes smooth *direct current*. This *direct current* then goes on to the tube transmitter proper, which converts it into *radio-frequency power*. The feed line which will be described later in the article, take the radio frequency and puts it into the antenna where it can be radiated throughout the world, depending upon conditions.

The circuit of this transmitter is a modification of the widely-used tuned-grid, tuned-plate arrangement, having only one variable control. Oscillation is caused by feed-back, as in a receiver, but due to the power applied to the tube it oscillates well with only the feed-back affected by the capacity between the grid and the plate of the tube.

The frequency on which a signal is sent is determined by the tank circuit L-1, C-1 (diagram). The grid circuit must be approximately in resonance with the plate circuit for feed-back and oscillation to take place.

It is possible to use a fixed grid coil for each amateur band, since one adjustment is adequate over a considerable range of the plate tank tuning.

The need for an antenna control is eliminated by use of a single-wire, untuned feeder connecting the plate cir-

cuit and the antenna. The antenna, or "flat-top" as it is called, is tuned to the desired transmission frequency by cutting it to a predetermined length.

TRANSMITTER SPECIFICATIONS

L1 and L2, plate and grid coils. Specifications given under the illustration of the coils.

C1, 350 mmf. (00035 m.f.) variable tank condenser. Any good receiving condenser will do.

C2, 2000 mmf. (.002 m.f.) fixed plate blocking condenser, mica, receiving type.

C3, 2 2000 mmf. (.002 m.f.) filament by-pass condensers. Same as C2.

C4, 250 mmf. (.00025 m.f.) grid by-pass condenser, mica, receiving type.

R.F.C., low resistance, high quality radio frequency choke, capable of passing 100 ma. The one used is a Hammarlund.

R1, 150 ohm center-tapped filament resistor, anything over 40 ohms can be used.

R2, 50,000 ohm, 5 watt wire-wound resistor.

S1, 4-prong socket to which filament, plate, and negative leads are lead. Cable from power supply plug into this socket.

CONSTRUCTING THE SET

There should be no difficulty about constructing the set, using the wiring diagram and the pictures shown with the story.

The base of the transmitter is a board 12 inches long by 7 inches wide. This should be sand-papered and given a coat of varnish so that its appearance is neat and workman-like. The board is mounted on four rubber or metal tacks, one in each corner, such as are used under the legs of chairs, to allow clearance for the two filament wires and prevent scratching of the table on which the transmitter is placed.

The grid coils are wound with No. 30 double cotton covered wire on regular coil forms. After the proper number of turns has been determined, the coils should be given a coat of collodion or clear varnish so they will retain their characteristics.

The plate coils are wound of ¼" diameter soft copper tubing. Wind the coil around a pipe or dry cell approximately 2⅜" diameter. Flatten the ends and drill them to fit over the machine screws on the stand-off insulators. The stand-offs behind the tank condenser should be mounted 5" apart between centers.

The lay-out of the apparatus is self-explanatory. The right-hand socket is for the grid coil and just behind is the grid leak and grid condenser (R2, C4).

The socket next to the tank condenser is for the tube. Behind the tube, the three condensers in a row are the two .002 mf. filament by-pass condensers and the plate blocking condensers, C2, C3. The plate lead of the tube is connected to one side of the condenser stator and the other side of the stator goes to the insulator at the extreme left. The right-hand stand-off is connected to the rotor of the condenser, the plate blocking condenser and the R.F. choke. The socket at the back is for the plug from the power supply cable. The Fahnestock clips at the right are for connection to the key. All the parts are wired with regular square bus-bar, covered with spaghetti. The connections to the plate of the tube and the tank connections are made of very heavy bus-bar to carry the high current flowing in that circuit. The filament leads from the tube to the power supply socket are run under the board. The 0-100 milliameter should be connected in the *keying leads*. It is usually most convenient to have it right by the key.

The power supply is mounted on a varnished board, 12" x 9". It is a conventional unit of the same type as is used on receivers, supplying 350 volts direct current and 2½ volts A.C. for the filament of the 45 transmitting tube. A standard "brute force" filter is used, consisting of two 16-mf., 450 volt peak electrolytic condensers and a 30-henry, 150 milliampere choke coil. Any suitable arrangement adaptable to the parts at hand may be used for the power supply unit and the plate voltage may be anything available from the transformer from 250 volts up to 400.

A regular 80 tube is used as the rectifier. The filament and the high voltage plus and minus leads are connected to the cable that runs to the transmitter. A 10,000-ohm bleeder resistor is used between plus and minus of the high voltage to afford good regulation and prevent a chirping note.

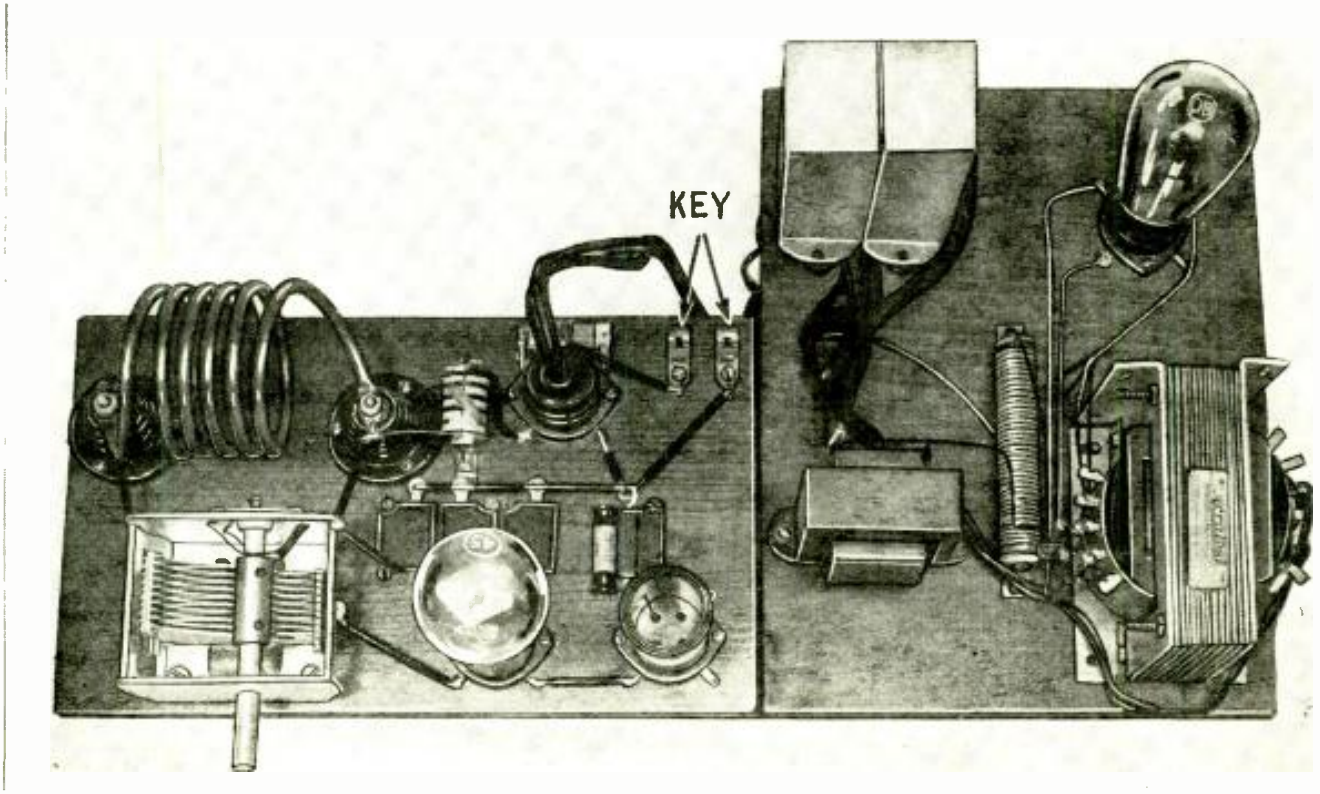
THE ANTENNA

The type antenna to be used with this transmitter is known as a single-wire, matched impedance, voltage feed Hertz, but don't let that scare you; it is one of the simplest types of aerials and very efficient in operation.

The size of the antenna will be largely dependent on the location and the frequency to be used. For *all-band* operation an antenna between 3500 and 3600 kc. must be used. These antennas work perfectly for doubling, i.e., an 80 meter antenna will work on 40 and 20 meters.

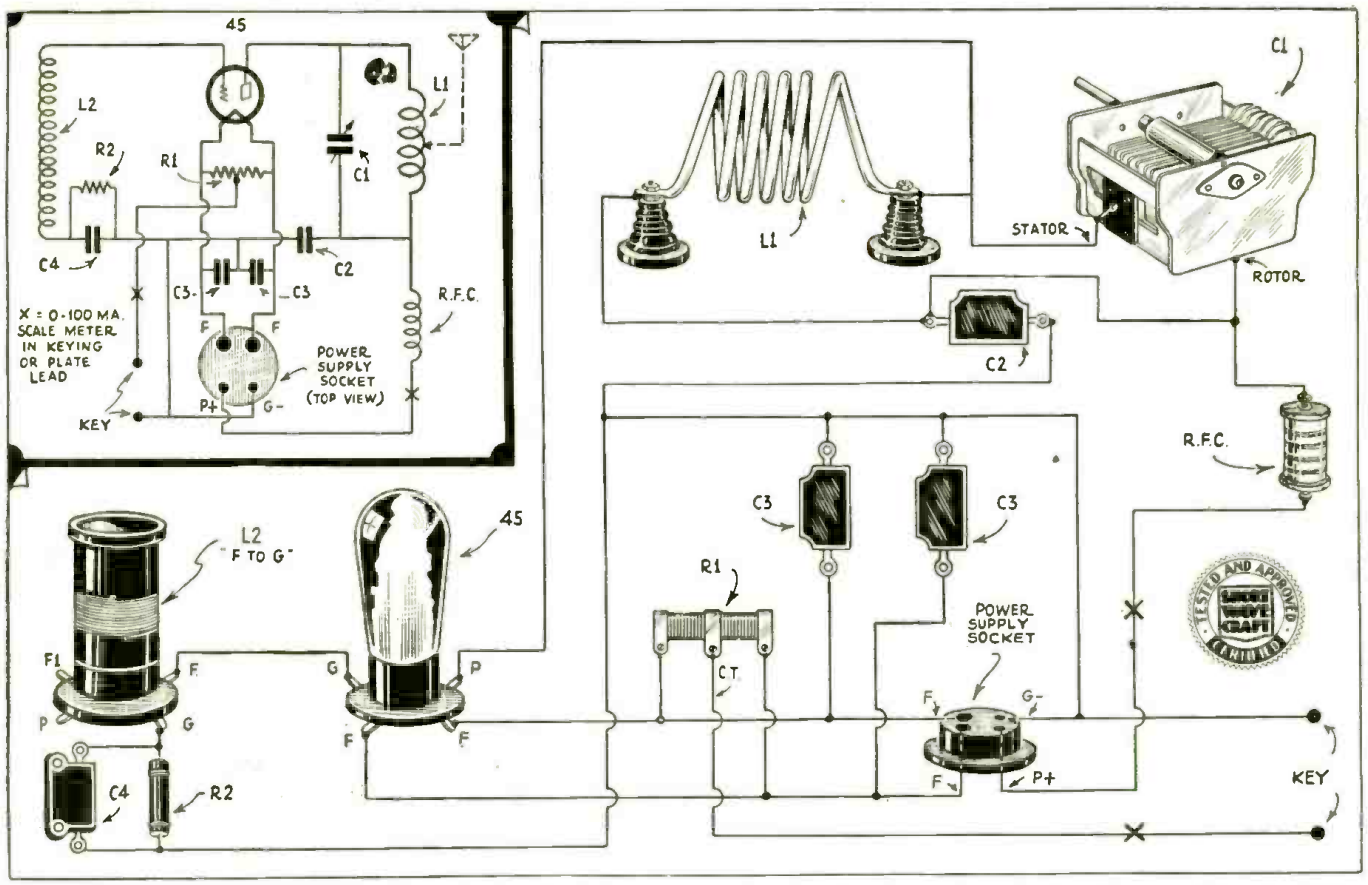
The specifications for the antenna can be taken right from the table given and if the wire is very accurately measured and the feeder carefully placed, the antenna will work perfectly the first time, without any trouble. The feeder may be any length at all, up to 1000 ft., which makes it possible to set up an excellent antenna with this system. However, the feeder must run at right-angles to the flat-top, for at least the first 30% of its length. The specifications call for No. 14 enameled wire, solid. The feeder can be any heavy rubber-covered, copper, lead-in wire that may be handy.

(Continued on page 311)

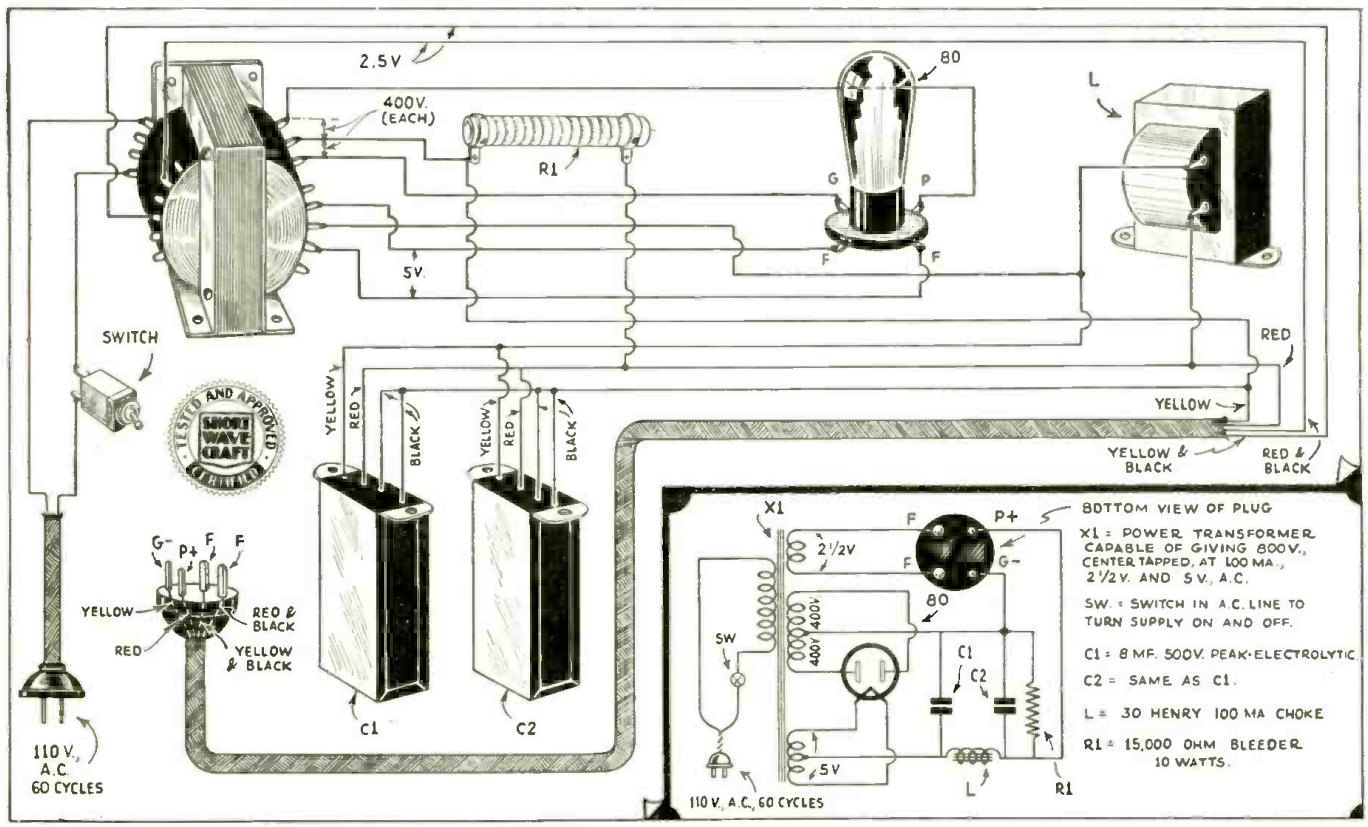


Top view of the C.W. transmitter, the construction of which is fully described in the accompanying article by Mr. Victor. The set illustrated uses a 45 tube for the oscillator and an 80 for the rectifier.

Details of C.W. "Code" Transmitter



The diagrams above show in schematic and also physical form how to wire the simple lay-out of parts comprising the C.W. transmitter for amateur use, as here described by Mr. Victor. A 45 or a smaller tube may be used as the oscillator.



The "power-supply" unit, using an 80 type tube for the rectifier, is shown in diagrammatic form above. It supplies 350 volts D.C. for the plate and 2½ volts A.C. for the filament of the 45 transmitting tube.

The MONITOR—How to Build and Use It

By LEONARD VICTOR, W2DHN

The author of the article on the C. W. transmitter here describes the next most important adjunct to every "ham" station—the *monitor* and how to use it. Next month, Mr. Victor will describe in clear style how to calibrate the monitor.

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by tuning it in on the monitor and then tuning the monitor whistle in on the receiver. Obviously the procedure can be reversed for placing the transmitter in any desired part of the band.

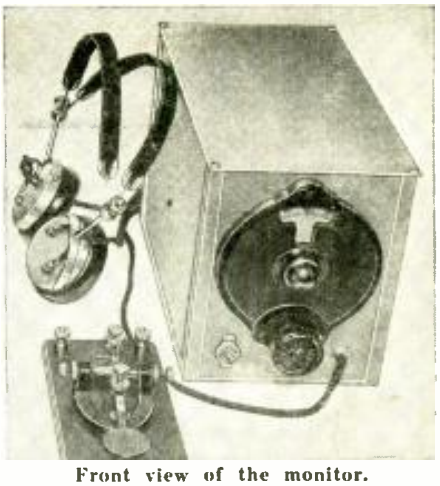
The unit is simplicity itself and almost any changes necessary can be made to adapt the monitor to the parts available. All of the components should be solidly placed so that the monitor will hold calibration, i. e., return to the same frequency at a given point on the dial. This is a mechanical detail and should be given great consideration on the part of the constructor.

The monitor shown in the picture uses a 2-volt, 30 type tube, but any of the small size tubes, such as the 99 type, may be used, by supplying the proper filament voltage. A little experimentation will determine the best spot to place the monitor, both to give a healthy signal in the receiver and have a fairly loud note from the transmitter. The coils may have to be changed by the "cut and try" method in some cases so that adequate band coverage can be obtained.

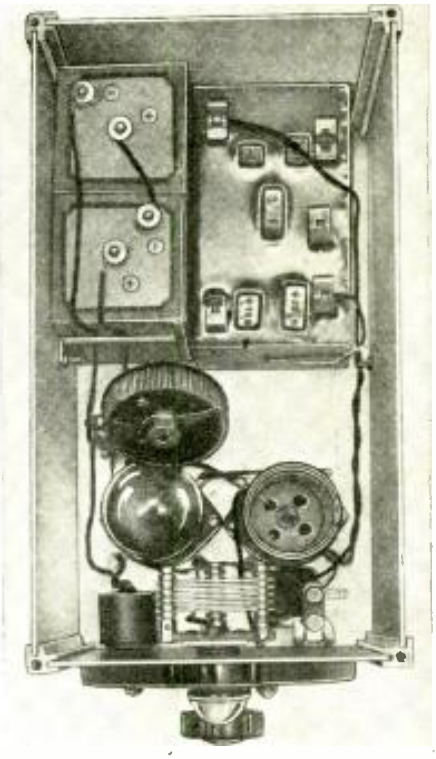
After the monitor has been calibrated try not to jar its mechanical setup. Be careful of the coils and see that the position of the turns is not changed, as this will affect the operation of the unit as far as accuracy is concerned.

If an extra pair of earphones is not available to use with the monitor at all times, a resistance having approximately the same value as the phones should be used in the monitor, when tuning it in on the receiver. This will minimize the unbalancing effect due to the changing of the voltage on the plate of the tube, which in turn shows up in the grid tuning circuit.

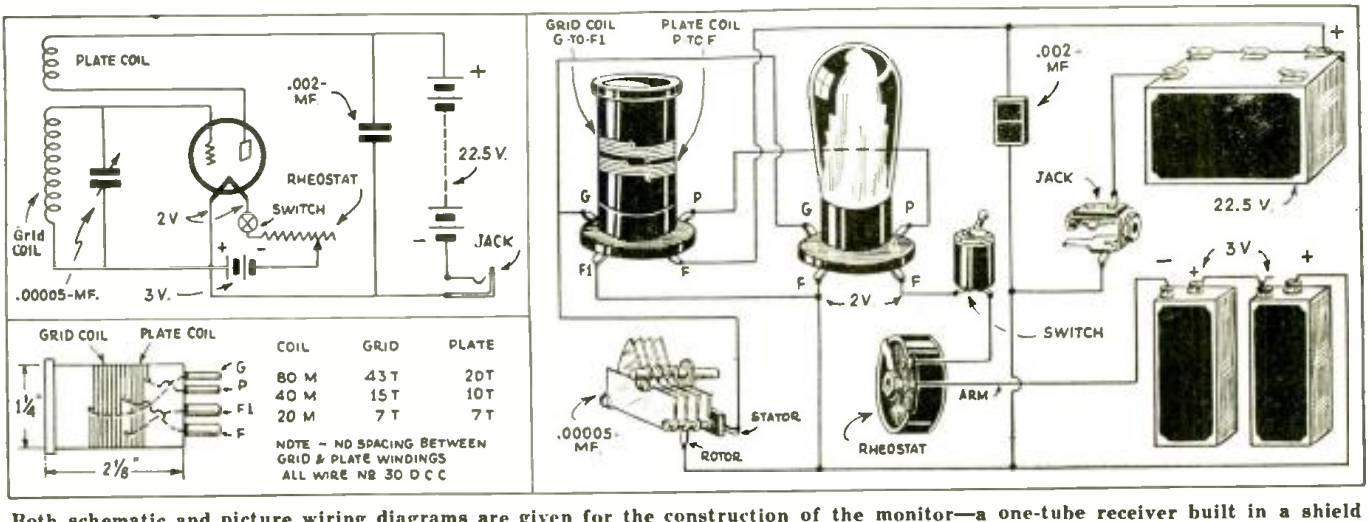
In next month's issue, simple, detailed instructions will be given as to the accurate calibration of the monitor.



Front view of the monitor.



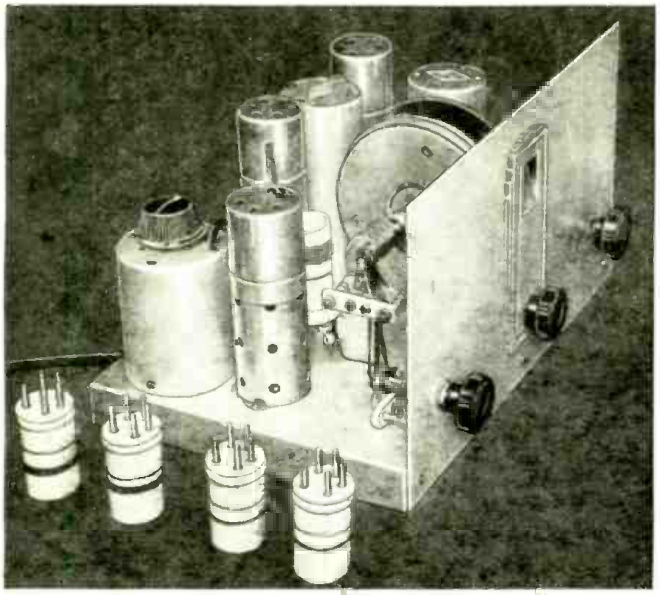
What the innards of the monitor looks like! The batteries for operating the 1-tube receiver are included in the shield box and a phone jack is provided.



Both schematic and picture wiring diagrams are given for the construction of the monitor—a one-tube receiver built in a shield box, so as not to pick up too strong a signal from the local transmitter. A 2-volt tube is used and no antenna is required.

This 3-TUBE "SUPER"

Loud-speaker reception of "foreign" short-wave stations is a regular performance for this 3-tube Superhet, designed by Mr. Shuart who gave us the very excellent "band-spread" S-W converter in the July and August issues. This Superhet has an extra tube which acts as a C. W. oscillator for code reception; one of the new pentagrid-converter tubes acts as first detector and oscillator for "phone" reception. You'll be delighted beyond words with this set.



Very "professional looking" indeed is this easy-to-build, 3-tube Superhet which brings in the "foreign" and other DX short-wave stations with marvelous ease—and on a loud speaker!

● THE new type tubes now on the market have paved the way for many changes in our short-wave receivers. Among these is the much discussed *Pentagrid Converter*, the type 2A7 or 6A7, which works very nicely on the "High Frequency" bands.

The receiver presented in this article employs one of these tubes as the high frequency *first detector and local oscillator*, and this tube is partly responsible for the minimum number of tubes used to make up a very simple and efficient short-wave superheterodyne receiver, which can be built by the average short wave "Fan" at very nominal cost. The receiver described here, provides all that any one could want for general short-wave reception, including various amateur activities. Although no provision is made for band-spread, and would be necessary should one wish to use it for amateur work.

Separate Beat Oscillator for "Code"

This receiver is really a three tube set, so far as ordinary reception is concerned; the fourth tube is provided to allow "CW" reception on code and also provide an easy method of locating the various short-wave broadcast (phone) stations; after the modulated signal has been located the beat oscillator is no longer needed and is turned off.

The line-up of tubes is as follows: the 2A7, as stated before, is used as the frequency converter, a type 58 for the intermediate frequency amplifier, and a type 2A5 as the second detector tube. The type 2A5 used as the second detector gives sufficient audio amplification to operate a speaker, either magnetic or dynamic, at regular speaker volume. That is, any of the major foreign short-wave stations can be heard all over the house and one does not have to stand with one's ear in the speaker either. The fourth tube, the type 57, is the *beat oscillator* tube and plays no part in the reception of broadcast (phone) reception, other than to aid in tuning or locating the station.

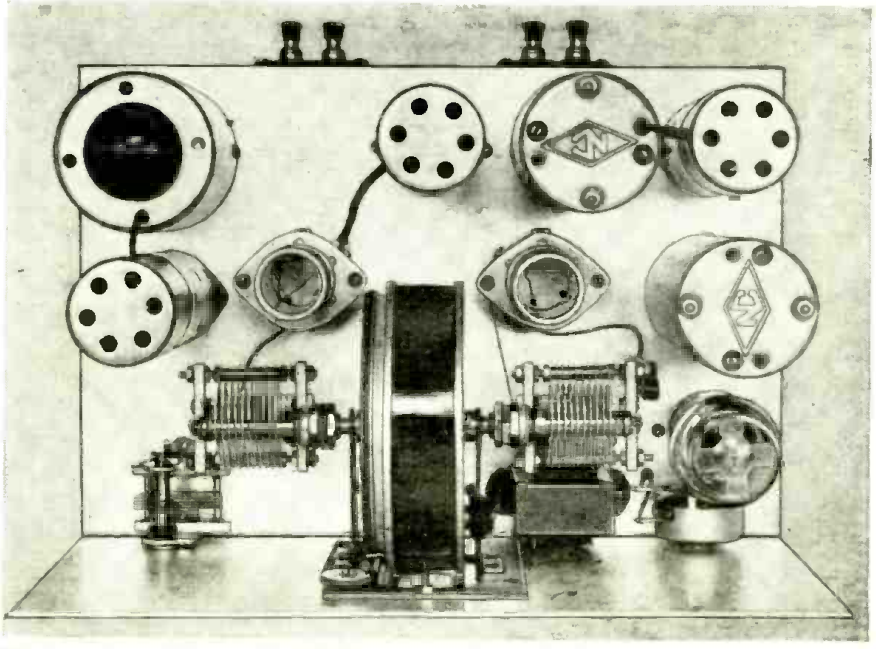
The coils used in this receiver are very easy to construct; they are all close-wound and the two sets, that is, the first detector and oscillator coils are identical in number of turns. The coils used in the set shown are wound on small isolantite forms. Complete coil data is given in the appended "Coil table."

In designing this set, size and simplicity were among the main considerations. The front panel is made of 1/16th inch aluminum and is 12 inches long by 7 inches high. The base or chassis is made of the same stock and is 8 inches wide by 12 inches in length and 1 inch deep. All bypass condensers and resistors are mounted in this space under the set. The layout of parts in this receiver cannot be changed very much without the necessary addition to the size of the chassis.

A drum type dial is used in order that the two tuning condensers can be mounted on either side, allowing short leads to the two coils and the frequency-converter tube. The 2A7 converter tube is mounted directly behind the drum dial. If the 2A7 were put in any other position, the length of the connecting leads to one set of coils and condenser would be much too long. The layout used in a set using separate tubes for the oscillator and first detector cannot be used with the new tube with any great success, if simplicity of wiring and short leads are taken into consideration. Many other layouts were tried with very little success—in fact it made a very awkward looking job.

Description of the Circuit

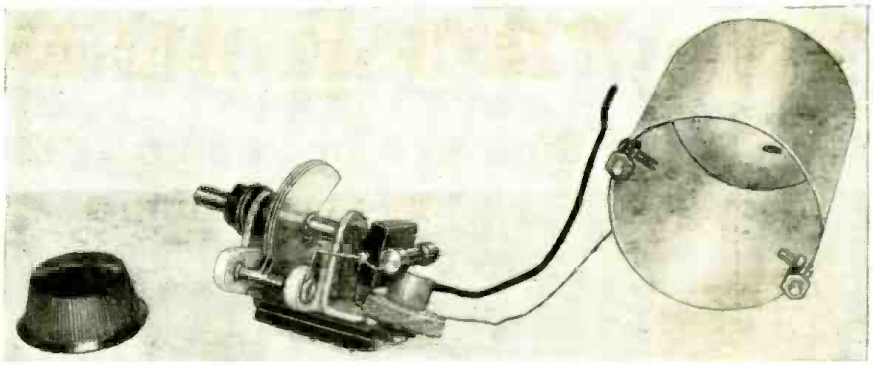
In describing the circuit we will start with the high frequency end of the receiver first. Many different circuits were tried in the high frequency unit and that shown in the diagram proved to be the most stable in oscillation. The circuit as can be seen in the diagram, permits the current from the plate and the anode-grid to return through



This top view of George Shuart's latest set—the 3-tube Superhet, shows the excellent layout of the parts.

Has "IT"

By GEORGE W. SHUART
(W2AMN-W2CBC)



The parts used, together with shield can, in building the CW oscillator for "code" reception.

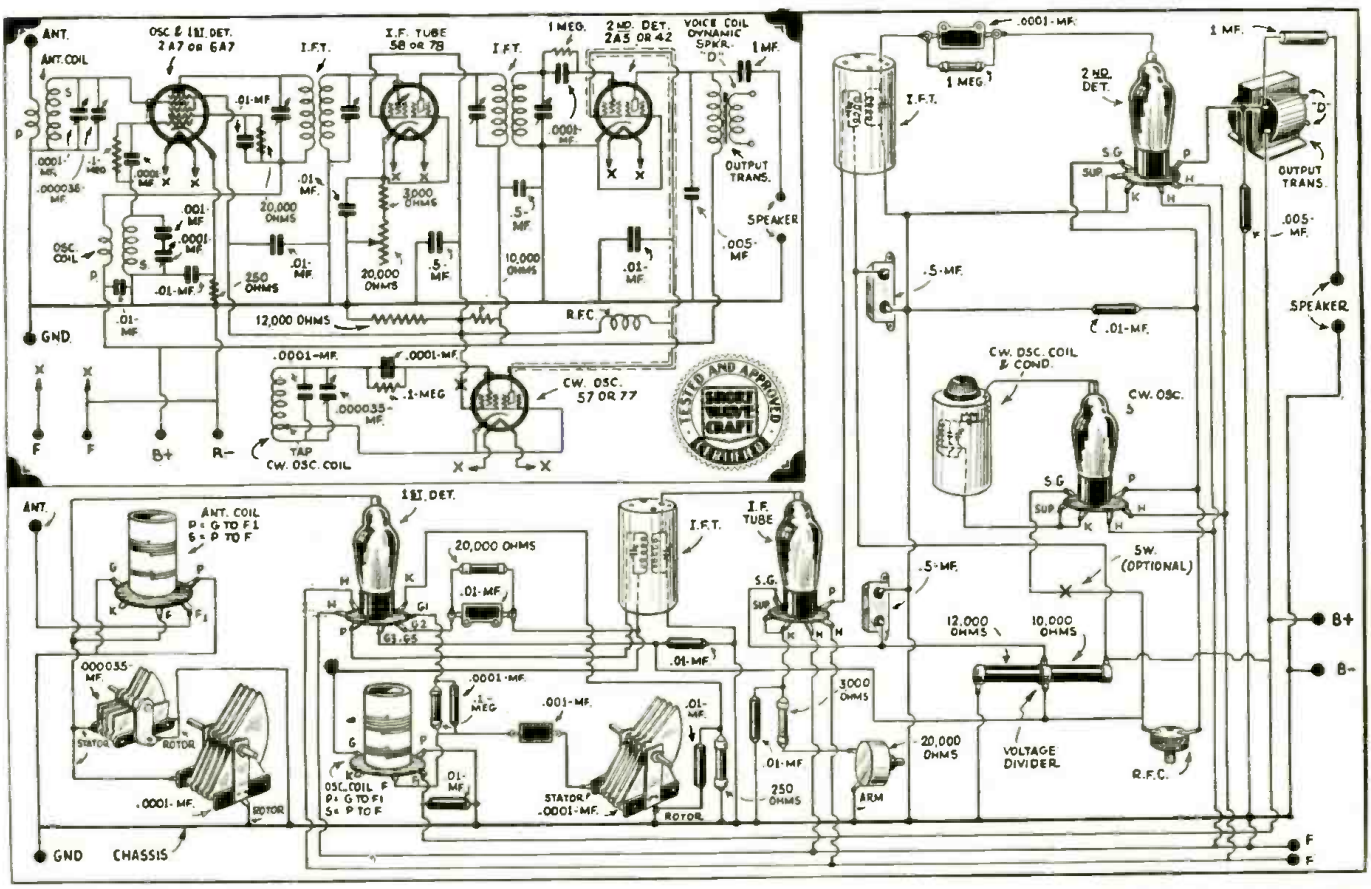
the oscillator plate coil. In this circuit it is surprising how uniform the output of the oscillator circuit is; with only the few tickler turns shown in the coil table, there is no change in oscillator output over the entire tuning range of the oscillator grid coil, and it shows no tendencies of going out of oscillation as the capacity of the grid circuit is either increased or decreased. No increase in stability could be noticed when the oscillator grid circuit was changed to a high capacity with lower inductance. Even with the grid condenser turned to minimum capacity, there are no signs of instability. The values of resistances shown in the diagram of the converter circuit are those that work best with 250 volts applied to the plate. If a lower voltage is used, it is suggested that a change in the values be made, if the full gain of the 2A7 is to be had. This is mentioned because there is very little pickup in the first detector and the "over-all" gain in the converter circuit is very small.

When using *single-control* in a superheterodyne some sort of provision is necessary to get the two circuits to *track*. With the coil data given and the use of a 1000 MMF. condenser in series with the oscillator grid-tuning condenser, the two circuits were made to *track* very evenly, the 35 mmf. variable condenser used in the detector circuit is for compensating for small changes which may occur in the antenna circuit. The tuning condensers used in this receiver are of the 270 degree type. These condensers aid in tuning considerably because of the added 90 degrees in the tuning range giving less cramped tuning than the regular 180 type, a very worthwhile feature indeed.

Air-tuned I. F. Transformers Used

Referring to the diagram it can be seen that the intermediate frequency amplifier stage is of conventional style using a pentode tube. The I.F. transformers are the new style having *air-dielectric* tuning condensers. These transformers represent a decided improvement in that they can be adjusted and will hold their calibration indefinitely. If the builder wishes to build his own IF. transformers this can be done quite easily. The coils for the primary and secondary should have an inductance of from 1 to 1.3 millihenries and should be tuned with a 100 mmf. midget variable condensers. The above values are for frequencies between 550 and 465 kc. The regular universal-wound inductances are used and should not be coupled too close or the selectivity of the transformer will be destroyed; about one and one quarter inches is a good degree of coupling. The volume is controlled by a 20,000 ohm variable resistor inserted in series with the 300 ohm cathode bias resistor of the type 58 IF. amplifier tube. The .01 cathode bypass condenser is large enough to render the volume control quiet in operation. The set is equipped with a voltage

(Continued on page 307)



Schematic and also picture wiring diagrams are given above for the 3-tube superheterodyne short-wave receiver, the fourth tube being used as an extra oscillator for CW or "code" reception.

The "ACRATONE DISCOVERER"

An Easily Built 5-Tube "DeLuxe" Short-Wave Receiver

By CLIFFORD E. DENTON*

Yes, you will need a good-sized, well-arranged "log" book in which to record the many stations you are sure to hear with this receiver—and they come bouncing in on the loudspeaker!

This particular short-wave receiver presents not only a handsome appearance in its beautifully finished metal case, but it represents the very newest ideas in short-wave engineering. The "proof of the pudding" lies, of course, in the actual results obtained, and this receiver certainly "steps out" and proves that it has the goods! The tubes used are 58 R.F., 58 detector, with 56 and 59 first and second A.F.'s.

● IN designing the "Acratone Discoverer," my purpose was to produce a de luxe short-wave kit that could be relied upon to "deliver the goods" consistently. I am happy to state that I have succeeded 100 per cent in doing this. Furthermore, the design is so well-balanced that every "Discoverer" set built in accordance with the directions will give the same splendid results. Everything has been simplified to the last degree, so that the novice at set building will have no more difficulty with this receiver than with a beginner's "two-tube" job.

Before starting to tell you about the "Discoverer," I spent several months experimenting with the circuit. That's a really peculiar thing about radio. Any radio engineer can sit down and design a new radio circuit on paper in fifteen minutes. But when such a set is actually built up for the first time, many "bugs" must be removed before it becomes a practical proposition. The value of a resistor must be increased at one point or decreased at another, condensers may have to be added to eliminate hum, regeneration may not be smooth enough. These and many other small but important points must be ironed out.

In presenting the "Discoverer" you can rest assured that all this experimenting has been completed in my laboratory. The circuit and the parts are finished products, certain to work and give you the kind of results you want. Even the smallest details have been worked out for you. The chassis has all mounting holes drilled, thus eliminating all laborious work. Every component fits into its designated place. And the kit itself contains every part specified, from the largest item down to the small hardware.

The "Acratone Discoverer" employs five of the new type tubes in a highly improved tuned R.F. circuit. A single R.F. stage using the 58 variable mu R.F. pentode fulfills every requirement of sensitivity. A 58 tube is also used as the detector. Electron coupling regeneration is obtained by connecting the cathode of the detector tube to a tapped point in the secondary of the R.F. transformer L2. The regenerative action obtained is very powerful and changing the position of the regeneration control does not detune the set. A variable resistor controls regeneration by changing the detector screen grid voltage. In this way, well-regulated, even control is obtained.

A general purpose 56 tube is used in the first audio stage. This is fol-

Looking down into the "Acratone Discoverer" 5 tube S-W receiver, showing the careful layout of the shielding partitions.

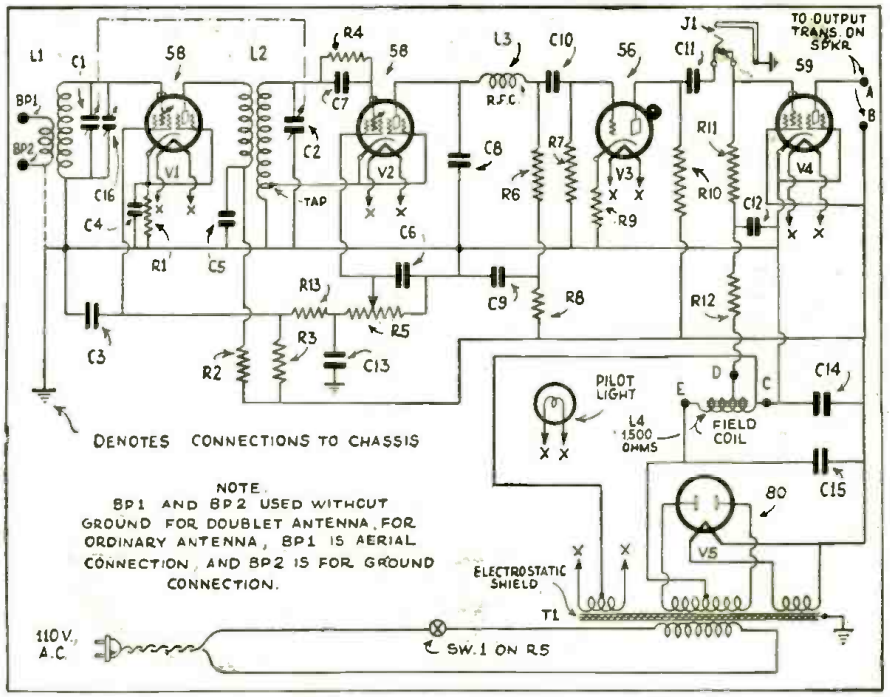
*Chief Engineer Federated Purchaser

lowed by a 59 power output tube of high-power sensitivity. The phone jack is connected so that the grid bias on the 59 is not disturbed when using the phones. No direct current flows in the jack terminals, so that there is no chance of getting a shock at this point.

A full wave type 80 rectifier is used, with conventional power supply. The filter system consists of the dynamic speaker field, by-passed at either end by 8 mf. electrolytic condensers. These are combined in a single case.

The plug-in coils specified with the "Acratone Discoverer" are of special design and add considerably to the effectiveness of the circuit. Four coils are used to cover the short-wave bands from 15 to 200 meters. Two sets of these are required, one to be plugged in at L1 and the other at L2, making a total of eight coils in all. The "Discoverer" is well shielded and is furnished with a handsome gun-metal finished cabinet.

All in all, I can highly recommend this receiver because it is basically correct from every standpoint. It is easy to assemble and wire, comparatively inexpensive, good-looking and most important of all, it will bring in the DX stations.



Schematic wiring diagram of the "Acratone Discoverer," showing the disposition of the five tubes.

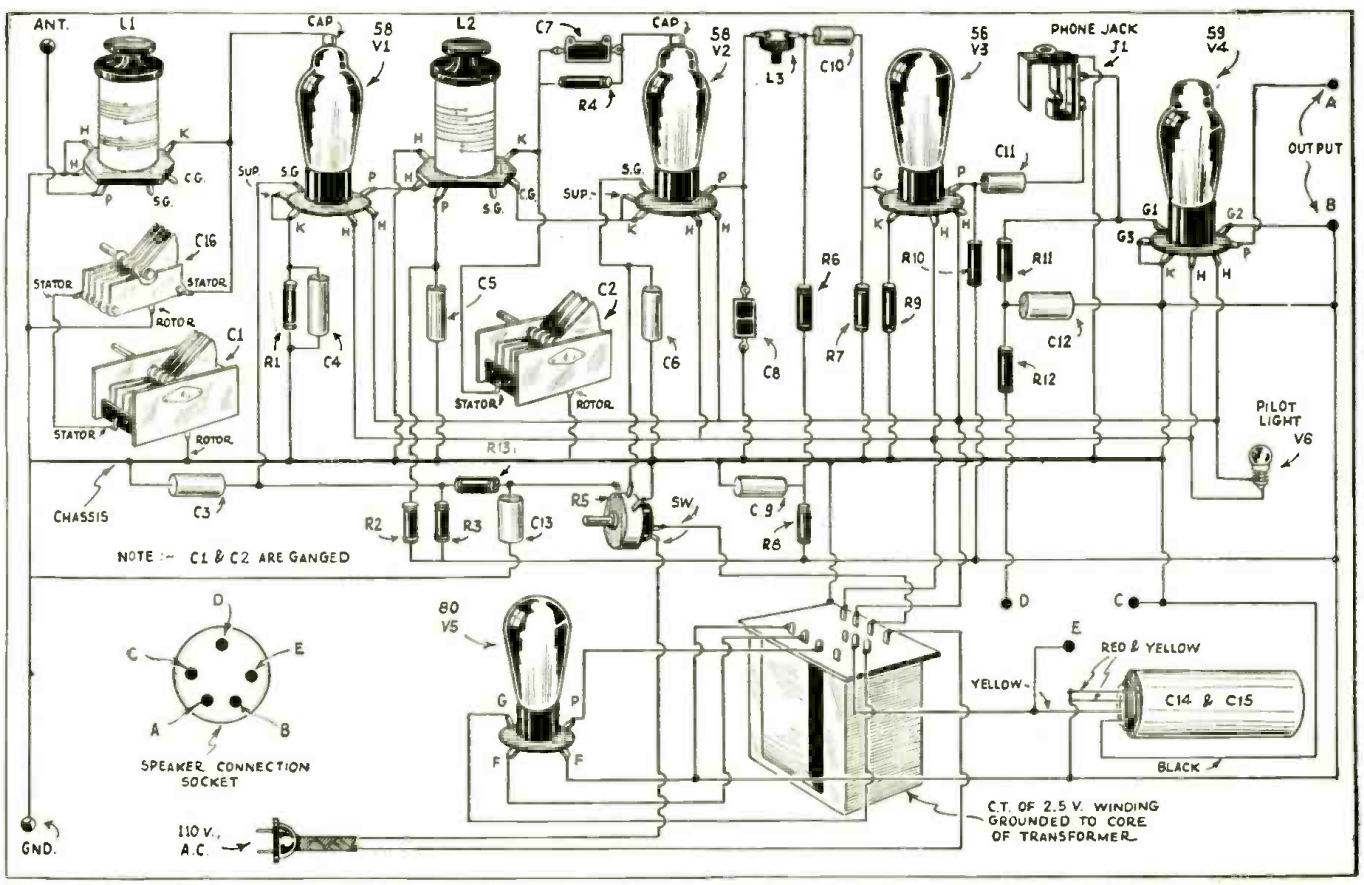
Constructing the "Discoverer" 5 Tuber

The metal chassis is furnished bent to shape and with the wafer sockets V3, V4, V5, speaker connection socket and binding post strip riveted in place. The four Isolantite sockets V1, L1, V2, L2 are fastened in place. The tube shield bases for V1 and V2 are also fastened in position at this time. The dual variable tuning condenser C1, C2 is equipped with stay bolts, so that the bolts can be slipped into the holes provided for them in the chassis and fastened securely. The condenser is mounted and then the dial. A single bolt on the front chassis wall holds the dial in place.

The small variable condenser C16 is mounted at the right of the front chassis wall. The regeneration control R5 is at the left. The phone jack J1 is mounted on the rear chassis wall as shown in the sketch.

The power transformer T1 is mounted next, being so placed that the 110-volt lugs are towards the rear of the chassis. A small bakelite termin-

(Continued on page 297)



This picture wiring diagram shows how simple a matter it is to construct a strictly up-to-date short-wave receiver of the highest engineering design—and it becomes all the simpler when one realizes that this set is available in "kit" form, with the exact parts as specified by the engineer who designed the set.

Leotone 2-Volt Set Has "Pep"!

This receiver possesses high selectivity, due to careful shielding; strong signals are produced in the loud-speaker by the judicious selection of the proper tubes. Four 2-volt dry-cell type tubes are used and standard plug-in coils are employed. A receiver that many readers have asked for data on.

It's "dead easy" to change the plug-in coils in the Leotone receiver, thanks to the diagonally opening metal cabinet. This 4-tube, 2-volt receiver operates a loud speaker nicely.

● THE carefully shielded 4-tube short-wave receiver shown in the accompanying illustrations embodies several new features. In the first place, the designers of the Leotone receiver have refreshingly departed from the usual mechanical arrangement of the tuning condensers found in the average receiver, and in this receiver we find them mounted vertically instead of horizontally. By this means, the engineers were permitted to mount the dial so that the graduations are read horizontally through a window at the bottom of the cabinet. Another excellent feature is the diagonal separation of the metal shielding cabinet, which exposes the plug-in coil sockets in a jiffy by simply flipping up the lid of the cabinet, which is a very desirable feature whenever the plug-in coils have to be changed. Improved selectivity is afforded by providing a well-designed tuned radio frequency stage. The plug-in coils used in the antenna circuit are of the same 4-pin type as those used for coupling the plate circuit of the R.F. tube with the grid of the detector tube. These plug-in coils may be of any standard make, data for winding which are given herewith, and designed for use with .00014 mf. tuning condensers. The two tuning condensers are ganged and a small variable trimming condenser of about 30 to 50 mmf. is connected across the second tuning condenser in the plate circuit of the R.F. tube.

To prevent the possibility of short-circuiting the B battery should the plates of the second tuning condenser accidentally touch, a small fixed condenser of .01 mf. is connected in series with the plate of the R.F. tube and the stator of the second tuning condenser as the diagram clearly shows. Due to the high value of this series blocking condenser there is no appreciable reduction in the tuning capacity.

Any average size antenna system may be used with this short-wave receiver or approximately the same size antenna as that used for broadcast reception. Instead of using a series trimming condenser in the antenna circuit the trimmer in this case is connected across the second tuning condenser in the plate circuit of the R.F. tube, as indicated in the diagram.

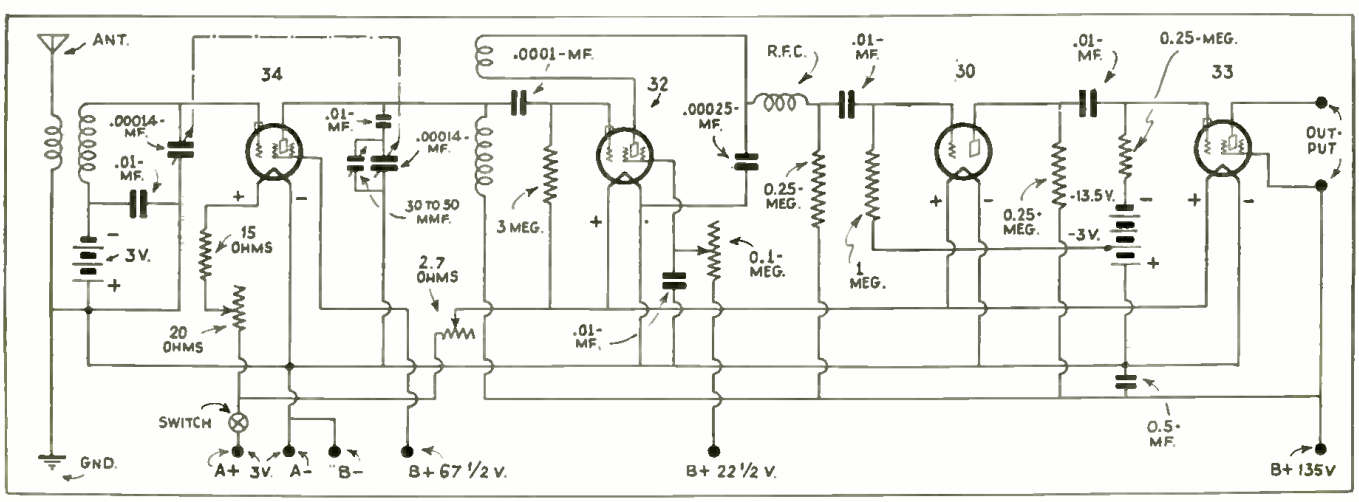
Detector Circuit Features

In this particular receiver grid-leak detection is employed, which provides high sensitivity and also smooth operation of the regeneration characteristic, the detector operating approximately on the square law. Regeneration is controlled in this detector circuit by means of the 100,000 ohm rheostat (potentiometer) which is connected in series with the 22.5 volt B plus feed, as illustrated in the diagram.

A volume control is also provided in this interesting circuit. In series with a 15-ohm filament resistor in the positive wire feeding the R.F. tube, we find a 20 ohm variable resistance, which is used as a *volume control.* This 20 ohm variable resistor also serves the purpose of checking any oscillations which might be set up in the R.F. circuit.

As in all other short-wave receivers, the radio frequency choke, RFC, is an important item and it should have low distributed capacity with a maximum of inductance, the value of the R.F. choke in this case being about 30 mh. One may try R.F. chokes having induct-

(Continued on page 300)



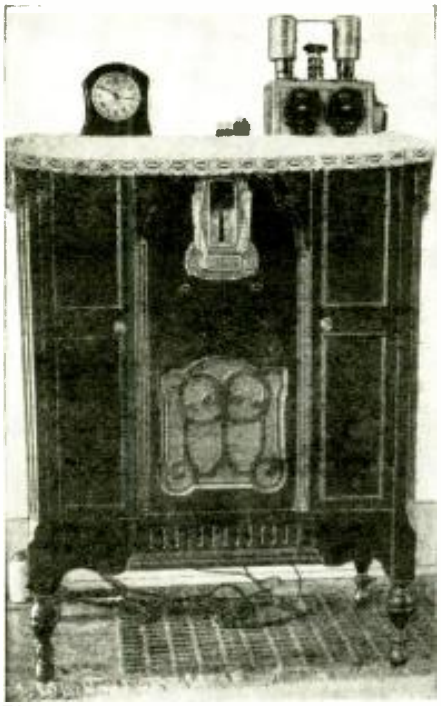
The interesting hook-up devised by the Leotone engineers, whereby maximum strength of signal is obtained, with a minimum of battery consumption. An A. C. model is also available.

2-TUBE A. C. Receiver To Work on Your B. C. Audio

By HENRY J. WAGNER

$20.00 June Prize-Winner

Mr. Wagner has tried out many different types of short-wave receivers; the one he here describes represents his final selection, with which he hears the "Europeans" in fine shape.



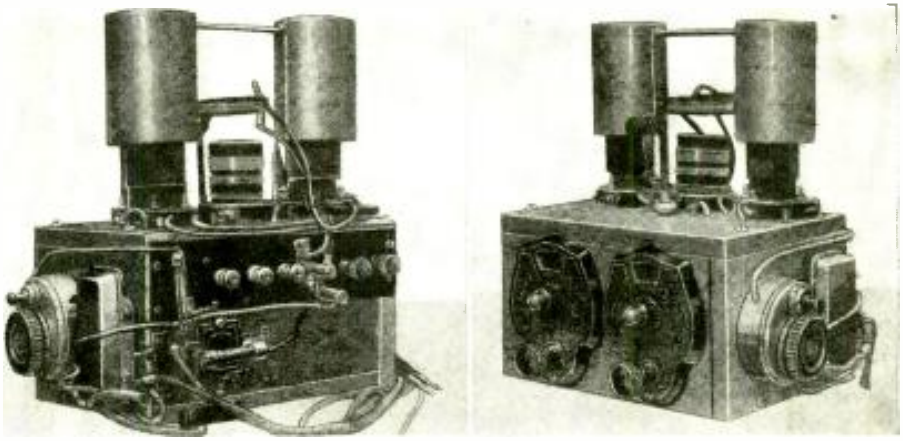


Photo at left above shows Zenith 200-550 meter "broadcast" receiver with Mr. Wagner's short-wave receiver perched on top of it. Front and rear "close-ups" of the S-W receiver unit appear at the center and right; the S-W signals are passed through the audio amplifier of the Zenith "B.C." set.

● I BELIEVE that short-wave fans will be interested in my reception of short-wave international broadcasting stations, whose programs are being heard directly from the loud speaker of a Zenith broadcast set. This model, 9 type 52, is equipped with a phono. pick-up connection at the rear of the chassis, which is coupled to its audio system. A two tube A.C. type short-wave receiver, which is placed on the top of the Zenith console, feeds its audio output into the phono. jack connection of the broadcast receiver, and with a combined power amplification of seven tubes, drives its 12 inch dynamic speaker.

For regular broadcast reception, the Zenith receiver is switched on in the regular way. To change to the short-wave band requires three operations that can be performed in five seconds. When the tubes heat up, the short-wave converter is ready to function. A selector switch connects the aerial lead-in from Zenith to converter, or vice versa. Another switch closes the connecting lead from converter to Zenith phone jack; another switch snaps on the house lighting current to the converter power supply. This describes the short wave change-over.

"Foreign" Stations Heard Nightly

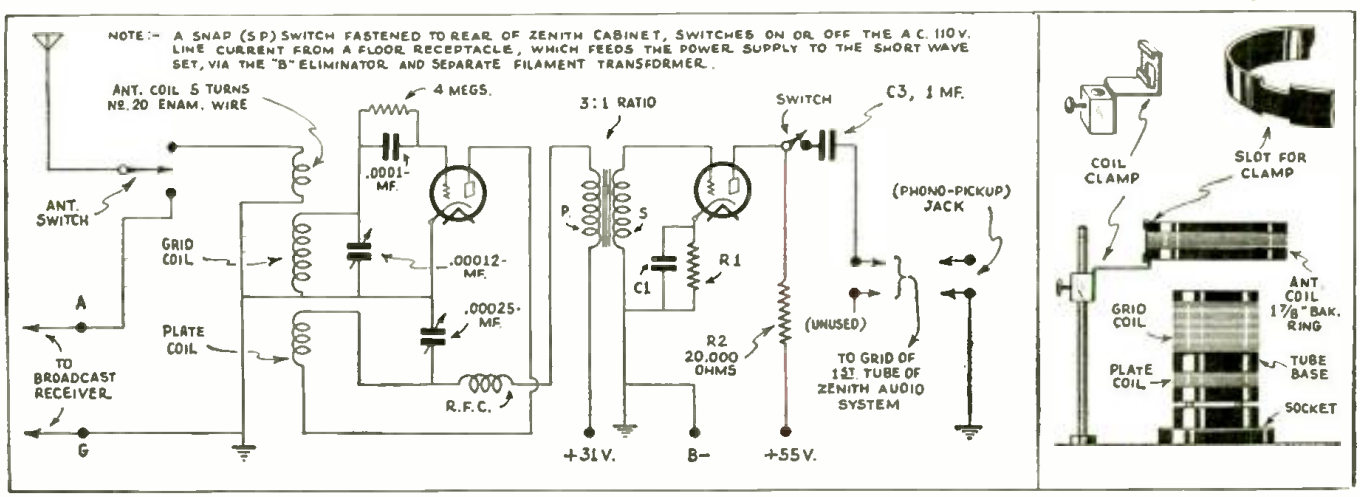
To swing back to broadcast reception (1500 to 550 kc.) move selector switch arm and open switch to phono. jack lead. The set receives, nightly, GSA, Daventry; EAQ, Madrid, and DJC, Berlin, with full loud speaker volume, and has remarkable stability. Placing the hands near the coils does not effect them. The American short-wave transmitters W1XAZ, W8XK, W2XE, W3XAL, etc., came in like "locals," and the regeneration must be cut down in most cases.

The original filament resistor wire was removed and a two-point contact was substituted in its receptacle by inserting two fine circular wound wires, over which slides the antenna lead-in contactor. Right-hand (clockwise turn of the knurled knob) connects antenna to short-wave receiver; the other way connects the Zenith broadcast receiver to the antenna.

Tubes in detector and audio amplifier stage are 27's. Filament current supply is from a separate filament transformer, placed within the Zenith cabinet. Plate supply is furnished by a Majestic type Raytheon "B" Eliminator, minimum output, 135 volts. Only two voltage taps are used, the 45 and 90 volt taps, respectively. However, this voltage is previously regulated by means of the resistor controls of the eliminator. Experience will determine which voltage is best for the detector and first amplifier—which is done by turning the knurled knobs on the eliminator.

You will note there is no cathode

(Continued on page 317)



Connections between the few pieces of apparatus required for building the 2-tube A.C. receiver, which Mr. Wagner finally found the best after many trials, are given in the diagram above.

"Aching all over, Bill connected up the dynatron frequency meter and set the dial reading to 10.1, the position that corresponded to the frequency of the police transmitter. . . Doc, standing behind the amateur, allowed nothing to escape his eagle eye and acute ear. . . ."

ATTENTION! All Squads!

By FRED E. EBEL W9CZU

● THOUGH Bill heard the door of his radio shack open and close, he did not turn around to welcome the visitor—a peculiarity which never failed to offend those who did not know the amateur well, and again, never failed to amuse those who were fortunate enough to be called friends. Though the latter chaffed the amateur on this apparent unsociability, they knew it was not bad manners that caused this eccentric behavior, but on the contrary, complete attention to the ham who was being worked.

Accordingly Bill, oblivious to his visitor, went on chewing the rag with the 160-meter fone down in Aurora, Illinois, three hundred miles away; a no mean distance what with a pair of overloaded '10's as oscillators and skip-distance being by no means great on 160 meters even allowing for nightfall.

"Glad to hook up with you, old boy," chatted Bill. "I was just going to pull the switch when I heard you calling CQ. Never heard such a dead night" . . . . .

An Unwelcome Visitor!

Had Bill eyes in the back of his head, they would have blinked in surprise at the sight "before" them. For they would have seen not the clean-cut youth that distinguishes most amateurs, but instead, a repulsive, sallow, hawk-faced individual.

And were the mythical eyes critical they would have detected a slight droop of the man's shoulders indicative of many years of hunching over pool tables.

Yet with all his repellent mien, Bill's visitor showed in his pinched features a high intelligence, or, considering the man's reputation, a misguided intelligence.

For the "uninvited guest" was none other than the notorious gang leader, "Doc" Turk, the same man who, years ago, had won a scholarship for his brilliant essay "The Prevention of Crime." The same man, too, whose abrupt departure from the university caused considerable concern. Even more concern when the school treasurer reported a deficit of two thousand dollars from the school safe. But at the time of this startling revelation, the versatile Mr. Turk had already forged commercial operator's papers, and, though his knowledge of the code was no greater than the average lid's, was pounding brass two thousand miles at sea on a dirty fruit vessel.

At this occupation of "Sparks" he engaged himself for five years, until, growing old enough to recognize the possibilities of capitalizing on his evil genius, Mr. Turk struck out for the Big City, not however without first relieving the captain of his life's savings. Here he established himself as a ring leader and acquired the appellation of "Doc" undoubtedly because of his erudition.

From that time on Doc Turk's unsavory adventures have been almost daily chronicled in the papers. Even now he was making crime history. . . .

The Fight!

Doc Turk smiling mirthlessly over the statement that it was a dead night, strode over to the 110-volt line-switch and threw off the current.

"Hey!" exclaimed Bill noticing the meter needles falling to zero. "Hey!" again, this time more as a gasp as he beheld his unusual guest.

"Sorry, young fellow," Doc said matter-of-factly, "but I'll have to use your station for about fifteen minutes. Just do as I say and you won't get hurt. Now follow me: tune your transmitter to the police station's frequency."

Bill, bewildered and numb of brain just stared at the man. Doc's features tightened; he pulled out a vicious looking Colt. "I'm not fooling," he rasped, "get going!"

The amateur collected some of his wits; he resorted to guile.

"I can't," he lied. "I'm down on 40 meters. The police station's on 122 meters. I couldn't . . . . "

"Doc laughed. "That's one for the book! So you're on 40—indeed! Well, listen here punk"—he wagged the automatic under Bill's nose—"I *know* you're on the 160-meter band; heard you! I'm an ex-commercial op, kid.

"I could tune this rig in my sleep, but tuning means fingerprints. Now get going—time's valuable and it's just about time for my boys to pay a little visit at the bank."

Bill saw the futility of argument. He, a mere amateur and this man an ex-commercial operator—no, he could not fool him. But he could lick him! Bill saw that immediately. He, lanky and wiry; his adversary, stunted and dissipated. A short scuffle and it would be all over. Bill would call the police and . . . but that gun!

He had it. He would direct the gang leader's attention off his person and then . . . .

"Okay," sighed Bill in mock resignation," hand me that wavemeter behind you."

The amateur held his breath. Would the gangster turn? He did. Viciously Bill struck out. The Colt went spinning and clattering across the floor, finally coming to rest in a corner. Bill lost no time pinning his light assailant to the floor. Now for the police. For once he regretted that his shack was practically sound proof; shouting would be of no avail.

But he had a transmitter! One that thousands of amateurs and short-wave fans could hear. Right in his block was a BCL with a short-wave converter. . . .

It was laborious lunging and pulling the gangster toward the 110-volt line-switch which Doc had just a few moments ago shut off. But, finally, with one knee pressing unceremoniously on the raging crook's chest, Bill threw the

switch. He waited for the tubes to heat.

And now the unhappy amateur had cause for further regret; the speech amplifier's pickup was crude. One had to speak directly into the "mike" and the latter was behind him on the table, five feet away! And that which would have simplified matters—the automatic—lay in the opposite corner of the shack. Bill was upon further thought glad of this. He did not want to fight for the gun's possession. One would probably be killed. The radio was safer.

The tubes were warm now. Bill, inwardly cursing his procrastination in building a more efficient speech amplifier, turned his head toward the "mike" and yelled: "Hel . . . ."

But he got no further. In that brief unguarded moment Doc had twisted his head and sunk his teeth into the amateur's arm. Instead of "Help" an agonizing cry of pain was broadcast.

Instinctively Bill's good arm pressed the wound. Doc took advantage of this. He sprang up and kicked the amateur in the stomach. Then throwing off the switch, he propped the gasping youth into a chair.

"Why, you—" Doc was inarticulate with rage, while Bill, fighting for air, felt like dying.

"One more slip like that, chump, and *out* you go!" warned Doc, the gun once more giving him the courage he desired. "Now will you get going, or should I let you have it?"

Cold steel pressed on to Bill's forehead. He did not want to die; he would do it.

●What would you do if you were the owner of an amateur transmitting station and was suddenly confronted by a gangster with a drawn gun, who ordered you to tune your station so as to interfere with police radio waves? This was the unusual experience through which Bill Jensen passed, and whether you agree with the way he reacted or not, we are sure that you will admire the clever bit of radio science which Bill brought to bear on the situation. How did the police learn of the situation in Bill's shack?

Heterodyning with the Police Radio

Aching all over, Bill connected up the dynatron frequency meter and set the dial reading to 10.1, a position that corresponded to 122 meters, or 2,458 kilocycles, the frequency of the police transmitter.

Doc, bending over the amateur's shoulders, allowed nothing to escape his eagle eye and acute ear. He checked every detail, even adjusting the condensers of the transmitter to zero beat with the monitor's note. Bill could hardly help admiring the fellow's thoroughness.

"We didn't allow the tube of the frequency meter to warm up," observed the ex-commercial operator. "That means 'frequency drift' which suits me just fine. Our frequency will be slightly off of the cop's wavelength and won't those signals sing a sweet heterodyne!"

Bill did not appreciate the gang chief's humor. He simply sat nursing his aches and unhappily wondering if his friends would visit him in jail. From the latter, Bill's active imagination took a more grim and morbid turn. He saw the gang chief's hoodlums breaking open banks, killing objecting watchmen, and, in general, running the gamut of crime, while the police radio—an impotent array of shiny expensive apparatus less useful than a peanut tube oscillator with loop modulation! Into these unpleasant meditations Doc's voice barked:

"How do you test the tone quality of your rig?"

"Phonograph records," replied the amateur listlessly.

"Fine! Put one on the turntable. If the heterodyne squeal doesn't mess up enough this will."

"No records," from Bill.

"No records? What do you call this?"

Doc held up a small aluminum home recording disc.

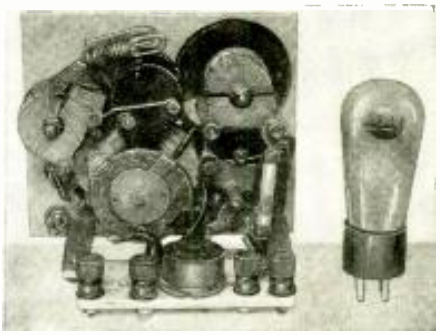
Bill's eyes flashed; he tried to answer calmly:

"Oh, that? That's one of those home recording records. My little brother made it during the Christmas holidays.

(Continued on page 315)

The "Tinymite" 1-Tuber Rolls 'em In

All ready for action—the "Tinymite" 1-tube S-W Receiver and phones.



Rear view of the "Tinymite."

● THE tickler switch of the *Tinymite* receiver rotates from the bottom to the top for higher waves, so that when the tickler switch is set on the third point from the bottom and the secondary switch is set on the third point from the top, they are on 160 meters and one should be able to hear amateurs, phone, police calls and airplanes. If the set refuses to oscillate on the lower waves, keep moving the tickler switch toward the top. If broadcast waves are desired, turn the secondary switch to the bottom point and leave tickler switch on the 160 meter or third point from the top, or move up to the top point.

The author has a confirmation on duplex speech between W3KL and Sandy Hook, N. J., and other "DX" records, which he can swear to if necessary. He has received (at Tionesta, Pa.) amateurs, phone, police calls, pilots in planes, plane stations and broadcast, all on a sixty-five foot aerial, one 45 "B" battery and 4½ volts "A" battery on a 99 tube, which seems to work best in the set. You might try a 30 type tube.

The author has heard police calls from Lansing, Pittsburgh, Cincinnati, Chicago; plane stations such as Toledo, Indianapolis, St. Louis, Cleveland and New York. The regeneration slide is critical on airplanes. If the set fails to oscillate pull the coils together, if too much, push apart, slowly turning the tuning condenser.

The aerial condenser is critical and seems to work good when set close; try adjusting it for different wavelengths. Give the set a critical test on a real aerial. If too much oscillation occurs shorten the aerial or adjust aerial condenser slowly.

The author's original reception check shows:

WRDS	W1BCR	W1DFF
WKDN	W3KL	W3XK
WPDC	W8DHT	W8ATM
W8FCL	W8HN	W8KFF
W8ACI	W8AGE	WBCW

Parts List for "Tinymite"

1—celluloid panel—bakelite may be used, 4⅜ x 5⅜.

L1—The secondary is a coil taken from old Crosley "pup." It was tapped at four evenly divided places.

L2 is the tickler, a coil taken from RCA old type superhet. It is tapped at four evenly divided points.

C1—.0001 mf. midget condenser, Hammarlund (National)

C2—vernier condenser, 10 to 20 mmf. capacity. —Hammarlund (National)

C3—.0001 mf. midget regeneration control condenser.

(Continued on page 306)

WORLD-WIDE SHORT-

Automatic Volume Control

(From Wireless Magazine—London, England)

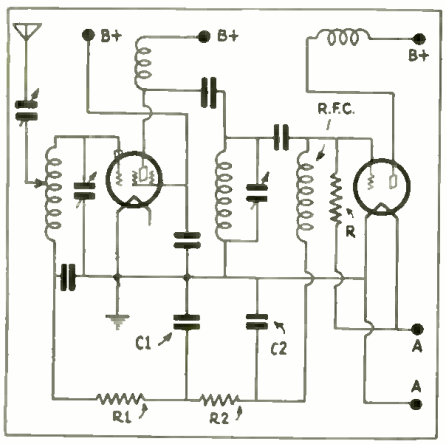
● AUTOMATIC volume control is in great favor at the moment. In the author's experience this refinement is only about 50 per cent effective and decreases the volume on weak signals, increasing the background noise between adjacent stations. Of all the systems tried, a detector limiting device was to be preferred as it helps to stabilize the output more than others.

"The arrangement is very simple and in operation, all you need do is push up the reaction (regeneration) to give the maximum amplification on a moderately weak signal; when a local or other powerful transmitter is tuned in, the *output limiter* will come into operation, keeping the volume at the same level all the time.

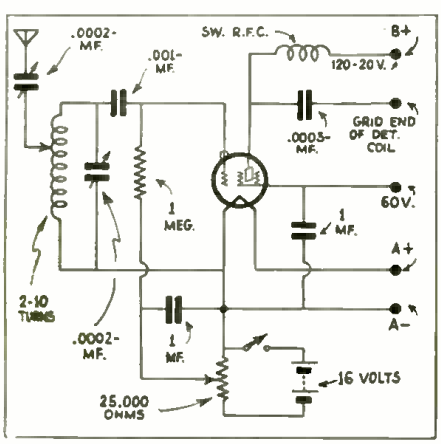
"The diagram shows the principle of the idea. Unless two high-frequency stages or high magnification A. C. valves (high amplification A. C. tubes) are used, the normal methods of automatic volume control are not to be recommended."

"I have not tried a double-diode triode or the simple double diodes in a short-waver —perhaps this may prove a solution to successful volume control," says the English writer of the article mentioned.

The diagram of the detector limiting device is shown here. Unfortunately no data were given, so the experimenter who is interested will have to find the correct values by trial.



A new English circuit providing automatic volume control for short-wave reception.



Improved screen-grid radio-frequency amplifier hook-up.

● **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.**

Improved Screen-Grid R. F. Stage

(From Amateur Wireless—London, England)

● MANY English "fans" who have built short-wave receivers of the usual regenerative type are finding that the addition of a tuned R. F. stage is quite worthwhile. This unit can be made separate from the main set and be connected to it.

For normal short-wave working the the straight *high frequency* (English term for radio frequency) set has commanded wide support, for in spite of the general belief about the loss of amplification below 100 meters, experience shows that down to about 20 meters real high frequency gain is obtained with a good H. F. stage.

Even down to the lowest of the normal wavebands, that is to say, 14 meters, a stage of screen-grid has proved an advantage in maintaining the smoothness of reaction (English term for regeneration). Moreover, the resulting stabilization of the detector and its segregation from the aerial tuning means that the detector tuning can be calibrated accurately.

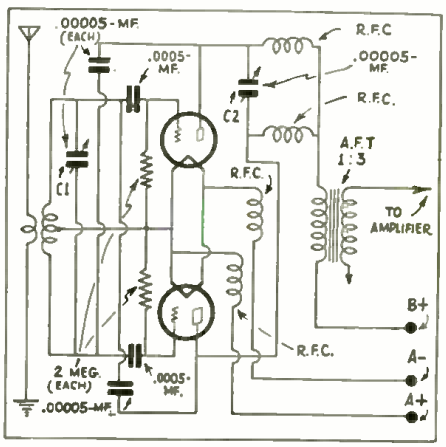
For most listeners a stage of tuned-grid coupling should be very useful. The diagram shows how such a stage can be added. There is the usual aerial tuning coil, from 2 to 10 turns, according to the waveband wanted. (It would be better to use another coil identical with the coil in the regular set, so that the tuning would be more or less the same on both the set and amplifier.—*Editor.*) The negative bias is applied to the screen-grid tube by a potentiometer across a 16 volt grid battery (commonly called a "C" battery in the U. S.). The grid-leak and condenser method of applying this bias is strongly recommended.

In the anode (plate) circuit there is a good short-wave R. F. choke, with a .0003 mf, coupling condenser connecting from the plate to the aerial terminal of the set, that is to the grid tuning coil of the detector.

A Push-Pull Ultra-Short-Wave Receiver

(From Funk-Technische Monatshefte—Berlin, Germany)

● IN the field of ultra short waves, the receivers that have become almost universal are certain forms of the super-regenerative circuit and superheterodynes. While these sets are proving their worth, they are often erratic in operation and are very difficult to control.

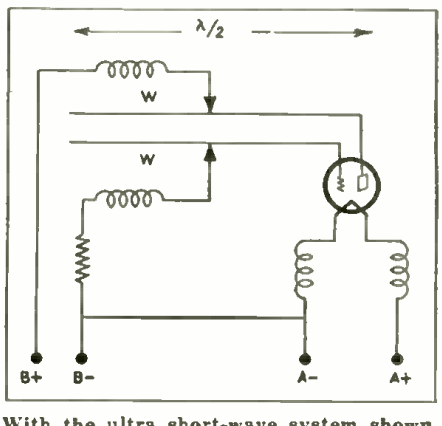


Superior stability and other features are claimed for this "push-pull" short-wave detector circuit

A different type of ultra-short-wave set is described in the above magazine. The author claims much greater stability with the arrangement shown, with sufficient sensitivity and amplification to compare favorably with the ordinary super-regenerative circuits. The set employs two triodes arranged in phase opposition, so that a push-pull action is obtained.

The circuit shows the values of the capacities required in the various parts of the circuit. The coil data were not given in the article, but the experimenter will find that coil constants supplied for other sets appearing in SHORT-WAVE CRAFT may be applied, by changing the value of C1 to suit the coil requirements. The only change necessary is the addition of a center-tap on the grid winding.

While no exact details are available for this circuit, it seems to have merit. The editors will be glad to hear from any experimenter who constructs one of these



With the ultra short-wave system shown, wave lengths as low as 2.8 meters were obtained with high power.

WAVE REVIEW

Edited by C. W. PALMER

sets, as to its stability and also how it compares to other systems for the wavelengths below 10 meters.

Ultra-Short-Wave Oscillator

(From World-Radio—London, England)

● DURING attempts which have been made to generate considerable amounts of power at very high frequencies, an entirely new form of circuit has appeared. The new circuit would seem to be a logical development of the Hartley and the Gutton-Touly circuits, which have become the standard circuits for ultra-short waves. It consists of a pair of Lecher wires attached to the tube electrodes (W and W), the difference between this and previous circuits being that L and C are distributed instead of lumped as in the two circuits mentioned above. The tube thus forms an integral part of the Lecher system.

The advantage of this is that the L/C ratio is kept as high as is physically possible, so that much shorter wavelengths may be generated with the same tube. Using a large (30 kw.) power tube, the shortest wavelength obtainable with circuits of conventional form was 6 meters, and then only with low efficiency. With the new system a wavelength of 2.8 meters was obtained and with quite good efficiency (over 20 per cent).

There are, however, apparently two snags in the method. First, the mechanical difficulty of tuning; secondly, on account of the fact that the tube forms part of the *transmission line* it must be so constructed or joined to the latter that its *characteristic impedance* is the same as that of the line. Since one cannot insert a transformer between the valve and the line, it is necessary to design the valve mechanically to form part of the line. The most efficient construction appears to be that of cylindrical electrodes of normal form, the line being formed of concentric tubes in continuation of the electrodes. The tubes form the line, of course, and may, in the case of very short waves, form the aerial —since their length is nearly a half-wavelength.

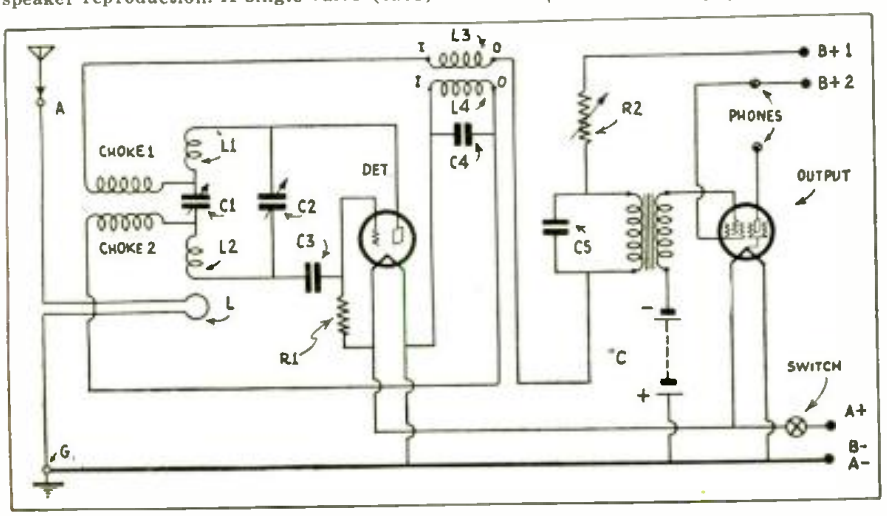
A 5 to 7 Meter Super-Regenerative Set

(From Wireless World—London, England)

● THIS set is a simple two-valve (tube) super-regenerative receiver intended for headphone reception; but as its sensitivity is of a very high order, there is every reason to believe that in many cases signals will attain an intensity suitable for loud-speaker reproduction. A single valve (tube) is made to serve the dual function of quenching oscillator (better known in U. S. as difference frequency oscillator) and detector, its sensitivity being controlled by a 50,000 ohm resistance R2 in the H. T. ("B" battery) supply lead. A single low frequency (audio) amplifier is employed and coupled to the detector by a step-up transformer. In the last stage either a triode or pentode valve may be used; the latter is recommended as it affords greater amplification.

A few special components (parts) are necessary including one small variable condenser C2, having a very low minimum capacity and a maximum value of not more than 35 mmf. This is used to tune a circuit consisting of two small coils L1 and L2 joined in series with a semi-variable condenser C1. This has a maximum value

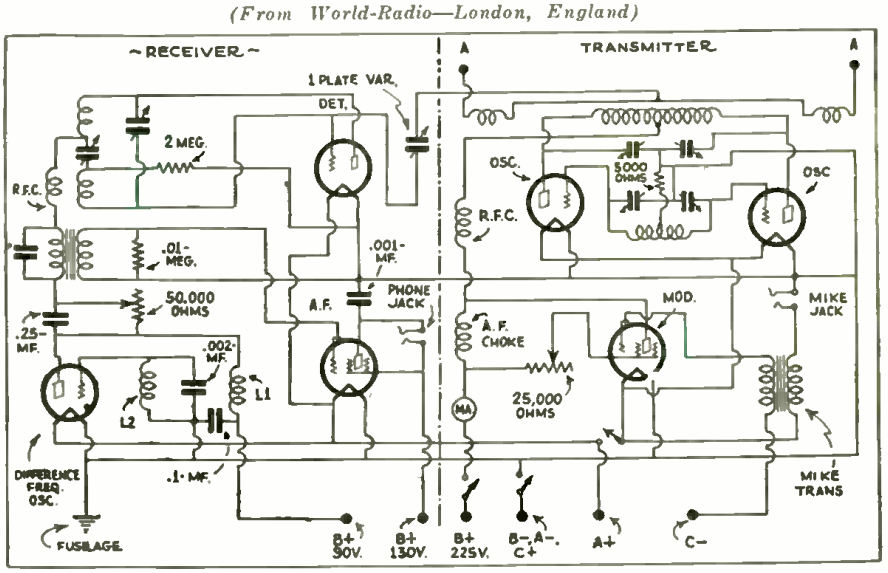
(Continued on page 319)



5 to 7 meter super-regenerative receiver diagram. C1=50 mmf. max., C2=35 mmf. max., C3=.0001 mf., C4=.01 mf., C5=.001mf., R1=2 megohms, R2=50,000 ohms variable.

U. S. W. Transmitter and Receiver

(From World-Radio—London, England)



The circuit diagram used in the combined airplane transmitter and receiver here described.

● IN this article there was described a portable transmitter and receiver arranged for *duplex* telephony on a single aerial for use between an airplane and its airdrome. This transmitter and receiver were designed and constructed in the Straits Settlements.

Duplex communication can be obtained by tuning the receiver and transmitter to slightly different frequencies. In this particular case, the wavelengths used were separated by 0.1 meter, being 7.1 and 7.2 meters respectively. Using a push-pull circuit for the transmitter with half-wave Hertzian aerials, one finds a point in the aerial coupling-coil circuit which is a point of low or zero potential for the transmitted wave. To the received wave, which is of slightly different frequency, however, it offers sufficient potential to allow the transfer of received signals from aerial to receiver. Reception is therefore carried on without interference from the transmitter.

The combined transmitter and receiver was fitted into the front cockpit of a Moth airplane, and the requisite batteries which were housed in the luggage locker in the fuselage were connected to it by means of a multiple cable, with a plug and socket to make easy removal possible. During tests of the range it was found that a maximum for the power used was approximately 10 miles at 5,000 feet altitude.

The weight of the combined unit is approximately 25 lbs. The batteries used weighed 80 lbs., but it is hoped by the use of a wind-screw (air-propelled) generator to reduce the total weight to 50 lbs.

The complete circuit diagram of the transmitter and receiver as operated from the common batteries is shown in the accompanying illustration. It was found advisable to fit a variable resistance of 25,000 ohms in the auxiliary grid circuit of the modulator, to give a control of the modulation as various observers use the microphone in different ways, the tendency for anyone wearing headphones being to shout. The total power input to the transmitter was approximately 3½ watts.

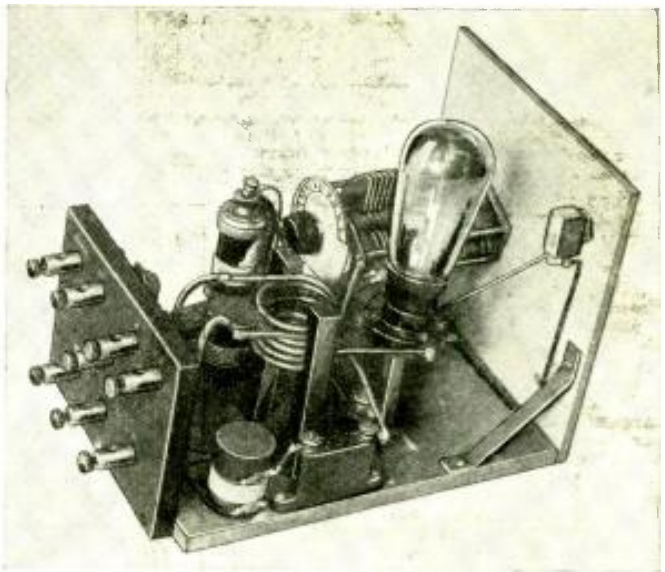
As already stated, the aerials used were half-wave Hertzian and were simply attached to the wings at a point about 3 feet from the ends of the folding lower wings. Ordinary rubber insulated flexible wire was used and no trouble was experienced.

(No other details about the construction of the units were given than those shown on the diagram. The interested experimenter can easily substitute parts for those not specified. The coils L1 and L2 are the variation frequency coils of the super-regenerative receiver, while the two coils

(Continued on page 317)

AN ULTRA Short-Wave Converter

Details for building an ultra short-wave converter to be used with any broadcast receiver, for tuning in waves in the 5 to 10 meter region. It uses but one tube which acts as an oscillator and detector or "frequency changer," forming a superheterodyne when connected to your B. C. set.



The ultra short-wave converter which uses but one tube; it permits you to tune in waves of from 5 to 10 meters length with your broadcast receiver.

● IN some recent experiments conducted by the B.B.C. (British Broadcasting Corp.) in which programs were broadcast on a wavelength of about seven meters, a number of sets were designed to pick up the signals. Preliminary tests made it obvious that receiver technique on seven meters is very different from that of the normal broadcast bands. The length of the aerial, for example, may be no more than the battery leads and much less than the usual ground wire. It is generally better, therefore, to replace the usual ground connection by a counterpoise and couple the aerial to the grid magnetically, so that there is no direct connection. Again, as the tuning inductance for this wavelength consists of about 10 inches of wire, great care must be taken with the layout of parts to avoid long leads.

This receiver is an adapter, consisting simply of an oscillating tube which acts as a frequency changer. By this means, any existing broadcast set can be converted into an ultra short-wave superheterodyne receiver. The circuit of the adapter is shown in the diagram. The tuning circuit is very simple. An aerial coil L1 is coupled to the grid coil L2, which is tuned by a variable condenser C1, having .0001 mf. capacity. This condenser is made up of two parts, a main section and a vernier section. The main portion is adjusted by a small knob in the rear of the set and the vernier only is operated by the dial on the front panel. This makes the tuning sufficiently stable for ordinary purposes, and still allows the set to cover a reasonably wide wave band.

Regeneration is provided by coil L3 and the plate bypass condenser C2. A plate resistor of 25,000 ohms is used with an output coupling condenser of .001 mf. Four ultra-short-wave chokes are inserted in the battery supply leads.

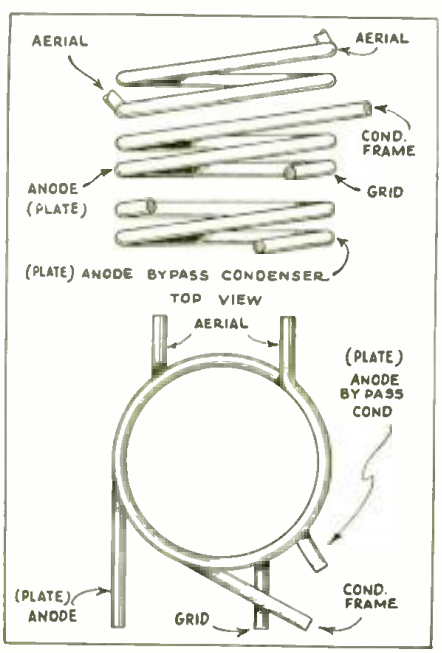
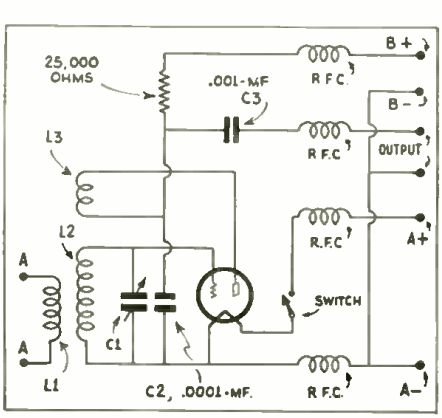


Diagram at left shows details of the ultra short-wave converter coils, while wiring diagram showing how to build this extremely simple converter appears below.



Tuning Coils

The coils are wound with No. 8 B & S gauge bare copper wire. The aerial, grid and feedback windings each consist of about 1¾ turns. They are made by winding the wire as tightly as possible around a wooden form 1¼ inches in diameter, spacing the turns 1/16 inch. When the wire is released from the form, the turns will spring and the diameter of the coil increase to about 1⅜ in. which is the required size. The direction of the winding is important and the sketches of the coils should be referred to in order to ensure the correct result.

The R.F. chokes are of the single-layer type, made by winding 24 turns of number 18 B & S gauge insulated copper wire, with adjacent turns touching, on a form one inch in diameter and 1¾ inches long. They may be supported by a machine screw inserted from beneath the baseboard into a threaded hole in the form.

(While the tube recommended for this set cannot, of course, be obtained in the U. S., it can be substituted by any triode with similar characteristics. The original type has an impedance of 4,000 ohms.)

Methods of Operation

To tune in the ultra-short-wave transmission, the first step is to adjust the broadcast receiver to maximum sensitivity with the tuning dial set to a point where *no interference* is produced from the broadcast band. The vernier condenser should then be set to the middle of its scale and the main section of the tuning condenser should be set approximately to tune in the desired transmission. Final adjustments can then be made quite satisfactorily with the vernier condenser. It will be found that there are two tuning points at which signals come in with equal clarity; this is the usual result with this type of adapter. There may also be found two other points at which signals are received, but at which they are much weaker and of poorer quality than the real tuning points.—*World-Radio, London, England.*

Preventing "Tuning Holes"

● SHORT wave receiving sets, particularly those sets designed for CW code reception on wavelengths below 100 meters, will stop oscillating when they are tuned to the same frequency

(Continued on page 319)

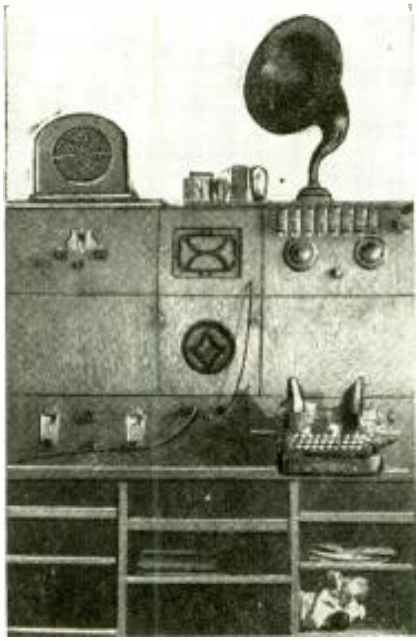
Miss Catherine Martin of Altadena, California, (Call W6JDQ) who has been an enthusiastic "short-wave fan" for several years and who is now one of Uncle Sam's licensed amateur radio operators.

HATS OFF TO Catherine Martin— Builder of 200 Sets! And She Has An Amateur License Too

Miss Catherine Martin is one of the outstanding, if indeed she is not the outstanding, young lady "ham" station owner and operator of all time. Miss Martin who hails from the sunbathed city of Altadena, California, has had a lot of experience in building and operating short-wave sets in the four years since she first "listened in" on a crystal set. Miss Martin has built around 200 sets, some "broadcast," but mostly "short-wave". She recently passed successfully Uncle Sam's examination for an Amateur Operator's License and her station call letters are W6JDQ.

● ABOUT four years ago, this past Mother's Day, my brother made me a "crystal" set, the first set I ever had. I could only get one station, KFI, on the set at first, but later, when I could just barely hear another station, KHJ, I was thrilled beyond expression. True, I could get all the stations on the family radio, but to be able to receive two stations on my very own set was practically beyond comprehension. Thus, I started in radio.

I had played around with many hobbies previous to this time and I had always been interested in science and mechanics. When I began to experiment with that crystal set I knew I had found my future field.



The "operating" desk in Miss Martin's station at Altadena, Calif. Yes, she has a "mill"—and some switchboard, what!

I was not contented with the crystal set, to make a one or two tube battery set, was at that time my highest ambition. I made that set—and it worked! Wonder of wonders, my head began to swell. At that time A.C. sets were becoming especially popular so I procured a few old D.C. sets. At first I made only broadcast sets and played with them, then my desire for DX took me into the short-wave field.

As a short-wave builder I wasn't so "hot". I did make a set that would bring in the local hams, and even reached up to San Francisco. In the basement of the house I fixed up a room that served very nicely as a workshop.

A little later I got enough money to buy an A.C. Pilot Super-Wasp, and my work in short waves really began. With the Super-Wasp I could easily reach out for the DX I had been wishing for.

She Has Made 200 Sets!

I guess I've made around two hundred sets, some broadcast or long wave, but mostly S.W. I learned all I knew up to about two months ago just by reading books and magazines, picking it out by myself, and learning much through sad experience.

Two months ago I decided I must begin to really get busy, so I began the Radio and Television Institute course. I have enjoyed it immensely and find it excellent.

Although I have never had an amateur station, I have wanted one and have all the parts for the transmitter. Code work has held me back. Now, however, I have started, with the help of my physics teacher who is an old army operator, a class in code after school. I hope to have a real "ham" station soon.

I am really a disgrace to the feminine population, because instead of having a nice girlish bedroom and closet, I have radio sets in the bedroom, and the closet—horrors!—the shelves are "chuck full" of old sets and parts. My clothes, instead of being the main articles, are shoved into the corner, and radio things fill every available space.

Everything I have, with the exception of the Super-Wasp, *I have made myself*, cabinet and radios. In the cabinet, as you can see from the picture, I have three radio sets. On the lower left-hand panel is the Super-Wasp. The panel above the Super-Wasp is on hinges, opening so as to change the coils on the set. In the upper left hand panel is a short wave set I made a short time ago, however I am making another set now to take

(Continued on page 300)

Miss Martin with one of her numerous receiving sets. It has screen-grid tubes 'n'everything.

WHAT'S NEW In Short-Wave Apparatus

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

Universal A.C.-D.C. Portable S.W. Receiver

● A HEADPHONE portable receiver for short-wave reception, operating from either the A.C. or D.C. line, requiring few parts, being simple to construct and assuring good performance, is especially attractive to the set builder at this time of the year when week-end traveling is popular.

The fact that good results can be obtained on short waves with the simplest equipment has often been pointed out in SHORT WAVE CRAFT. This fact is substantiated by this receiver which uses but two tubes and a rectifier, yet has a record of having received several European stations in the short time that it was tried out.

The flexibility of this little receiver is of course due to the use of the 25Z5 as a rectifier when A.C. is the supply; the tube being floated otherwise on the D.C. line. For D.C. operation the only use of the tube is for the resistance of its heater, as you can see by referring to the circuit diagram. The filament of this tube in addition to the 200 ohm, 20 watt series resistor serves to reduce the line voltage to the correct value for the two other tubes.

Of these two others, one, the 78 is the detector. While this tube is ordinarily classed as a super-control radio frequency amplifier, it lends itself well to the grid-leak type of detection, with the cathode connected to ground. Since the "B" current of the entire set is only about 16 milliamperes, the three separate chokes in the positive "B" lead drop the voltage only 7 volts, part of which is counteracted by the voltage-lifting effect of the filter condensers.

The Circuit

As an examination of the diagram will show, the set uses a standard regenerative detector fed into a power pentode audio stage, coupled by the resistance-condenser method. One variation from the standard type of circuit is in the aerial series condenser. Instead of placing a semi-variable capacity in the set, a variable condenser of 60 mmf. is mounted directly on the panel. The adjustment of this condenser is extremely important in a short-wave receiver, as many of you know.

By correctly adjusting this condenser, the natural wavelength of the aerial is shifted and this often results in an unconscious selection of half-wave and quarter-wave aerial conditions. Whatever the merits of the "measured" aerials may be, at least it is true that the regenerative effect in the detector is increased by decreasing the series capacity which assures satisfactory oscillation on even the highest frequencies.

The actual construction of the receiver is very simple—as explained before. The layout of the parts can be readily seen from the panel view. The values of the parts used are important, however, and it is suggested the original parts be used wherever possible.

List of Parts

1—Set of Powertone short-wave plug-in coils.
1—Powertone 50 millihenry R.F. Choke.
3—Powertone 30 henry chokes (special low resistance type).
2—Hammarlund 140 mmf. variable condensers.
1—Hammarlund 60 mmf. variable condensers.
1—Powertone .0001 mf. condenser.
1—Powertone .01 mf. condenser.
1—Powertone 10 mf. condenser.
1—Powertone three-section dry electrolytic condenser (16—16—8 mf.)
1—Powertone 3 megohm grid-leak.
1—Powertone 250,000 ohm resistor.
1—Powertone 500,000 ohm resistor.
1—Powertone 750 ohm resistor (1 watt).
1—Powertone 200 ohm resistor (20 watt).
3—Six contact sockets, Alden, (National, Hammarlund).
1—Four contact sockets, Alden, (National, Hammarlund).
1—Grid clip.
2—Pairs of Binding Posts; Eby.
1—Line Switch.
2—Dials—Vernier Type.
1—Knob.
1—Powertone metal chassis.
1—Six-foot cord with plug.
1—Tube shield for 78 tube.
1—Powertone metal panel.
1—Powertone Carrying Case.
1—78 Tube, Gold Seal.
1—43 Tube, Gold Seal.
1—25Z5 Tube, Gold Seal.

—C. W. Palmer.

New Glass H. T. Condensers

● WITH the increasing use of high frequencies for transmitting purposes, the need for electrically and mechanically perfect equipment is apparent. With this thought in mind, one radio manufacturer offers a new line of electrostatic capacitors, in

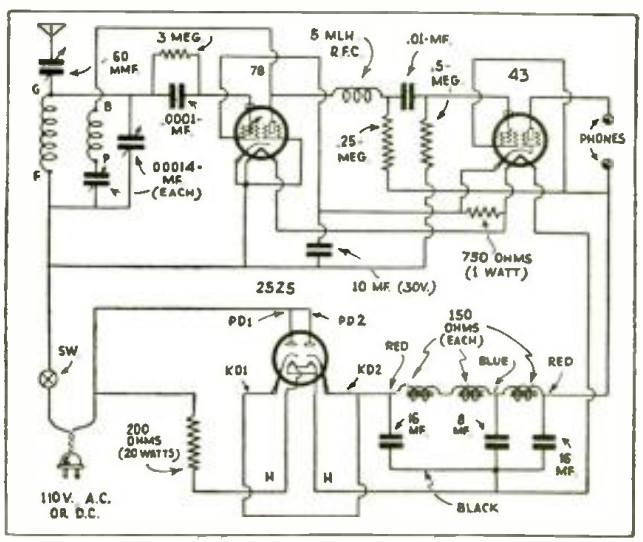
A novel new type of guaranteed high tension condenser for transmitting and similar equipment, the dielectric of which is composed of selected flint glass (No. 117)

which a high quality of flint glass is used for the dielectric medium, instead of paper or other materials.

By using flint glass for the dielectric

(Continued on page 299)

Above—C. W. Palmer, author of the accompanying article making actual test with the Powertone portahle 110-volt, A.C.-D.C. Receiver. (No. 116)



Simple wiring diagram used in the 110-volt A.C.-D.C. portable illustrated above. The plate current is rectified hy a 25Z5 tube. The whole outfit is very light.

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

VELOCITY . . . The Latest Microphone

By A. Barbieri, E.E.
Research Engineer of Bruno Laboratories

The velocity microphone has the "whole world by the ears," to use the popular expression, and the editors are glad to present herewith a description of a "mike" of this type, intended for the amateur.

● WHEN Bell invented the telephone, he could not visualize what demand would be made of his invention only half a century later. For fifty years the carbon microphone reigned supreme, but when radio ceased to be an

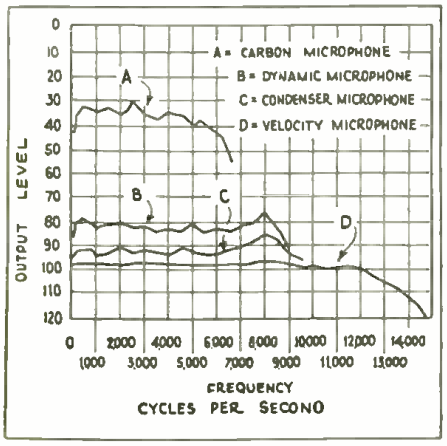


Fig. 1. Graphs showing output level and frequency response of four different types of microphones.

experiment, the first and most important link in the chain of electro-mechanical apparatus used in the transmission of sound was made the object of an enormous amount of research.

The first improvement to appear was the *condenser* microphone. This device consists of two electrodes spaced one thousandth of an inch or more. One electrode is a very thin diaphragm of aluminum, the other a relatively massive disk. The sound waves striking the diaphragm will cause very minute changes in the spacing between electrodes, thus changing the capacity of the device, which in turn, amplified by two or more stages, produces variation in the electrical circuit to which it is connected.

The *condenser* microphone, when properly constructed, is absolutely quiet in operation. There is no possibility of hissing, as this microphone is essentially an open-circuit device—nor is it possible to "blast" it. However, its *output level* is very much lower than that of the carbon microphone and it is for this reason that at least two stages of amplification are necessary before a condenser microphone can be of any practical use.

The *frequency response* of a typical condenser microphone, however, is far superior to that of an average carbon. Figure 1 shows a comparative set of curves taken with four commonly used microphones.

Figure 2 shows a typical wiring diagram exceptionally well suited for a *condenser* microphone *pre-amplifier.*

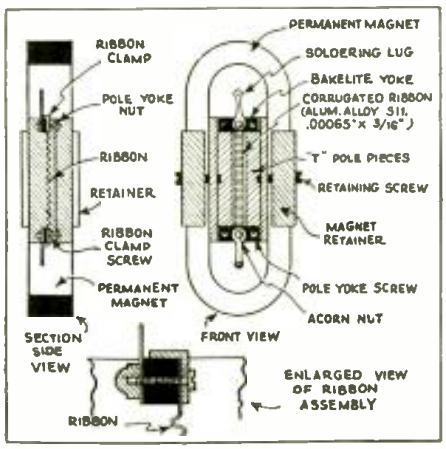


Fig. 4—Sectional view of the Bruno Velocity Mike.

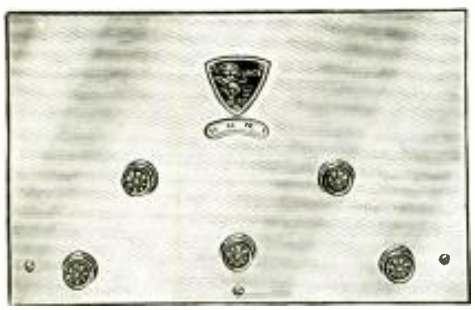
The type 864 tubes are recommended as they are not as microphonic as others. With the proper changes in "A" battery supply, the 30 type tubes can be used satisfactorily.

Next on the list of recent microphone developments is the *dynamic.* Its construction is very similar to the dynamic speaker. It consists of very delicate movable parts, capable of being operated by the very minute energy of the sound waves exerted on the dia-

(Continued on page 309)

Powertone-Wallace S-W Receiver

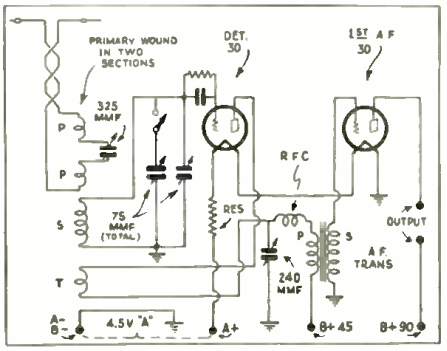
This short-wave receiver represents a new departure, particularly in the design of the antenna coil, which is arranged in two sections with a variable tuning capacity connected between them. This set is especially suited for transposition lead-ins.



Front view of the Powertone-Wallace S-W receiver.

● MANY short-wave enthusiasts prefer to purchase a completely built, wired and tested receiver from a radio supply house. Others like to "roll their own"; that is, assemble a receiver from a standard kit of approved and specified parts. So that the fancies of all can be satisfied, a well-known radio manufacturer is building Wallace receivers, wired or unwired, or in kit form with complete constructional and wiring information.

One of the obstacles to enjoyable short-wave reception is the difficulty encountered in finding DX stations. This task is simplified in the Wallace receiver by use of a specially manufactured Hammarlund combination band-spread tank-tuning condenser. This condenser is built in two sections; one ("band-spread") of two plates, a stator and a rotor, the other ("tank")



Connections used in the new receiver here described; note split antenna coil.

Rear view of the receiver, showing the new type tuning coil.

of nine plates, five stators and four rotors. When a plug-in coil is inserted in its socket, it "band-spread-tunes" the beginning of the band for which the coil is wound. A unique switching arrangement, controlled from the front of the receiver panel, automatically enables the band of the coil to be spread out for that portion to which the coil first responds in wavelength or frequency. Another snap of the control switch on the receiver panel and the *band-spread* section of the condenser is automatically "paralleled" with the larger condenser section and tuning is then accomplished with 11 plates—6 rotors and 5 stators. When used in this manner, the tuning of the receiver is no longer of the band-

(Continued on page 313)

LETTERS FROM S-W FANS

Give Us More Station Photos!

Rex Brooks' Amateur Transmitting and Receiving Station

REX BROOKS' STATION

Editor, SHORT WAVE CRAFT:

I made contact with your "mag." about a year ago and have kept regular schedule ever since. (nuff sed) Thanks for some "FB" dope. Don't care for all the stuff but guess everybody can't be suited all the time.

Have been on the air about four months with a "junk" station, consisting entirely of old receiver parts. The rig, including transmitter, receiver, power supplies, monitor, etc., cost about fifteen bucks to construct, and have sure had plenty of qso with it.

Am inclosing a snap of the "om" and "rig," in answer to your requests for pictures of stations. Hoping that if published it may bring in some "dx" schedules, missing qsls, ham correspondance or "what have you."

REX BROOKS, W7CSI,
121 West Works St., Sheridan, Wyo.

(Fine business, Rex and we are glad to publish the interesting picture of your transmitting and receiving station herewith. We bet you thoroughly enjoy this outfit and we note also that you built it at a very reasonable figure. It just shows what a lot of "real fun," packed with many "thrills," you can really get out of short waves, especially when one has the courage and persistence to master the telegraphic code and take the government examination so as to go "on the air" with their transmitter. We hope many more of the "brothers in that great short-wave fraternity," will kick in with some good photos of their stations, including the "OM" himself.—Editor.)

THE 1-TUBE OSCILLODYNE A "PIP"

Editor, SHORT WAVE CRAFT:

I receive the SHORT WAVE CRAFT magazine every month and I think it is the best radio magazine out. I built the one-tube *Oscillodyne* set described in the April issue and I think it's a "pip."

I have picked up stations all over the United States and other parts of the world. Here are some of the stations, in the U. S. I have heard—W8XK Pittsburgh, W2XAF Schenectady, W1XAL Boston, W9XAA Chicago, W3XL Boundbrook, N. J., W1XAZ Springfield, Mass., WEA Rocky Point, W9XF Chicago, W8XL Dayton, Ohio, WOO Deal, N. J., and a few ships at sea.

I will let you know again some time how your set is working. Foreign—VK3ME Melbourne, VE3BW Bowmanville, Ont., VE9GW Bowmanville, Ont., VK3ME Sydney. Australia, GSB Daventry, Eng.

JIMMIE LEES,
Excelsior, Minn.

(Fine business, Jimmy, and we shall be glad to hear from you again with another list of stations that you pick up on the "Oscillodyne."—Editor.)

Oscillodyne "Greatest Yet"

Editor, SHORT WAVE CRAFT:

I sure have good news for you! I completed the "Oscillodyne" this afternoon and it is the greatest yet. I believe it will be as famous as the "Doerle"—maybe! It sure beats my 2-tube "junk pile" and I don't mean maybe.

I haven't had time to bring in a good list of stations yet, but there are about ten I have got and you will get a lot more later even if you don't want them!

Two days ago I received my SHORT WAVE LEAGUE certificate. so guess I belong to the "gang." I would like to know if there are any other SHORT WAVE LEAGUE members in my town, or in cities near by.

RAYMOND E. HARRIMAN.
53 Howland Ave.,
Jamestown, R. I.

(Your experience, Raymond, was similar to the editors', who have experienced exceptionally fine results with the "Oscillodyne." One thing about the Oscillodyne that you have undoubtedly noticed is that the dial is "alive" with stations on practically every band, or at least whenever you listen in at the right time, so that there are stations on the air transmitting at the wavelengths you are tuning to at that particular time of the day. Another point in favor of the Oscillodyne is that it does seem to get the most out of whichever tube you happen to be using with it. The editors have tried the Oscillodyne with both battery and A.C. tubes and it has invariably shown uniformly fine results—plenty of sensitivity and volume.—Editor.)

NEWS FROM SHANGHAI!

Editor, SHORT WAVE CRAFT:

I read with great interest, the article "*Short-Wave Record Set by League Report,*" written by H. Winfield Secor, in the May issue of SHORT WAVE CRAFT, in which it was described how the radio operators of the *New York Times* station received the "League of Nations Report and Recommendations" which was sent by the Geneva station, "HBP," on February 18, 1933.

Perhaps your readers would be interested in another radio operator's point of view, regarding the reception of that "memorable" report.

A Russian radio operator, assisted by the writer, received the above mentioned report on that date, for *Reuters, Limited,* an English News-Agency here in Shanghai.

We received notice from our office that the Geneva station, HBP, would send the "League of Nations Report and Recommendations" on that date. Due to a mix up in time, about 1,000 words of the beginning of the report, was lost, and also because of QRM from harmonics of a broadcast station, which is very close to our station. We actually began copying the report, from about 10:45 p.m. (Shanghai time). The entire reception, was by means of headphones and a typewriter, no tape recorder was had or was used. So the speed of about 25 words or so a minute, which was maintained by the Geneva station throughout the report, suited us admirably.

The "Report" lasted from about 10 p.m. to about 8:30 a.m. (Shanghai time). Signals were very good and steady, about QSA 5 R 6-7, with slight traces of fading.

The receiver used, and which has been in use in this station for more than two years and which is still "going strong," is a "Marconi China Receiver, Type S.W. 32." This receiver, built in China, consists of three tubes of English make. They are 4 volt tubes and 135 volts of "B" battery is used. The "C" battery is a 4½ volt type with tappings for 3 volts. Filament supply is from a 4 volt storage battery.

The receiver is at the present moment being used for the bulk of our press work in this receiving station, since the long wave receiver, which we use for 18,500 meters, is now useless, owing to weather conditions. The long wave receiver is used during the winter months for press from Great Britain.

The antenna which we use all the time for short wave work, is about 50 feet long, in an East-West direction, with the lead-in connected in the eastern direction. The lead-in is about 20 feet long. No ground was used or is used for all receptions.

The circuit of the above mentioned receiver, is of the conventional regenerative detector and two stages of audio amplification. Compare this one with the elaborate receiver employed by the NEW YORK TIMES station.

Besides receiving the 15,000 word "report" from Geneva, it was our duty to receive the daily presses from Japan and Great Britain, so anyone can imagine how busy the two of us were on that day.

The "Reuters" receiving station is located on the ground floor of a four story apartment house. The antenna, which is on the roof, is supported by two bamboo poles about 30 feet high, each. We, the two of us, have received from Japan and Great Britain and several other countries, more than 101,000 words in one month!

I wish also to mention that the reception of the "report" from Geneva was entirely on 38.47 meters.

The main idea of this letter is to bring out the lack of elaborateness or preparedness on our part and the care and preparation indulged in by the operators of the NEW YORK TIMES station.

I also wish to mention that this station is not the station in Shanghai, which was mentioned in Mr. Secor's article.

FRANK M. LEE,
Seymour Road,
Lane 643, House No. 8,
Shanghai, China.

(F.B. (fine business) O.M., you and your buddy certainly did a fine piece of work in the reception of the Geneva report over such a vast distance and with just a 3-tube receiver. Sounds almost impossible, but just shows what a "good 3-tuber" can do when it is expertly handled. This should be great news for all S-W. fans, especially in these days when 3 tubes is about the limit for many pocket-books. We salute you!—Editor.)

IF

YOU have built one of the S-W Receivers described in this magazine and you obtain good results with it—write the Editor and tell him about it. He will also welcome constructive criticism.

Bouquets and Brickbats from Our Readers

CHANGES OSCILLODYNE TO S-W ADAPTER

Editor, SHORT WAVE CRAFT:

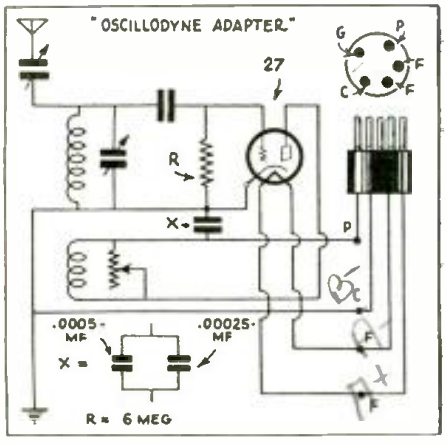
I just can't resist from writing to you about the 1-tube *Oscillodyne*, which I think might be of interest to the ones who have made this set. I have changed it into an *adapter*, on which I receive these stations regular, with good volume and clearness—DJD, Germany; EAQ, Madrid, Spain; FYA, France I2RO, Rome, Italy; GSB, England, and many others.

There is no change in the Oscillodyne receiver; this makes it possible to use it as an adapter or receiver. To change it into an adapter get a 5 prong tube base, solder a piece of wire about three feet long to prong P, and another piece to C, one to F minus and another to F plus. The leads F minus and F plus are twisted to reduce hum. Connect the wire from P to output of the Oscillodyne, C to the ground, F minus and F plus to the filament of the Oscillodyne. Remove the '27 .(det.) tube from the broadcast receiver, and put the adapter plug in its place. Place the '27 tube in the Oscillodyne. Remove the Ant. and Gnd. from the broadcast receiver, and connect them to the Oscillodyne. Turn on the set and it will be ready for operation in about a minute.

Some experimenting might be necessary on the condenser marked X in the hook-up, and on grid leak R. I am using a .0005 mf. and .00025 mf. for condenser X and a 6 meg. grid-leak for R. Here's hoping anyone trying this adapter has as much luck with it as I am having. I would be glad to hear from anyone that does try it; I will also answer any questions concerning the Oscillodyne Adapter.

SAUL KORNEKE, Jr.,
2032 Lautner St.,
N. S. Pittsburgh, Pa.

(Great idea, Saul, and we are publishing your diagram herewith, for the benefit of other short-wave "fans" who may like to try out this improved short-wave adapter. —Editor.)



How Mr. Korneke, Jr., wired his Oscillodyne for use as a S-W Adapter.

WHOLE WORLD ON THE DOERLE

Editor, SHORT WAVE CRAFT:

I have had a "Doerle" set for two months and I would like to tell you of the results. Here they are:

Canada			
	VE9GW		VEX
	VE9DR		CFA
	VE9JR		CCD
	VE9CS		
	CGA	Two waves	
England			
	GSA		
	GSB		
	GBS		
	GBK		
Germany			
	DJA		
	DJB		
	DJC		
Australia	VK3ME		
	VK2ME		
Spain	EAQ		
France	FYA	Two waves	
Italy	I2RO		
Switzerland	HBL		
Venezuela	YV1BC		
Columbia	HKD		
U. S.	W8XK		
	W1XAZ		
	W2XAF		
	W3XAU		
	W2XE		
	W9XAA		
	W9XF		
	WZXAL		
	WOO		

Also two ships, the *Majestic* and the *Empress of Britain*, besides many amateurs, police and air port stations.

KENNETH PRATT,
514 Eliot St., Mattapan, Mass.

(Well, well, Kenneth, you seem "to take the cake"—some dandy list of "foreigns"—and all on a little "Doerle" receiver. You do not state whether it is the two or three-tube Doerle that you hung up this fine reception record with, but we know, from the hundreds of letters reporting great success with the Doerle receiver, that either the two or three-tube Doerle will "bring home the bacon." The reason why the Doerle brings in the DX stations in such wonderful fashion, is undoubtedly due to the fact that it is basically sound and does not employ a "freak" circuit. Some of the results that builders and owners of the Doerle sets write the editor about, seem almost unbelievable but we know that they are undoubtedly genuine, from the fact that so many readers have attested to the reception of the same stations over and over again. Here's wishing you plenty of thrills with the Doerle.—Editor.)

WELCOME CRITICISM

Editor, SHORT WAVE CRAFT:

I have just bought the June number of SHORT WAVE CRAFT and read Mr. R. G. Hunt's comments, page 104.

While I certainly agree with the first paragraph, I would like to say my "But" to the rest.

I am a reader of this splendid magazine and RADIO-CRAFT since 1930 and have not missed a single number, and when I get my copy I look for the big set and not the small "Junk Box Two." I was tickled to see the "pet stenographer" with the nine tube "super-hot," rather than with the silly earphones and the one tube *"Gogripthemsignalifyoucan."*

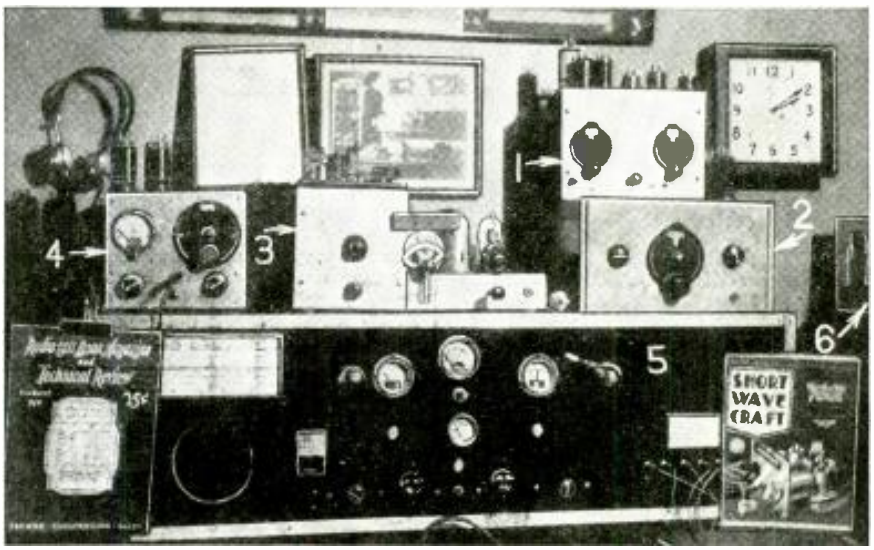
May be it will occur to some of the boys that other fellows are pretty far away and the next station you care to hear is about 6,000 miles from here! In this case there is only one thing, and that is the *all-wave "super,"* 10 tubes and up, if your "family" is to enjoy it too.

It is the big set which inspires the man who wants it, more than anything else and I trust SHORT WAVE CRAFT will soon bring out one again.

C. H. MIRTLE,
São Paulo, Brazil.

(Blaze away, Brother Mirtle! We like it! Constructive criticism is always valuable and welcome. Yes, we agree that many of the "boys" like yourself, are far from home and the editors have not forgotten this fact either. Nowadays, with a depression still within our memory and money not so plentiful, we know that thousands of our readers are not interested in sets using more than 3-tubes, perhaps. However, you will note a number of sets described right along, especially those of the "super-heterodyne" type, which we believe you will find thoroughly reliable for reception of stations all over the world, even in your location. The "band-spread" Short Wave Superhet, described in the July and August issues, by George W. Shuart, is particularly recommended as this set has "high gain" and it also enables you to spread the stations over the dial "on any band"! It is one of the very best short-wave receivers that the editors have ever had the pleasure of operating.—Editor.)

William Wolf's "Listening Post" Is a Corker!



The photo above shows the short-wave Receiving Station of William Wolf, 265 E. 176 Street, Bronx, New York City. Mr. Wolf has been a prolific reader of Short Wave Craft and he has built a number of sets described in various issues. No. 1 is the "Globe Trotter"; 2, is a 3-tube receiver with 2 shield-grid tubes, detector and 2 A.F. stages; 3, is the "2 R.F. Set" described in a previous issue of this magazine, and comprising two shield-grid T.R.F. stages, with a detector and two audio stages; 4, is a self-contained "1-tube" battery set, with a filament voltmeter on the panel, all batteries being included inside the cabinet; 5, is a general "test switchboard" fitted with numerous meters for testing, also jacks which provide the various plate potentials for operating the different receivers as desired; a power amplifier as well as loud-speaker are also mounted in this cabinet. No. 6 indicates a 3-tube receiver of the fully shielded type and comprising 1 S.G., R.F. stage—1 S.G. detector and 2 A.F. stages.

FROM ITALY! AND HE LIKES S.W.C.

Editor, SHORT WAVE CRAFT:

Only a few months ago I have "discovered" your magazine and from that time I did not leave off buying it. I can state that every issue is full of news and descriptions the amateur is looking for.

(Continued on page 303)

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 July, 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 August, 1933 number, contained a "grand" list of short wave relay broadcasting, experimental and commercial radiophone stations. It will appear in the October, 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 in tracking down new stations.

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.	KBTY
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.

Albany, N. Y.	WSDM
Atlanta, Ga.	WQPD
Bera, Ohio	WSDQ
Big Spring, Tex.	KGUG
Brownsville, Tex.	KGUE
Burbank, Calif.	KGUR
Chicago, Ill.	WSDG
Cincinnati, Ohio	WSID
Columbus, Ohio	WSDP
Dallas, Tex.	KGUF
Douglas, Ariz.	KGUN
El Paso, Tex.	KGUA
Frijole, Tex.	KGUM
Indianapolis, Ind.	WSDZ
Indio, Calif.	KGUQ
Jackson, Miss.	KSDB
Little Rock, Ark.	KQUU
Louisville, Ky.	WSDF
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
Buffalo, N. Y.	WSDO
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.

Atlantic City, N. J.	WEEQ
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

AIRPORT RADIO STATIONS—Alphabetically by Call Letters

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

KBTY	Butte, Mont. (2)	KGUB	Houston, Tex. (8)	KNWC	Pembina, N. D. (6)	WMDV	San Juan, P. R. (10)
KEU	Burbank, Calif. (1)	KGUD	San Antonio, Tex.(5)	KOE	Cheyenne, Wyo. (1)	WNAO	Newark, N. J. (1)
KFM	Sacramento,Calif.(1)	KGUE	Brownsville, Tex.(5)	WAEC	Pittsburgh, Pa. (2)	WNAK	Cleveland, Ohio (1)
KFO	Oakland, Calif. (1)	KGUF	Dallas, Tex. (5)	WAED	Harrisburg, Pa. (2)	WNAL	Brookville, Pa. (1)
KGE	Medford, Ore. (1)	KGUG	Big Spring, Tex. (5)	WAEE	Camden, N. J. (2)	WNAM	Bellefont, Pa. (1)
KGGUC	Ft. Worth, Tex. (1)	KGUH	Waco, Tex. (5)	WAEF	Newark, N. J. (2)	WNAT	Orlando Twnshp., Ill. (1)
KGJW	Brownsville,Tex.(10)	KGUK	Shreveport, La. (5)	WAEG	Cresson, Pa. (2)	WNAU	Moline, Ill. (1)
KGQZ	San Diego, Calif.	KGUL	Abilene, Tex. (4)	WAEH	Milwaukee, Wis. (6)	WQDQ	New Orleans, La. (5)
KGSB	Alameda, Calif, (2)	KGUM	Frijole, Tex. (5)	WAE1	Detroit, Mich. (7)	WQPD	Atlanta, Ga. (5)
KGSP	Denver, Colo. (3)	KGUN	Douglas, Ariz. (5)	WAEJ	Springfield, Ill. (5)	WSDC	Newark, N. J. (4)
KGSR	Pueblo, Colo. (3)	KGUO	Tuscon, Ariz. (4)	WAEK	Mobile, Ala. (4)	WSDD	Boston, Mass. (4)
KGT	Fresno, Calif, (1)	KGUP	Phoenix, Ariz. (5)	WEEB	Baltimore, Md. (9)	WSDE	Birmingham, Ala.(4)
KGTA	Winslow, Ariz. (2)	KGUQ	Indio, Calif. (5)	WEEC	Charleston, S. C. (9)	WSDF	Louisville, Ky. (5)
KGTD	Wichita, Kans. (2)	KGUR	Burbank, Calif. (5)	WEEF	Spartanburg, S.C.(9)	WSDG	Chicago, Ill. (5)
KGTE	Wichita, Kans. (1)	KGUS	Blythe, Calif. (8)	WEEG	Greensboro, N.C.(9)	WSDK	Memphis, Tenn. (5)
KGTH	Salt Lake City, U.(3)	KGUT	Robertson, Mo. (5)	WEEH	McRae, Ga. (9)	WSDL	Duluth, Minn. (6)
KGTJ	Las Vegas, Nev. (3)	KGUZ	Ponca City, Okla.(1)	WEEJ	Jacksonville, Fla. (9)	WSDM	Albany, N. Y. (5)
KGTL	Kingman, Ariz. (2)	KKO	Elko, Neva. (1)	WEEM	Miami, Fla. (9)	WSDO	Buffalo, N. Y. (8)
KGTN	Las Vegas, Nev. (2)	KMP	Omaha, Neb. (1)	WEEN	Linden, N. J. (9)	WSDP	Columbus, Ohio (5)
KGTQ	Springfield, Mo. (2)	KMR	No. Platte, Nebr. (1)	WEEO	Orlando, Fla. (9)	WSDQ	Berea, Ohio (5)
KGTR	Robertson, Mo. (2)	KNAS	Kansas City, Mo.(1)	WEEQ	Atlantic City, N. J. (9)	WSDS	Chicago, Ill. (6)
KGTS	Omaha, Neb. (5)	KNAT	Dallas, Tex. (1)	WEER	Richmond, Va. (9)	WSDT	Nashville, Tenn. (5)
KGTV	Beaumont, Tex. (4)	KNAU	Tulsa, Okla. (1)	WHG	Columbus, Ohio (2)	WSDZ	Indianapolis, Ind.(5)
KGTX	Pocatella, Idaho (2)	KNAV	Okla. City, Okla. (1)	WHM	Indianapolis, Ind.(2)	WSID	Cincinnati, Ohio (5)
KGTZ	Spokane, Wash. (1)	KNWA	St. Paul. Minn. (6)	WKDL	Miami. Fla. (10)	WUCG	Chicago, Ill. (1)
KGUA	El Paso, Tex. (5)	KNWB	Fargo, N. D. (6)				

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

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.
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.
WRDQ Toledo, Ohio
WPFL Gary, Ind.
PPFQ Swathmore, Pa.
WPFO Knoxville, Tenn.
WPFR Johnson City, Tenn

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.

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.

2430 kc.-123.4 m.

Dial:

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.

2422 kc.-123.8 m.

Dial:

WMJ Buffalo, N. Y.
KGPE Kansas City, Mo.
KGPG Vallejo, Cal.
WPEK New Orleans, La.
WPDW Washington, D. C.
WPFG Jacksonville, Fla.

2416 kc.-124.1 m.

Dial:

KGPB Minneapolis, Minn.
WPDS St. Paul, Minn.

2414 kc.-124.2 m.

Dial:

WPDY Atlanta, Ga.
KGPS Bakersfield, Cal.
WCK Belle Island, Mich.
WPDX Detroit, Mich.
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:

KGPJ Beaumont, Tex.
KSW Berkeley, Cal.
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 W. B'dgew'r, Mass.
WPEV Portable, Mass.

1534 kc.-196.1 m.

Dial:

KGHO Des Moines, Ia.

257 kc.-1123 m.

Dial:

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

Alphabetically By Call Letters

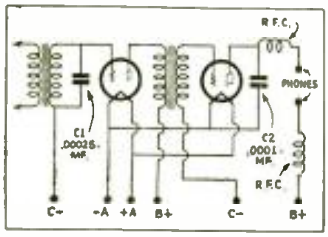
KGHO	Des Moines, Iowa	1534 kc.
KGJX	Pasadena, Cal.	1712 kc.
KGOZ	Cedar Rapids, Iowa	2470 kc.
KGPA	Seattle, Wash.	2414 kc.
KGPB	Minneapolis, Minn.	2416 kc.
KGPC	St. Louis, Mo.	1712 kc.
KGPD	San Francisco, Cal.	2470 kc.
KGPE	Kansas City, Mo.	2422 kc.
KGPG	Vallejo, Cal.	2422 kc.
KGPH	Oklahoma City, Okla.	2450 kc.
KGPI	Omaha, Neb.	2470 kc.
KGPJ	Beaumont, Tex.	1712 kc.
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	Shreveport, La.	1574 kc.
KGPZ	Wichita, Kans.	2450 kc.
KGZB	Houston, Tex.	1712 kc.
KGZD	San Diego, Cal.	2430 kc.
KGZE	San Antonio, Tex.	2506 kc.
KGZF	Chanute, Kans.	2450 kc.
KGZH	Klamath Falls, Ore.	2442 kc.
KGZI	Wichita Falls, Tex.	1712 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.
WJL	Greensburg, Pa.	257 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.
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.	2416 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.
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.	2422 kc.
WPEL	W. Bridgewater, Mass.	1574 kc.
WPEP	Arlington, Mass.	1712 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.

$5.00 For Best Short Wave Kink

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

ELIMINATING "FRINGE HOWL"

$5.00 Prize Winner.



Many receivers are cursed with a condition known as "fringe howl." That is one reason why S-W receivers are so often placed on the "shelf" by disgusted fans. This condition may be eliminated entirely by the proper circuit arrangements. Many fans shunt the secondary of the first A.F. transformer by means of a resistor; but there is a better solution.

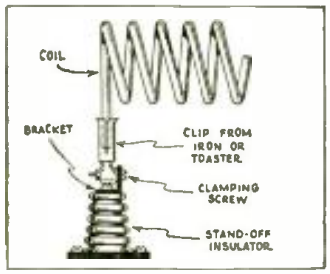
The first A.F. transformer is shunted by a .00025 mf. by-pass condenser, indicated in the diagram as C1. In some cases it might have to be increased, but it should be kept as small as possible, since a large capacitance will decrease the volume. C2, which is shunted from the plate of the last tube to the filament, has a value of .0001 mf. This capacity should not exceed this value, since an increase in capacitance would tend to cut off the higher notes of the musical scale.

The radio frequency chokes prevent body capacity troubles in the phone cord. If they are not employed, touching the phone cord will detune the set or knock it out of oscillation. When by-passed in this way the set is entirely freed from "fringe howl," and very stable regeneration is obtained.—Fred H. Williams.

▼ ▼ ▼

PLUG-IN TRANSMITTER COILS

From the junk-box several contact clips such as used in the plug connection on irons, toasters, etc., were obtained. These clips are the ones that are used to fit over the male contact pins, and normally

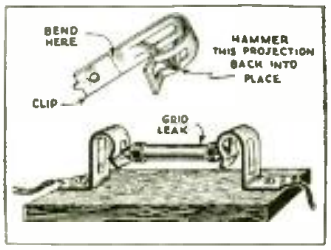


have an opening of about one-eighth inch. If you haven't them, any electric dealer can supply them at very low cost. These were mounted on small stand off insulators as shown in the figure. By bending a short length of the inductance perpendicular to its axis, the arrangement was completed. The coils in my case are of one-eighth inch copper tubing, but by spreading the clips slightly, larger sizes may be accommodated. Contact surfaces on both the coils and the clips should be kept clean and bright, of course. Any good metal polish or burnishing paste will take care of this.—Frederick Grimwood, (Station WFIW).

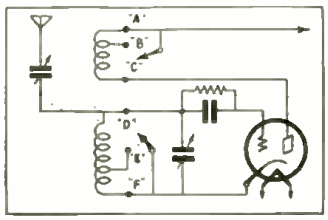
▼ ▼ ▼

GRID-LEAK CLIPS

The accompanying illustration shows how to improvise very effective grid-leak spring clips. To make this grid-leak support one needs two Fahnestock spring clips. Next, the center tongue on each spring clip is hammered back into place, so as to leave no obstruction under the curved springy part of the clip. Next, the ends of the clips are bent at right angles, as shown, by means of a pair of pliers or a vise and they are mounted with the two curved members facing towards each other. The distance between the two clips will depend on the size of the grid-leak cartridge to be accommodated.—Paul Korneke, Jr.



TAPPED-COIL SWITCH



This coil switch layout is very convenient for the fan or "ham" who works two bands; for instance, 20 meters before nightfall and 40 meters after dark. It is bothersome to change plug-in coils every time you change from one band to another. The coils can be wound on six-prong forms and used with six-prong sockets. Likewise many sets of coils can be made; for instance 160 meter amateur band and the 80 meter amateur band, 49 meter and 30 meter relay stations, etc.

From "D" to "E" are the number of turns required for the lowest (in wavelength) band on the grid coil. Then from "E" to "F" is the difference between the higher and lower band's number of turns. Likewise on the tickler from "C" to "B" is the tickler number of the lowest band and from "B" to "A" is the difference between the tickler on the lowest band and the tickler on the highest band. For instance, if 40 turns on the secondary respectively tune the 80 meter band. From "D" to "E" equals 30t., from "E" to "F" equals 10t., from "C" to "B" equals 10t., and from "B" to "A" equals five turns. Toggle switches may be used.—R. C. Amundsen.

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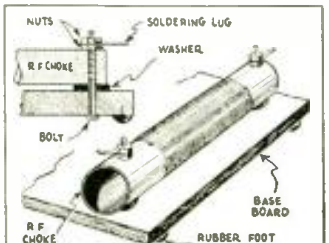
CHOKE COIL MOUNTING



After laboriously winding 300 turns of No. 36 D.S.C. wire on a ½" dowel, the next job is to mount it. Here is a simple and efficient method. Drill two holes through the baseboard which coincide with two holes that are drilled through the choke near its ends. Separate the choke from the baseboard by means of a washer. Fasten the assembly thus far with a nut. Then insert a soldering lug which is held in place by another nut. (A lock washer may also be inserted if desired.) The same assembly is mounted on the other side of the choke. The soldering lug provides a terminal for the end of the choke. This makes an easy compact mounting for the choke; it can be mounted in the same manner on the underside of a subpanel. The diagram makes the assembly clear.—Theodore Ulmer, W8HMO, W8HMR.

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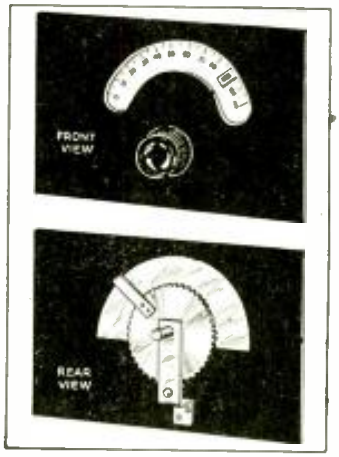
NEW DIALS FOR OLD

This dial is easily constructed from material found in most workshops, and when finished presents a very neat appearance. Select an old type dial that is not too badly scratched and with a hack-saw remove the original knob and cut the dial in two a little below the center. Then from an old alarm clock remove a large gear, preferably the one connected to the main spring, and also a small pinion, that will mesh with the large wheel teeth; a suitable indicator needle should be secured to the large wheel, and bent so that it will follow the dial figures. A mounting bracket for the wheel and pinion can be made from a piece of iron sufficiently heavy to prevent bending under ordinary operating conditions. After selecting the position for the dial on the panel cut a semi-circular aperture the same diameter as the dial, mount the dial to center with the aperture and secure with machine screws. A suitable knob is then mounted on the end of the pinion shaft, and the dial is ready for use. If desired a pilot lamp may be mounted above the dial so that the light will strike the figures.—Lincoln A. Williams.



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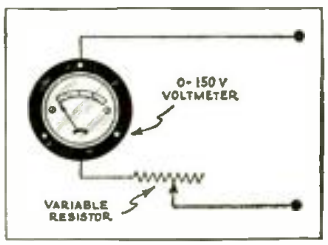
EXTENDING METER'S RANGE

Here is a simple scheme I use to temporarily extend the range of a voltmeter. I had a voltmeter with a 150 volt scale and desired to read voltages in excess of 150 volts. The voltage from some stable source of potential, such as B batteries is read with the voltmeter, let us say it amounts to 94 volts. A variable resistor whose range will include a resistance equal to the meter's resistance is placed in series with the meter as shown in the



sketch. This combination is again placed across the B batteries and the resistance of the resistor varied until the meter reads half of what it did before, or 47 divisions on the scale. The combination may then be used to measure unknown voltages and the meter is calibrated to read 0 to 300 volts. By adjusting the resistor till the meter reads ½ or ¼ of its normal deflection its range can be increased 3 times or 4 times instead of doubled. This scheme can of course be used on any range voltmeter.—Lawrence W. Bale.

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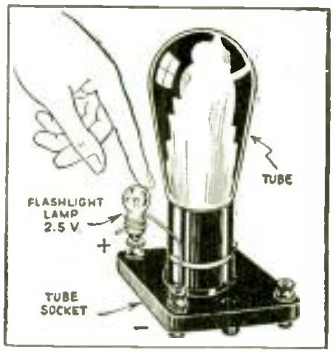
TUBE PROTECTOR

After "blowing out" several costly tubes, I devised a scheme that has saved me much grief and dollars too. Here 'tis: I procured a 10c flashlight bulb removed the radio tubes from the sockets, mounted it as in sketch. Turn on rheostat; if bulb burns "O.K." then it is safe to plug-in the tubes. The bulb should have



the same voltage rating as the tube or tubes used.—Clinton Parker.

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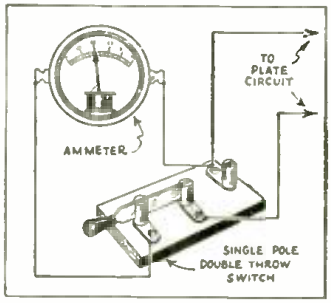
AMMETER SWITCH



Here's how to lengthen the life of the transmitter plate ammeter. When keying, the ammeter has to swing at a tremendous speed and there are continuous surges of current through it. By putting in a single-pole, double-throw switch, as illustrated I can switch the meter in or out as desired. For adjustment, I switch the meter in; then I cut it out when I am ready to send; thereby adding a great deal to the life of the ammeter.—Geo. J. Crossland, VE3RW.

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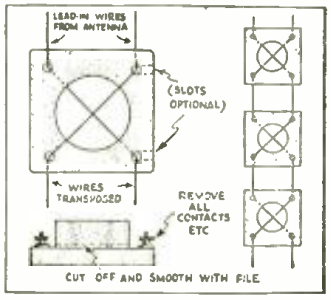
TRANSPOSITION INSULATORS



The spreaders for a transposed lead-in for S. W. aerials can be made out of old bakelite sockets found in your old "junk box." First remove all the nuts, bolts and contact points from the socket. Then saw off the top part, leaving a square with four holes for the wire.—J. Vicek.

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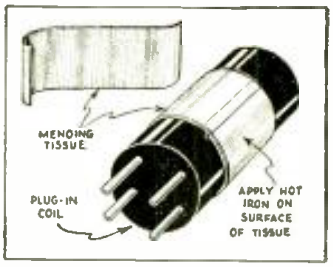
TIGHTENING LOOSE COILS



Many fans make it a practice of winding their own coils. Sometimes when the wire is wound and soldered in the prongs, the wire works loose and makes the whole coil a failure. Here is a kink that will solve the trouble. Procure mending tissue that can be bought at any store and wind around the coil. Then apply a warm iron on the surface of the tissue. This will make it a neat and lasting job.—Alfonso Slemianowski.

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

New Amateur Regulations

● NEW governmental regulations governing the "hams" and formulated with their approval will go into effect on October 1, affecting about 40,000 amateur transmitting stations. The new rules largely concern routine and technical operation, but one of the most important, which went into effect on June 23, widens the channels set aside for *amateur radiophone* use. These channels now embrace 1,800-2,000 kilocycles, 28,000 to 28,500 kilocycles, and 400,000 to 401,000 kilocycles.

Summary of Regulations

The October regulations may be summarized as follows:

1. Combined operator-station licenses are to be issued hereafter to individual "hams" instead of requiring two separate licenses. The licenses will stipulate three classes of privileges: (a) unlimited, (b) unlimited radio telegraph but limited radio telephone, and (c) same as Class B, but with special examinations and practical code tests required on demand.

2. Applicants residing more than 125 miles from Washington or from any one of the twenty district offices of the Radio Commission are to be examined by mail hereafter, and their papers will be graded in Washington. In addition to the district inspection offices, Federal inspectors will visit the following cities quarterly for personal examinations: St. Louis, Pittsburgh, Nashville, Oklahoma City, San Antonio, Columbus, Des Moines, Cincinnati, Cleveland, Schenectady and Winston-Salem, S. C. Applicants residing within 125 miles of Washington, a district office or an examining city will be given a personal supervisory examination.

3. Amateur portable stations will not be licensed as such, but portables may be operated away from specified locations with the usual call letters on condition advance notice of all locations is filed with the district inspector. Amateur mobile stations will not be permitted, except aboard aircraft and capable of operating in the 56,000-60,000 and 400,000-401,000 kilocycle bands.

4. Station licenses will be issued only to licensed amateur operators who have made satisfactory showing of ownership or control of proper transmitting apparatus. Rigid technical efficiency must be maintained as specified by the commission, including pure Type A-1, or continuous wave transmission in radio telegraphing below 14,400 kilocycles.

5. Corporations, associations or organizations cannot secure amateur stations, though bona fide amateur societies can secure them through a licensed "ham" acting as trustee. This is in keeping with the plan never to commercialize amateur radio or permit commercial interests to encroach on the "ham" wave lengths.

For the most part, the changes were made to expedite the handling of amateur radio matters within the commission, which has suffered a severe budget cut and accordingly has reduced its field force considerably. They are also designed to increase the efficiency of "hamdom" and thus somewhat relieve the congestion existing on the amateur waves due to the growing number of "hams."

If rule number 4 doesn't sound clear, we will elucidate. It means simply that raw A.C. for plate supply is OUT, and that respectable D.C. must be employed to insure the "pure Type A-1 transmission" specified. Intentional tone modulation becomes a serious offense. CLEAN, WHISTLE-LIKE NOTES ARE NOW THE ORDER OF THE DAY.

Just why mobile amateur stations will be permitted in airplanes and not in other types of vehicles is something of a mystery. As one of our readers aptly puts it, not one ham in ten thousand owns an airplane, but plenty of them have motorboats, in which short-wave transmitters really would be valuable from the standpoint of safety of life.

● THE new amateur regulations recently promulgated by the Federal Radio Commission are given herewith in full, because they are of the utmost importance to every "ham" or would-be ham. We advise all LEAGUE members to cut them out and to paste them inside their "log" books or in some other reliable place where they will not be lost.

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.

Readers' Opinions

A Good Idea!

Editor, SHORT WAVE CRAFT:

I find it hard to understand why some "hams" seemingly satisfied to pound brass and fill the air with their own ear splitting code, should object to the LEAGUE'S proposal of putting a new class of experimenters in the five meter band, experimenters with new ideas, experimenters more eager for research and control of experiment than for futile babbling over the air. These objectors should have more of the fellowship, tolerance, patient disinterestedness of the "old-timers" who have obtained for them the privileges they now enjoy.

We need more research on *modulation*, and I foresee, that in the near future, through the use of the new cathodic jet relay (see SHORT WAVE CRAFT page 606 Feb., 1933), we will have a carrier wave phone modulation "chopped" to audio frequencies as neatly as it is done in code signalling. Great distance and clearness should be obtained. Quit the squabbling and bucking, you hams and get going on this

Yours sincerely,
Arthur J. Pelletier,
34 Hancock Street,
Boston, Mass.

Favors "Code-less" Phone License

Editor, SHORT WAVE CRAFT:

I am in favor of code-less phone licenses on 5 meters. I have learned my code but on account of sickness I haven't been financially able to purchase a set of batteries for my "two-lunger," and at the present time don't just know when I will be able to purchase any more batteries.

I will not promise to answer all letters I receive, but will appreciate any and all letters received from anyone who wishes to write. If three cents is

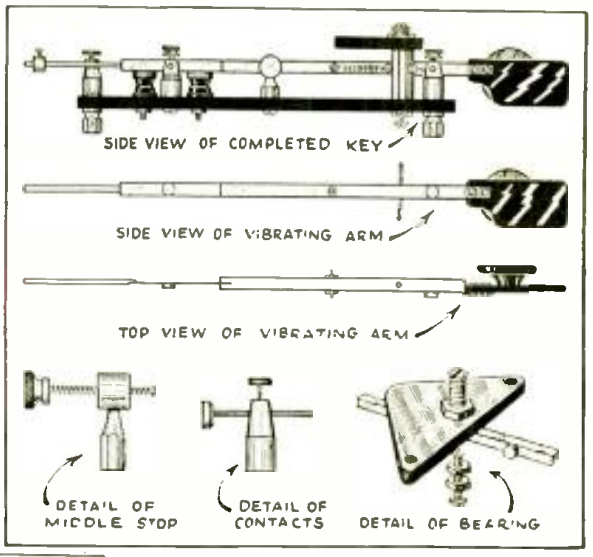
(Continued on page 306)

Making An AUTOMATIC KEY

● MANY an amateur operator has heard the familiar rhythm of an automatic key on the air and remarked at the snappy operating that such a key affords. However, all amateurs cannot afford the ten to twenty dollars necessary to purchase one of these convenient instruments. But one can be put together for practically nothing plus a little patience and skill.

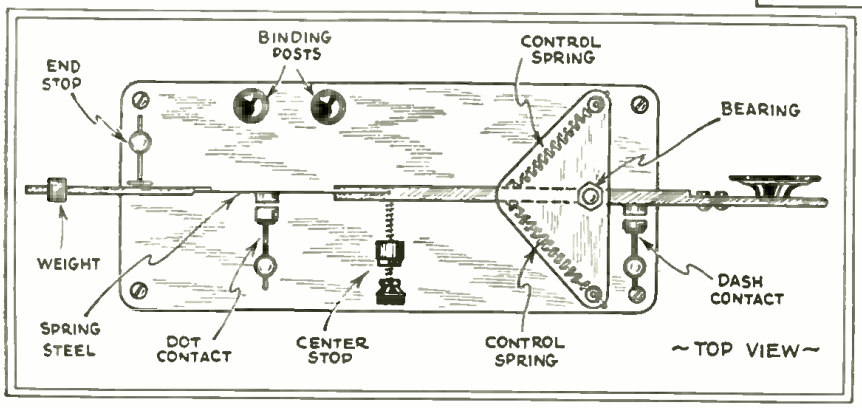
The key to be described cost nothing. Every piece of hardware and hard rubber was in the junk-box, where for several years all sorts of hardware had been placed for future use. Practically all amateurs have such a collection of odds and ends so that there should be no trouble in obtaining the parts. Besides, size and dimensions can be altered as well as materials without impairing the operation of the key. However, as this key was the result of experimentation, it will be described specifically. The parts are:

1 brass rod, round or square, 5 inches long, ¼ inch thick
1 hard rubber base, 7 x 3 ins.
2 pieces of hard rubber, 3 x 3 in. and 2 x 1 in.
2 binding posts (Eby)
4 mounting feet
1 old condenser bearing (end)
1 spring, ⅛ inch dia. and about 2 in. long
2 pillar posts, one inch high
1 strip of flat steel spring, ¼ in. wide, 2¼ in. long
1 brass rod 2 in. long, ⅛ in. dia.
Miscellaneous bushings, bolts, nuts, solder, nails, etc.



Right: side view and details of the parts used in building the automatic "speed" key.

Below: top view of the assemhled automatic "speed" key here described. You can make dots and dashes like a "streak of lightning" with it.



Making the Vibrating Arm

The first step is to construct the vibrating arm. Take the quarter-inch brass rod and attach the handle to it by two small nuts and bolts. Next solder the dash contact to the arm 1¼ inches from the handle end of the rod (the contacts, 4 of them, are sawed from brass rod the same size as the arm). One inch farther on a hole is drilled for the pivot. This pivot is a one-eighth inch bolt filed to a point at both ends after the head has been sawed off and is seven-eighths of an inch long. It is soldered to the arm. One inch from the pivot a hole is drilled to accommodate a very small bolt which fastens the control springs to the arm. At the end of the rod (opposite the handle end) a small slit is sawed lengthwise for ¼ of an inch. The piece of spring steel (out of an old clock and bent straight) is soldered into this slit. At the other end of the spring steel, the two-inch piece of brass rod is soldered. This rod came from an old bakelite-end condenser. A brass dot contact is soldered in the middle of the spring steel and on the same side as the dash contact. This completes the vibrating arm.

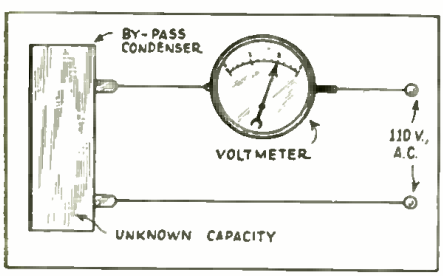
Laying Out the Base

The base is then laid out. At each corner is placed a mounting foot. These happened to be half-inch hexagonal binding-post nuts. Holes are then drilled in the base for the two stops, the two pillar posts, the two binding-

(Continued on page 316)

Measuring Condenser Capacities

● THE drawing herewith shows how I connected a low-resistance battery-type voltmeter, having a ten volt scale, in series with an A.C. circuit and a condenser; it would be the safest to connect a 110 volt lamp in series with the meter. With the particular meter I used, the needle gave a *deflection* of about one volt for every microfarad of condenser capacity. If the meter has a high resistance it will be necesary to try it on a condenser of known capacity and then compute the percentage of difference.—*Clark Waage.*



With a suitable meter connected in series with a source of A.C. and a condenser, proportional scale readings are obtained with various capacities.

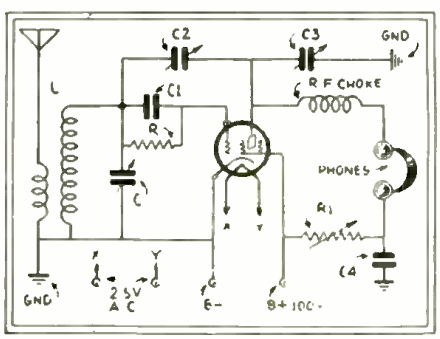
Automatic Regeneration Control

● THE desirability of a detector with self regeneration control is, of course, evident. Here is a good way to accomplish this most desirable feature. The circuit at right is that of a dynatron similar to one used very successfully by me some seven months ago. The regeneration scheme is, however, new. One condenser, C2, increases the regeneration as the frequency increases; the other, C3 decreases it at the same time. Thus, if the condensers are properly adjusted, these two effects neutralize each other and regeneration is ever constant. No power supply is shown, as that is not important and none that could be shown would please even a majority of the readers.

The constants are standard save for the following:

C2—140 mmf. equalizer.
C3—140 mmf. equalizer.
R1—50,000 ohms adjustable.

—*Roger Geffen.*



By means of this circuit an attempt is made to accomplish automatic regeneration control.

SHORT WAVE QUESTION BOX

LEAD-IN BLOCKS

F. G. Hall, Indianapolis, Ind.

(Q) I have quite a number of old bakelite panels on hand and would like to know if I could cut these up into square little blocks, for use as separators on a transposed wire lead-in.

(A) It is perfectly practical to use bakelite for this purpose. Of course, you have to be careful to cut the bakelite in such a manner that the wires will cross over properly without touching each other.

WIRE FOR COILS

Paul Hogg, Shaker Heights, Ohio.

(Q) Before ordering some spools of magnet wire, I wish your advice in regard to the correct sizes for short-wave plug-in coils. I understand that the heavier the wire, the better the results. What is your advice?

(A) For all practical purposes No. 18 wire is quite heavy enough for use as the secondary winding on any short-wave coils. Wire as thin as No. 26 may also be used for the same purpose, without any appreciable difference in results. It is advantageous to use the heavier wire because it will hold better on the coil form.

For coils requiring more than 15 or 18 turns, No. 20 or 22 may be used. Primary and tickler coils in all cases need not be heavier than No. 24.

In the heavy size the wire may have enameled insulation, as the turns are separated. Coils that are close-wound should have double-cotton or double-silk insulation.

SOUNDER OPERATION

M. L. P., Kansas City, Mo., asks,

(Q) I have been trying, rather unsuccessfully, to operate an ordinary telegraph relay in the plate circuit of the output tube of my short-wave receiver. Although the signals with earphones or loud speaker are unbearably loud, and I am positive the current is flowing through the relay windings, I cannot make the relay armature kick over enough to work a local circuit with a telegraph sounder in it. I am an old Morse wire man and get a great deal of fun out of listening to amateur and commercial stations, but would like to have the dots and dashes come in over the sounder. A diagram of my set is enclosed.

(A) The better your audio amplifier is, the less chance it has of working the relay-sounder combination you describe. The reason is simple. Your amplifier (consisting of two ordinary transformer coupled stages with 01A and 71A tubes) is of the regular class "A" variety, and the actual plate current remains at a fairly steady value, as indicated by a D.C. plate milliammeter, whether signals are being received or not. In fact, movement of the milliammeter needle during signal reception indicates very definitely that the amplifier is distorting.

What you need for the operation of a telegraph relay or sounder is very sharp direct current pulses. The loud signals you hear in phones or loud speaker are due to the *audio-frequency* component of the plate current. The phones or speaker respond to them because the vibrating diaphragm is thin and light and can follow the rapid fluctuations. A telegraph relay is an enormously slower device, and will respond only to violent plate current changes.

Our suggestion is that you add a third stage of amplification, and that you adjust the grid bias, by means of a potentiometer, as shown in Fig. 1, until this stage acts more as a detector than as an amplifier and distorts voice or music so badly it is hardly recognizable. A sensitive relay should then respond properly to code 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.

INSTALLING NEW TUBES

Arthur H., New York, asks,

(Q) I have an old three-tube short-wave receiver using type 01A tubes. This has always worked well, but recently two of the tubes went bad and I thought I might as well replace them by newer tubes. What do you recommend?

(A) This depends on your source of filament current. If you intend to use dry cells, your best bet is the type 30 tube, which draws only .06 ampere at two volts and is therefore very economical. If you have a six-volt storage battery, by all means use the type 37, which is one of the so-called automobile series. These are particularly desirable for short-wave work because of their complete freedom from "microphonics," which can sometimes be extremely annoying with tubes of the two-volt series, unless resilient sockets are used.

The 30's will fit in the same sockets as the old 01A's; the 37's being of the heater-cathode variety, will require new five-prong sockets. The filament consumption of the 37 is .6 ampere at 6.3 volts, which is only a fraction of an ampere more than the drain of the 01A.

SHORT-WAVE NETWORKS

Quite a number of people have inquired about diagrams of transmitters and receivers for special purposes, such as a calling system for cruising taxicabs, communication between the scattered forest camps of lumber firms, motorboat and yacht installations, etc.

(A) The main thing that all these people do not realize is that transmitting stations of any kind, power or location in the United States must be licensed by the Federal Radio Commission, and that the rules concerning various classes of service are very clear and specific. Furthermore, amateur licenses are not valid for commercial communication, except, of course, under emergency conditions. Amateur licenses are *not* issued to *corporations* or firms or to cover stations in motorboats. Any business organization contemplating the use of private radio stations should communicate directly with the Federal Radio Commission, Washington, D. C., before it spends a cent on equipment.

This information is given in SHORT WAVE CRAFT because we know for a fact that amateurs are always being approached by firms that want to avoid telephone and telegraph tolls between various cities. It is a good idea for both amateur and business man to know the situation.

SIMPLEST POSSIBLE SET

R. G. Washburge, Bogota, N. J., asks.

(Q) Will you please publish a diagram of the very simplest possible short-wave receiver, using the absolute minimum of parts, and working, of course, on dry cells?

(A) The accompanying diagram, Fig. 2, is what you want. The set as shown uses one type 30 tube, which requires either two No. 4 or No. 6 dry cells in series for filament supply and one 22½-volt "B" battery for plate supply. The plug-in coils are wound on old tube bases. With a good pair of ear phones and a lot of patience, this set will actually bring in foreign broadcasting stations, and certainly hundreds of code stations. You should be able to build the thing in about one hour flat.

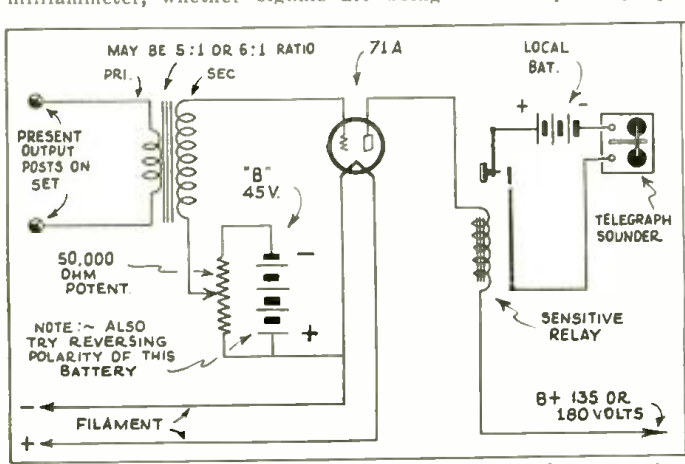
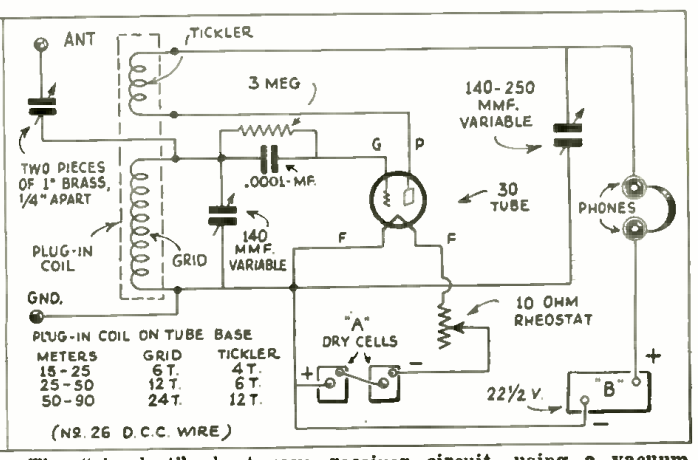


Diagram showing how to arrange special biasing adjustment in output audio stage to work a relay and telegraph sounder.



The "simplest" short-wave receiver circuit, using a vacuum tube, is presented in the above diagram.

The "Acratone Discoverer"

(Continued from page 277)

al strip is mounted beneath the chassis ¾" from the under side, near the outlet hole provided for the 110-volt supply cable. The cable is firmly anchored to this strip. The dual electrolytic condenser C14, C15 is mounted next.

The long metal shield plate "C" is fastened to the top of the chassis as indicated and the two smaller shield strips are then fastened at right angles to this and to the chassis.

Fixed resistor R4 is soldered to the terminals of mica condenser C7 and the latter is then fastened to the side of shield plate "A" as shown. The R.F. choke L3 is fastened underneath the chassis using a 2¼" bolt which also serves to fasten the socket V2. All other parts are soldered in position during wiring.

Wiring Details

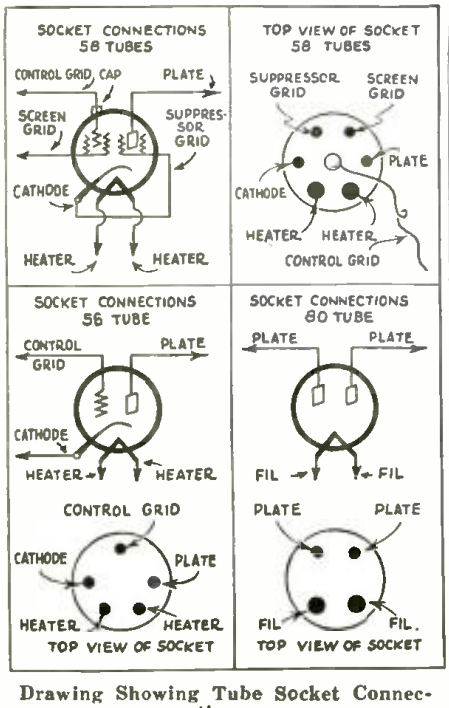
Flexible hookup wiring is recommended. The usual order of procedure should be followed. Filament circuit first, then grid circuit, plates, cathodes, by-pass condensers and negative returns, filter system and power supply. Special care should be taken to make connections to socket terminals exactly as shown in the sketches.

Do not depend on the chassis as a return circuit for the tuning circuit. Run wires to all points in the high frequency circuit. This is necessary if maximum results are to be obtained.

In wiring to the tube sockets, study the diagrams of sockets carefully, before starting the wiring. Note that the control grid connections are made to the caps of tubes V1 and V2.

Operating the Set

The "Discoverer" uses a simple tuned R.F. circuit where the only required adjustment is that of the trimmer condenser on C1. This adjusting condenser is designated on the diagrams as C16. After all the wiring and preliminary testing have been accomplished, the set should be fastened in the metal cabinet furnished with the kit. The antenna and ground should then be connected and the tubes and coils inserted in the proper sockets. The speaker should



Drawing Showing Tube Socket Connections.

be plugged into the 5-prong wafer socket mounted on the rear of the receiver chassis before the power supply is turned on.

The regeneration control knob should be turned to the right to place the receiver in operation, as this closes the A.C. power switch. Time should then be allowed for the tubes to heat up. The regeneration control should be advanced about one-quarter of the way until a squeal is heard in the speaker. If this is not heard, rotate the small antenna trimmer condenser slowly until the two main tuning circuits are in exact resonance. As the trimmer condenser is turned and the antenna circuit is placed into resonance with the detector tuning circuit, it should be necessary to turn the regeneration control to the left, due to the excess of oscillation or regenerative action present in the circuit. If the regeneration control is advanced too far, it becomes impossible to obtain the regenerative action and as this condition varies with the different bands, it is necessary to have a regeneration control which is capable of covering all the variations due to the difference in coil characteristics for the various bands.

The antenna trimmer condenser C16 should be adjusted constantly to exact resonance with condensers C1, C2 when tuning for weak or distant signals. The operator will note that the smoothest control of regeneration will occur when the antenna and the detector circuits are tuned to exact resonance and the regeneration control is backed off a trifle from the point of maximum regeneration.

Special Regenerative Action

Actually, this receiver works in a slightly different way than that ordinarily ascribed to regenerative circuits. This action can be described as follows:

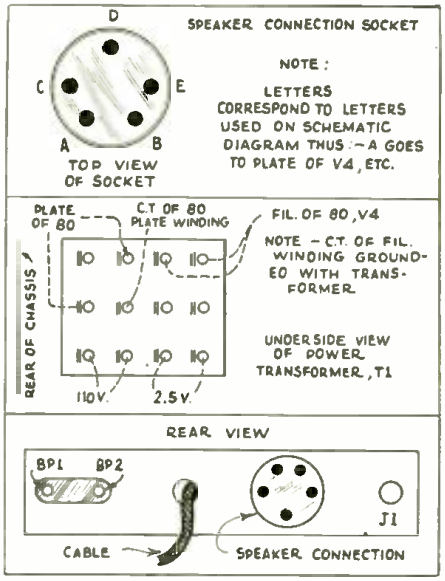
The detector is constantly oscillating and is pulled out of oscillation by means of the regeneration control. There are two factors which govern this action; one is the power absorbed from the detector circuit by the preceding stage. This absorption is considerable due to the close coupling between the R.F. stage and the detector. Further, the reduction of the applied voltage to the screen grid of the detector tube will tend to pull the tube out of oscillation.

In the ordinary regenerative receiver, the tube is pushed into oscillation by means of energy feed-back from the plate circuit to the grid circuit or by some other means. The fundamental action is that of a stable tube and the tube is actually forced into oscillation by means of any one of the commonly known methods. In this receiver, we use the opposite method, whereby the tube is constantly oscillating and has to be pulled out of oscillation for voice reception or music.

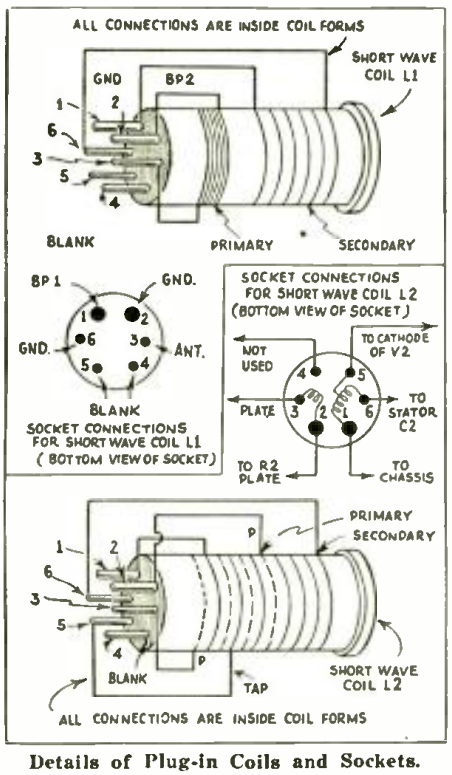
Therefore, keep the antenna trimmer condenser C16 constantly in step with the main tuning condenser C1, C2, so that exact resonance is obtained in both of these tuned circuits. Turn the regeneration control dial and after the whistle of the incoming carrier has been heard, carefully tune C1, C2, which are on a common shaft, and adjust C16 for absolute resonance. Then you will find at this time that you can advance C16 control with greater signal output.

Parts List Acratone "Discoverer" 5 Tube Set

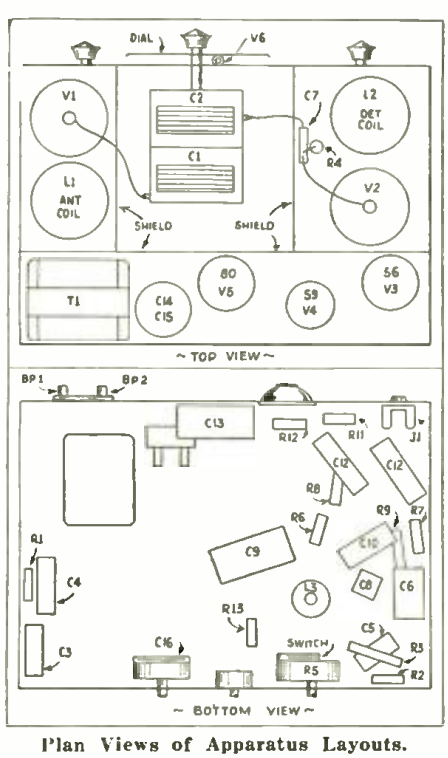
1—Acratest Two-Gang variable condenser, .00014 mf. each section, (C1, C2)
5—.02 mf. 300 volt Acratest cartridge condensers, (C3, C4, C5, C10, C11)
1—.1 mf., 200 volts Acratest condenser, (C12)
1—.5 mf., 200 volts Acratest condenser, (C6)
2—.0001 mf. Micamold Mica Condensers, (C7, C8)
2—2 mf., 400 volts Acratest Electrolytic Condenser, (C9) (C13)
1—Acratest Dual 8 mf. (ea. section) Electrolytic condenser (C14, C15)
1—25 mmf. USL Midget variable condenser, (C16)
1—300 ohm ½ watt Acratest resistor, (R1)
2—2000 ohm, ½ watt Acratest resistors, (R2, R9)
1—25,000 ohm, ½ watt Acratest resistor, (R3)
1—3 meg., ½ watt Acratest resistor, (R4)
1—25,000 ohm potentiometer (R5) and switch (Sw1)
2—.25 meg., ½ watt Acratest resistors, (R6, R12)
2—.5 meg., ½ watt Acratest resistors, (R7, R11)
1—.1 meg., ½ watt Acratest resistor, (R8)
1—50,000 ohm, ½ watt Acratest resistor, (R10)
1—25,000 ohm, ½ watt Acratest resistor, (R13)
1—Full-Vision vernier tuning dial and escutcheon with pilot light V6
4—Acratest 6 prong wafer type isolantite sockets, (V1, V2, L1, L2)
1—Acratest 5-prong wafer type socket (for speaker connection) riveted to chassis.
1—Acratest 5-prong wafer type socket, marked for 56 tube (V3)
1—Acratest 7 prong wafer type socket, marked for 59 tube (V4)
1—Acratest 4 prong wafer type socket, marked for 80 tube (V5)
1—Acratest power transformer, (T1)
2—Acratest tube shields, for tubes V1 and V2
1—Acratest short-wave R.F. choke (L3)
1—Dual antenna-ground binding post, (BP1, BP2)
1—Drilled metal chassis, cadmium plated, 11½"x9¾"x2" high
1—Metal shield plate 11⅜"x5" No. 20 gauge (Plate "C")



Wiring of Power Transformer, Speaker Connections, etc.



Details of Plug-in Coils and Sockets.



Plan Views of Apparatus Layouts.

2—Metal shield plates, 5"x5" No. 20 gauge (Plates "A" & "B")
1—Power supply cord and plug
2—Screen grid clips
3—Small knobs
1—Earphone Jack (J1)
1—Set 8 Special short-wave coils, covering 10 to 200 meters (L1, L2)
1—5-prong speaker plug
1—Dynamic Speaker, 8½" Dia. with 1800 ohm field tapped at 300 ohms; matched to output of 59 tube
1—Ornamental metal cabinet; gun-metal finish, hinged cover, 11⅝"x9½"
2—58 Variable-mu tubes (V1, V2—Gold Seal
1—56 General purpose tube (V3)—Gold Seal
1—59 Output pentode tube (V4)—Gold Seal
1—80 Rectifier tube (V5)—Gold Seal

New Glass H. T. Condensers

(Continued from page 286)

the makers of these condensers have introduced a phase angle of 10 minutes which means that only .00291% of the total power flowing through the capacitor is lost.

By way of comparison, some solid dielectric capacitors have a phase angle in excess of one degree, which means that the losses in this type of capacitor are 1000% greater than those employing flint glass for the dielectric, the sponsors of the new glass insulated units point out.

Another important feature in favor of a glass dielectric is its very low coefficient of expansion. In the majority of cases where wave shifting or creeping is experienced, it has been found that this was directly caused by the expansion of the dielectric material used in the blocking or bypass condensers, causing a change in capacity of the unit. The glass dielectric overcomes this trouble.

A very serious handicap in the construction of a capacitor is the trapping of tiny air bubbles between the plates. This permits corona discharge, which means a decrease in efficiency; in addition, if the corona is great enough it will cause a subsequent rise in temperature, and eventual failure of the unit. By a special method of impregnation this danger is entirely overcome in the new glass insulated condensers. These new type condensers are guaranteed to be free from all defects in both material and workmanship for a period of one year from date of purchase.

3 1-2 Inch Waves Now Practical

(Continued from page 267)

The equipment for the *Century of Progress* exhibition consists of a transmitter and receiver, each mounted in an iron-screen rack, 30"x30"x12". Oscillations, corresponding to 9.1 cm. waves, are generated by the small magneto-static tube already mentioned. By means of two-wire transmission line, magnetically coupled to the oscillating circuit, the power is fed into an antenna-dipole located at the focal point of a 24" *parabolic metal reflector*, which projects the radiated waves in a very narrow beam. The beam is intercepted by another similar mirror on the receiving end, and is focussed by it on a receiving dipole with a crystal detector, by which the 9 cm. oscillations are rectified.

In order to make the transmission audible, the quasi-optical radiation is modulated in the transmitter. A direct audio-modulation is quite feasible, but it is preferable to apply a broadcast-frequency modulation by means of a local oscillator, which can be, for instance, a single 27 type tube. In its turn, the intermediate frequency is modulated in a regular manner by audio frequencies of speech or music. This enables one to receive signals, voice and music directly on a standard *broadcast* receiver, which gives a greater gain in volume, as compared to the case of a direct audio modulation. All necessary potentials for filaments and plates, both in the transmitter and receiver, are supplied by power-packs from 110 volts A. C. The whole equipment is portable and very simple to handle.

Hats Off to Catherine Martin

(Continued from page 285)

the place of it. The two upper middle panels contain two magnetic speakers, the bottom panel contains the switches for changing over the aerial on the different radios, the phone jacks, etc. The upper right hand panel holds the long wave set, the Super-Wasp coils hanging just above. The other two right-hand panels are for the transmitter. The two speakers are self-explanatory, I guess. In between them, on top, is a power-pack I made some time ago. The paneling on the cabinet is three-ply wood, walnut stained.

As you can imagine I am rather busy with my school work, the R. T. I. course, making sets, servicing radios, and code practice. I have two ambitions, one I will probably never achieve—the other may some day be realized. The first, to work in the General Electric Laboratories—"The House of Magic"; the other to be a technician of some sort in a broadcast studio. Having picked out radio as my career, I certainly hope to make good in spite of being one of the so-called weaker sex.

Miss Martin Waxes Technical

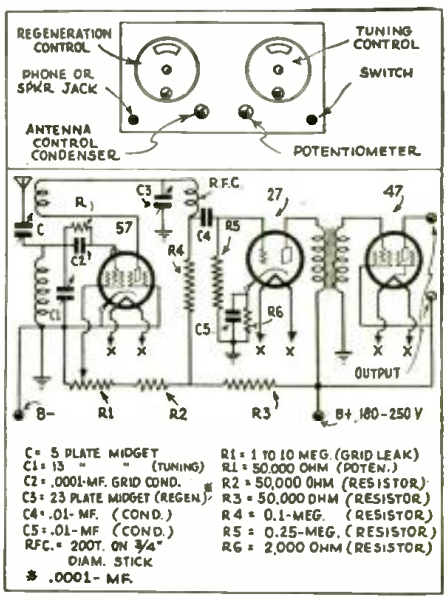
You asked for more technical data which is included under the set diagrams. The picture is a 5x8 which is the best I shall be able to send. It was taken by Robert Ande whom you know as he received second prize in the set builders contest some time ago. He has helped me much with set construction.

Now for the set under construction.

This set employs the new -57 and -47. Since the -57 gives an amplification factor of 1500, and the -47 pentode a factor of 150, the signals are well amplified.

Tracing through the diagram—the 5-plate antenna condenser works very well on a short-wave set, often helping to tune the distant stations in better. The 13-plate tuning condenser is the usual type employed, the potentiometer helps as the regeneration control as well as the 23-plate condenser. The resistance-coupled stage does not serve to amplify as the transformer stage does, but it produces a steady signal and serves to "hold down" the signal. The -27 acts as an intermediate stage to feed into the transformer and -47. The resistances R2 and R3 give the right voltages so that only two "B" leads are necessary, the B— and the B+, 180 to 250 volts. No special tricks are needed in the construction, but the set should be so planned that the grid and plate leads are as short and separated as possible. My set has a 3-ply panel and subpanel. It is not a bread-board layout as the leads can be planned to better advantage if a non-bread-board type is used.

Before this set is finally done, a stage of radio frequency will probably be added. The r.f. stage will employ a -58, and will be very much like that in Mr. Myer's set described in the April, 1933, SHORT WAVE CRAFT. This set, by the way, is a very good one, especially for code.



Front Panel and Circuit Diagram of Miss Martin's Receiver.

Leotone 2-Volt Set Has "Pep"!

(Continued from page 278)

ances from anywhere from 20 to 100 mh. A by-pass condenser of .00025 mf. is connected from the tickler to the filament circuit; the plate load resistor for the detector is 0.25 megohm, which is coupled through a .01-mf. fixed condenser to the 1-megohm grid resistor of the first audio amplifier, a 30 type tube. The plate load resistor for this first audio tube has a value of 0.25 megohm. This couples through another 0.01-mf. condenser to the 0.25-megohm grid resistor of the second audio or output tube, also of the 30 type.

Receiver Very Economical

This receiver is extremely economical, especially when the great strength of signal produced in the loud speaker is considered; the first three tubes in the set drawing but .18 ampere and the output pentode requiring but 0.26 ampere, the total filament current therefore being only 0.44 ampere. The "B" battery drain is also very low, the total plate current approximating 20 milliamperes. The designers of this receiver therefore figure that two No. 6 type dry cells, series connected, together with three medium-sized 45 volt "B" batteries, should operate the set for about five months with the average daily use. It is, of course, recommended to try and obtain the large sized "B" battery units if the "old wallet" will stand it, which should provide approximately a year's service.

The Leotone receiver has a wave-length range of 17 to 200 meters; possesses, as we have seen, a very low current drain on both the "A" and "B" batteries; uses four inexpensive tubes of the desirable 2-volt dry-cell type, and may be purchased if desired in kit or fully assembled and wired form. A *foundation kit*, including one metal case, one chassis, and one shielded compartment, is also available.

List of Parts for Leotone Receiver

COILS:

2 sets of short-wave plug-in coils for 0.00014 mf. capacity. Alden, (Bruno).

1—30 millihenry honeycomb R.F. choke coil.

CONDENSERS:

1—two-gang 0.00014 mf. tuning condenser.
5—0.01 mf. mica condensers.
1—0.5 mf. bypass condenser.
1—0.00025 mf., mica condenser.
1—0.0001 mf. mica condenser.

RESISTORS:

1—15 ohm fixed filament resistor.
1—20 ohm rheostat.
1—2.7 ohm fixed resistor (may be improvised from a 6 ohm rheostat set to apply 2 volts on filament, when the 20 ohm rheostat is set at zero resistance).
1—3 meg. pigtail resistor.
1—100,000 potentiometer, with switch attached.
3—0.25 meg. (250,000 ohm) pigtail resistors.
1—1.0 meg. pigtail resistor.

OTHER REQUIREMENTS:

3 UX and one UY sockets.
1 antenna-ground connector.
1 speaker connector.
1 six-lead outlead cable.
1 drum dial, scale, escutcheon.
1 shielded box with hinge cover, overall 9¾" wide x 8¾" high x 8¾".
1 chassis with shield compartments, to fit inside shield cover.
2—"C" batteries; 1—3 volt, 1—22½ volt (small "B" unit).

LEOTONE-ALDEN PLUG-IN COIL DATA

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

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

Dos and Don'ts for Short-Wave Fans

Edgar Messing

● DON'T use junk; use good material for a good set.

Don't use an R.F. choke where you can use a resistor.

Don't wind coils on cardboard tubing; use something that won't absorb moisture.

Don't try to eliminate unwanted oscillation by reducing gain; look for the cause first.

Don't put coils too near metal shields or chassis; keep them at least .7 the coil diameter distant from the nearest metal.

Don't run leads across the chassis to bypass condensers; use roll type condensers and solder them right at the point where they are to work.

Ditto for R.F. chokes, whether they are resistors or coils.

Don't use the '82 unless you have to; the '80 will give less trouble.

Don't trust the chassis as an R.F. ground at the shorter wavelengths; run wires from the variable condenser rotors.

Don't run long ground leads in the set but try to make all R.F. grounds at one spot.

Don't run the leads between the high side of the variable condenser and the high side of the coil too close to a metal chassis. Use bare wire if possible. Tests have shown that the elimination of poor condensers and the use of bare wire may increase selectivity as much as 30%.

Don't use wire larger than No. 18 nor smaller than No. 26 for tuned circuit coils operating below 100 meters.

Don't use large ticklers spaced far from the coil they are tickling; use No. 30 to 34 wire and wind the coils as close to the tickled coil as possible.

Don't space the turns on a space wound coil more than the diameter of the wire; the gain is not noticeable for greater spacing and it becomes harder to couple to the coil.

Don't guess; if you have a meter, measure.

Don't think a set is good because it gives a loud signal; it is the signal to noise ratio that counts.

Don't use switches where you can avoid it; the more switch sections the greater the possibilities of trouble.

Don't use the '24 or '35; use '57's or '58's. The new tubes have lower output capacities and will give greater gain.

Don't swear at fading; use a.v.c. The '55 accomplishes a.v.c. very simply; try it.

Don't use class "B" amplification in your first set; use a single pentode as the output tube.

Don't use resistors larger than ½ megohm anywhere throughout the set; higher values are never accurate and often troublesome. In resistance coupling the grid to ground resistor if larger than ½ megohm makes the grid too sensitive to stray pick-up.

Don't use resistors larger than ¼ megohm for detector plate loads; use 100,000 ohms when a '27 or a '56 is the detector, and ¼ megohm when a '24 or a '57 is used.

Don't make detector cathode resistors too small; use 5,000 to 10,000 ohms in first detector cathodes (5000 ohms will be a bit more sensitive), use 50,000 ohms in the cathode of a second detector '57 or '24, use 30,000 to 40,000 ohms with a '56 or '27.

Don't use an R.F. choke in the plate circuit of the second detector; use a resistor of at least 30,000 ohms.

Don't rely too strongly on carbon resistors below 10 meters; their R.F. resistance and the marked value are two entirely different animals.

Don't use a condenser larger than 4 mikes as the first section of the power pack filter; it isn't good engineering because it isn't economical (Class B excepted).

Don't lay out the chassis for beauty; follow the diagram for straight line wiring.

Don't spoil your set by putting too little power in the field of a dynamic speaker; use about 8 watts (square of D.C. through the field times field resistance.) for good quality, six watts for fair quality, and 4 watts for midget set quality.

Don't use a large variable condenser for tuning when you can use a smaller one; the smaller condenser will give greater gain.

Don't expect the smaller condenser to cover as large a range as the larger; a regular .000365 mf. standard broadcast variable will cover from 18 to about 55 meters with a good coil and careful wiring, a .00015 will cover from 18 to 38 meters.

Don't use inductive type condensers; you might just as well use a choke and stop trying to fool the R.F.

Don't put bypass condensers in a block; they may bypass in the wrong direction.

Don't use a transformer without an electrostatic shield if you can help it; the hardest-to-trace kind of hums will originate from that kind of transformer. If you must use a transformer without a shield put .1 mf. high voltage non-inductive condensers from each plate of the rectifier to center tap and put an R.F. choke in series with the first filter section.

Don't use a shielded lead-in with the shield grounded to prevent noise pick-up; you may not hear noise but you will *not* hear many short wave signals.

Don't overlook the tone control; on short waves it may really be worth its salt (for the first time!). Use a .01 mf. in series with a 30,000 ohm variable resistor from plate to ground of the output tube if it is a '47. These values will also serve to straighten out the response of the '47 and tend to give better quality.

Don't leave out a plate to screen condenser for the '47 if you eliminate the tone control; use a .004 to .006 mf. If this condenser is connected between plate and screen instead of plate to ground it will be just as effective, may have a lower voltage rating, and will be cheaper.

Don't bypass a 400 ohm resistor in an audio circuit with a ½ mike condenser; it just won't work. Incidentally, the easiest way to calculate condenser reactances is to remember one simple set of figures—1 mf. has a reactance of 1600 ohms at 100 cycles. From this value any condenser reactance at any frequency can be calculated; for example 1 mf. at 1000 cycles has a reactance of 160 ohms, One-half mf. at 100 cycles has a reactance of 3200 ohms, one-half mf. at 2000 cycles—160 ohms. The value of reactance of the bypasser to the thing by-passed should be at least 1:20.

Don't shield grid wires except as a last resort; the additional capacity lowers gain, and decreases range.

Don't let a regenerative set squawk or squeal at the point of regeneration; it makes tuning a nuisance and hurts the ears! The point of regeneration should distinguish itself by a soft "shush." Incorrect values of grid leak and condenser are the usual sources of trouble. Remember that at the higher frequencies it is easier for the grid condenser to "choke" and cause a squeal. A .0001 mf. condenser and 2 megohm leak usually compose a safe combination.

Don't use a variable condenser for controlling oscillation; a variable screen grid bias arrangement controls as satisfactorily and does not react on the tuned circuit as the capacity control does. Use a 50,000 ohm potentiometer connected between 90 volts and B—, the arm going to the screen and by-passed to ground by a 1 mf. condenser to eliminate any audio noise caused by movement of the arm over the resistance strip.

Don't forget the sure and simple test for oscillation; touching the grid terminal of the tube or variable condenser. If the tube is oscillating a sharp click will be heard when either of these terminals is touched and another when the finger is removed.

Don't use a condenser larger than 15 mmf. if a tuned circuit is to be capacity coupled to the antenna; a larger condenser gives too close coupling, a smaller condenser decreases gain at the 200 meter end of the range.

Don't use a trimmer as vernier across the main tuning condenser that has more than 1/6th the capacity of the larger condenser; a large trimmer makes it difficult to pick up stations, adds to reaction effects, and gives a "false" sharp tuning effect.

Don't make grid or plate wires any longer than necessary; the shorter they are the more stable the set.

Don't control volume by varying either bias alone or antenna input alone; a combination of both gives a smoother control with better quality.

Don't forget that a 58 when used as a detector may take the same screen bias as the R.F. or I.F. tubes.

Don't solder to nuts or screws; fasten a soldering lug under the nut and solder to the lug.

Don't use anything but rosin core solder for soldering; some of these so-called non-corrosive soldering pastes can do very funny things to coils at the shorter wavelengths.

Don't apply heat to carbon resistors; make soldered connections to the pigtails distant at least ½ inch from the end of the resistor. The same applies to roll type condensers.

Don't allow solder to fall on coils or in socket prongs; one can search for hours for trouble causes and overlook these very common and annoying reasons.

Don't rely on carbon resistors (or any other type for that matter) to be exactly the values marked; the usual manufacturing tolerance is 10%. Remember, however, that few resistors in a set have to be exact and that 10% tolerance is usually perfectly all right.

Don't forget that oscillator grid condenser and resistor combinations can cause whistles in a super-heterodyne as well as in a regenerative receiver. The author forgot once and spent a night and a day wondering why the I.F. persisted in squealing when there was every sort of by-pass and filter on it.

Don't plug in the juice in a new set before testing for *shorts* across the high potential supply.

Letters from S-W Fans

(Continued from page 289)

It is the only magazine really useful to the builder and to everybody that wishes to learn the secrets of short waves. I am afraid I am going to have to subscribe, as I don't want to lose one number.

I am glad to tell you that very often (every night that I keep up studying, as I am a student) I receive very well your stations W8XK and W2XAF. The last one is better and stronger on 31.48 meters. I use an antenna 38 meters long. I can hear clearly your speaker announcing the station during the transmission of music (a thing that never happens in European stations).

I would be glad if I could be of some use to you.

Let me congratulate you on the success of your magazine and believe me,

VITTORIO TURLETTI,
Via Crana 15,
Turin (11 F),
Italy.

(Greetings, Vittorio, and we are mighty glad that you took time to write us from Italy. We are tickled to note that you find the descriptions of short-wave sets as presented in SHORT WAVE CRAFT *not only pleasing but useful as well. You state that you will be glad if you can be of any service to us and we can only state that the more readers* SHORT WAVE CRAFT *can obtain, the greater and bigger the magazine can be made. So you can do yourself and short-wave fans everywhere a great favor by telling them about* SHORT WAVE CRAFT *whenever you have the opportunity. Thanks again for your welcome letter.—Editor.)*

HE LIKES S-W FICTION!

Editor, SHORT WAVE CRAFT:

Some time ago I read a story in SHORT WAVE CRAFT by A. D. Middelton and it was a corker but "'Ham' Radio Foils Ransom Plot" in the June issue is the best yet.

Not only is this story thrilling fiction for the S-W fan, but it suggests forcibly to the would-be brass pounder the advantages of better operating.

Keep QSO with this W8UC-W4CA and let's have more of these stories.

J. E. FAW, W2BYX,
122 Archbold Place,
Westfield, N. J.

(We try to pick out the best possible short-wave fiction, J.E.F., and we were glad to hear from you to the effect that you liked Mr. Middleton's story in the June number. You will find another interesting and thrilling short-wave tale in this number of SHORT WAVE CRAFT.*—Editor.)*

LIKES THE "GLOBE TROTTER"!

Editor, SHORT WAVE CRAFT:

I wish to compliment you on the wonderful magazine which you are publishing. I have been a reader of SHORT WAVE CRAFT, since the April, 1932, issue.

I think the "Globe Trotter" which was described in the November, 1932, issue is a very good receiver. I added one stage of audio and a band-spread" condenser. I have worked many amateurs on the loud speaker. I have received "hams" from nearly every district; I also get short wave broadcast stations of the U. S. and Police Calls. I am hoping you will keep up the good work.

CURTIS SMALL,
206 E. Broadway,
Fulton, N. Y.

(Glad you liked the "Globe Trotter," Curtis, and we have received several thousand letters since the publication of the article describing how to build it and telling of the fine results which various readers of SHORT WAVE CRAFT *have achieved with it. Many of our readers have heard their first "foreign" short-wave stations on the Globe Trotter. Thanks and let us hear from you again.—Editor.)*

BEGINNERS CAN UNDERSTAND OUR ARTICLES!

Editor, SHORT WAVE CRAFT:

I wish to tell you how we appreciate your magazine down in this little part of the continent.

It is the only magazine we can obtain from our newsstands that a beginner can *understand.* Your sets are good and yet are described in such simple terms that anyone can understand them.

From our location any short wave station is "DX" to us. That is from seven hundred miles up, so when we build a set to pull your stations in regularly, we are quite pleased.

To give you some idea of how the set "perks" I am listening to GSA, England, at present. Also get Holland, Germany, France, Spain, Italy, Argentina, Ecuador, Columbia and Venezuela. Get practically all your stations over there including "hams," police, airport, ship-to-shore, etc.

HADDON B. MARTIN,
113 Hawthorne Street,
Dartmouth, Nova Scotia.

(Tickled pink to hear from you, Haddon, and we are pleased to hear you say that the articles in SHORT WAVE CRAFT *are described in simple terms so that practically anyone can understand them. We make a special effort each month to make the various articles we publish clearer than ever before, and we go to a lot of editorial trouble and expense in our Drafting Department in order to make the "picture" diagrams which we feel most anyone, even a rank layman, can follow. Let's hear from you folks down "Nova Scotia way again —and right soon.—Editor.)*

AMLIE CIRCUIT GETS AUSTRALIA!

Editor, SHORT WAVE CRAFT:

As I am a reader of SHORT WAVE CRAFT I would like to tell you that I am very pleased with your fine magazine, and shall always be a reader of it. After looking through the "Letters From S.W. Fans" page in the December issue, I came across a letter from Mr. Ned Chestnutt. I agree with him on Mr. Oliver Amlie's circuit. To prove this circuit is O.K., here is my record! I have heard G5SW, FYA, six days a week on the speaker. I have also heard VK3ME, VK2ME, HRB, GBS, HKD, T14, HV2, 200 amateurs, 25 police stations, all on the loud speaker!

Best of luck to SHORT WAVE CRAFT and staff.

BILL SMITH,
58th N. 60 St,
Philadelphia, Pa.

(Hot-cha-cha, Bill!—My! but you boys are certainly doing wonders with Amlie's circuit which we published in the May, 1932, issue. All we've got to say is that the circuit is certainly "simplification" itself, and anyone can easily build it—that's one thing to be sure of. Here's hoping that many more short-wave "fans" have the fine success with the Amlie circuit that you and many others have experienced with it already.—Editor.)

THAT "DOERLE" AGAIN!

Editor, SHORT WAVE CRAFT:

Talk about petting a radio! My set is the talk of the neighborhood. I am a kind of a "hobbyist." Before I started tinkering with short-wave sets I was a builder of model airplanes.

I first set my eyes on your magazine last December. From then on airplanes were forgotten! The "Doerle" regenerative circuit was the first radio I built, although, I know plenty of radio through reading books on the subject.

At first the set didn't satisfy me. I had built it in a hurry because I was anxious to hear "foreign" broadcasts. All I ever did hear was W3XAL, W8XK, W8XAL, W4XA, VE9DR, VE9GW, VE9JR, W9XAA, all in the 49 meter band. I also heard

(Continued on page 306)

Skeptical of Short Waves? we actually Guarantee Results

BUY GUARANTEED

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

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

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

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

THE OSCILLODYNE

HOW IT WORKS

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

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

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

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

A PEACH

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

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

HENRY TOWNSEND, Ramsey, N. J.

THE DOERLE RECEIVERS

SOME LIST!

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

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

THIS IS GOING SOME!

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

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

A DOERLE ENTHUSIAST

I have just completed my two-tube Doerle, and it surely is a great receiver! It works fine on all the 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, Graving, Mich.

FRANCE, SPAIN, ETC., ON LOUDSPEAKER

I hooked up my two tube Doerle Kit and I received France, Rome, Spain, Germany and England on the loudspeaker as well as over 100 amateur phone stations. I am very pleased with the receiver and would not part with it for anything. I have listened to many factory built short-wave receivers, but believe me, my DOERLE is the set for me.

ARTHUR W. SMITH, Springfield, Mass.

REGULAR FOREIGN RECEPTION

A few days ago, I purchased one of your TWO TUBE DOERLE WORLD WIDE SHORT WAVE RECEIVERS. I just want to tell you that this set does all you claim. In the short time I have had the set, I have brought in stations in England, Germany, France and South America. Davenshire, England, and 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, Zeesen, Germany. I certainly received this station with a thrill. Your for success.

RANDOLPH GRAY, Quincy, Mass.

Order From This Page

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

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

Rear View

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

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

A REALLY NEW CIRCUIT

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

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

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

ABSOLUTELY FOOL-PROOF

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

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

Front View

Oscillodyne Wonder Set

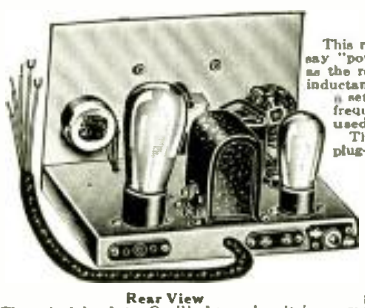
The set is exactly as illustrated here, size of aluminum panel is 6" high by 4½" wide, base 5½" long by 4½" wide. List of materials used:

No. 2146. Official One-Tube Wonder Set, completely wired and tested as per above specifications. YOUR PRICE **$6.18**

No. 2147. Official One-Tube Wonder Set, but not wired, with blueprint connections and instructions for operation, complete shipping weight 3 lbs. YOUR PRICE **$5.33**

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 **$5.08**

The Oscillodyne 2 Tube Loudspeaker Set
NO PLUG-IN COILS



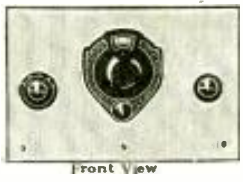
Rear View

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

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

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

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



Front View

No. 2197. 2-Tube Oscillodyne Loudspeaker Set, Completely wired and tested. Ship. wt. 9 lbs. YOUR PRICE **$10.83**

No. 2198. 2-Tube Oscillodyne Loudspeaker Set in kit form. Ship. wt. 9 lbs. YOUR PRICE **$9.83**

No. 2199. Complete accessories for this receiver, including 1—type 56 tube, 1—type 47, 1—special short-wave hum-free AC power pack, No. 2149; 1—type 280 rectifier tube for the power pack; 1—B. B. L. magnetic loudspeaker. Ship. wt. 14 lbs. YOUR PRICE **$11.18**

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

SHORT WAVE SETS

Sets Which Work At Your Command

And NOW The Electrified Official Doerle

2 And 3 Tube Receivers

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

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

Only **$14.22**

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

And Now These Doerle Sets Have Been Completely Electrified

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

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

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

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

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

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

Improved Circuit and Design

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

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

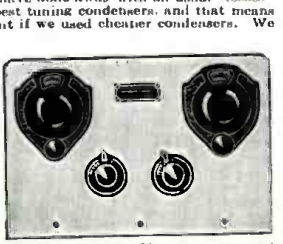
Only First-Class Parts Are Used

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

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

Our Own Tests

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



FRONT VIEW Showing general appearance of all Doerle receivers

Only **$8.88**

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

SPECIFICATIONS

No. 2174. Electrified 2 Tube 12,500 Mile Doerle Receiver, completely wired and tested, less tubes. Measures 9" long x 6" high x 6⅛" wide. Shipping wt. 5 lbs.
YOUR PRICE **$9.43**

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 **$8.23**

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 **$1.78**

No. 2177. Electrified 3 Tube Doerle Signal Gripper, completely wired and tested; less tubes. Measures 10½" long x 7" high x 8¾" wide. Ship. wt. 7 lbs.
YOUR PRICE **$14.18**

No. 2178. Electrified 3 Tube Doerle Signal Gripper in kit form, including blueprints and instructions; less tubes. Ship. wt. 7 lbs.
YOUR PRICE **$12.73**

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 **$2.68**

BATTERY SETS

No. 2140. TWO TUBE 12,500 MILE 2-VOLT DOERLE SHORT WAVE RECEIVER, completely wired and tested. Ship. wt. 5 lbs.
YOUR PRICE **$8.88**

No. 2141. TWO TUBE 12,500 MILE 2-VOLT DOERLE SHORT WAVE RECEIVER KIT, with blueprint connections and instructions. Ship. wt. 5 lbs.
YOUR PRICE **$7.68**

No. 2142. COMPLETE ACCESSORIES, including 2 No. 230 tubes; one set of Brandes Headphones; 2 No. 6 dry cells; 2 standard 45-volt "B" batteries complete, ship. wt. 22 lbs.
YOUR PRICE **$5.38**

No. 2143. THREE TUBE 2-VOLT DOERLE SET, completely wired, ready to use
YOUR PRICE **$11.83**

No. 2144. THREE TUBE 2-VOLT DOERLE SET IN KIT FORM, with blueprint connections and instructions. Ship. wt. 7 lbs.
YOUR PRICE **$10.48**

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 **$10.98**

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

Designed Especially For The Doerle Receivers

$6.23

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 7¼" long x 4" wide x 4¼" high overall. *Sold complete with 280 tube.* Ship wt. 10 lbs.

No. 2149 Special Short-Wave Hum-Free A. C. Power Pack, including 280 tube.
YOUR PRICE **$6.23**

FREE Short-Wave BOOKS

YOUR CHOICE

Book No. 830

of either one of books illustrated herewith—*FREE OF CHARGE*—with the purchase of any of the short-wave receivers listed in this advertisement.

Book No. 866 explains in a most thorough-going 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 and thorough 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.*

Book No. 866

FREE 116 page Summer Edition of Radio and Short Wave Treatise. 100 hook-ups, 1,000 illustrations. Enclose 4c for postage. Treatise sent by return mail.

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

Letters from S-W Fans

(Continued from page 303)

hundreds of "amateurs." The trouble was that I couldn't get any lower than forty meters. (This was probably due to the losses.)

I made up my mind to rebuild it. I got hold of a metal panel which helped to stop the "hand capacity." (I don't use the "Doerle extension bakelite shafts.") I made very short "leads," having learned my lesson that long connections don't pay. I built the set in two parts; one section containing the detector stage and first audio stage; the second is a second and third audio stage, *carefully matched and shielded!*

And boy, oh boy! Do the foreign stations come in now! I have held EAQ, Madrid, Spain, for two hours (5:00 to 7:00 EST) almost every day for about two months. G5SW and I2RO come in pretty fair (all loudspeaker reception). I am more than "satisfied" with the "Doerle circuit!" I am a 100% SHORT WAVE CRAFT booster. I haven't missed any of your magazines, since December.

I guess I have said enough (hi! hi!) so I'll say the best 73's to you and "diddle-de-bump-de-bump" as W9ARK says.

JOSEPH W. SEMKOW,
3433 Seyburn Ave.,
Detroit, Mich.

(Hi! Hi! yourself, Joseph. You've certainly dressed the "Doerle" up pretty and get mighty fine results too—we'll say. As becomes apparent from your letter, and as many other readers have found the Doerle regenerative tuning and detector circuit can sure "roll them in" up to 12,000 miles, and after that—well, as Ethel Barrymore puts it—"that's all there is, there ain't no more." So-o-o-o-o-o-o, the thing to do seems to be to use the "Doerle hook-up" and tune stations in; then with the addition of an extra audio stage as you have done, it's a cinch to put stations on the "loud speaker"—Editor.)

Short Wave League

(Continued from page 294)

enclosed I will promise to answer all that contains three cents.

Anyone keeping touch with F. R. C., I will certainly appreciate it if they will keep me posted as to when code-less phone licenses are legal on five meters and below. I would like to see more "fiction" articles. The December story sure was a dandy!

After I have read all the articles on receivers and transmitters, I like to rest my brain on a good short wave "fiction" story. I would like to see more letters from Texas hams; I am hoping some day to be on the air with a 5 meter phone transmitter. I will close hoping to hear from anyone who wishes to write.

Vivian D. Kinard,
Big Spring, Texas

Disgusted With Code

Editor, SHORT WAVE CRAFT:
Dear sir:

Being a subscriber to *Radio Craft* and a newsstand buyer of SHORT WAVE CRAFT, I can readily state that you have the most interesting magazine for the experimenter and short-wave enthusiast.

If the "Code test" were eliminated on phone transmission below six meters I would apply for such a license. I have tried to learn code about two years ago and became disgusted with it. About four months ago I tried it again but in vain. I can learn code and no doubt anyone can learn it, providing they devote enough time on that one subject, but who wants to spend all that time on something that is not used on phone transmission.

Many readers will agree with me when I say that everyone cannot master code in two months just as M. R. Rofajko claims he did (in the Feb. 1933 issue of SHORT WAVE CRAFT). Rofajko also states that if code were eliminated, inexperienced fellows would build transmitters and get on the air. If his statement were true inexperienced fellows would learn code, then build transmitters and get on the air. He probably does not know that if code were eliminated a person would still have to pass a test to prove his knowledge of the transmitting apparatus and as a person can prove that knowledge it will be proof enough he can operate a transmitter efficiently.

In my opinion it is easier to build a transmitter than it is to learn code.

The least that could be done about it is give it a tryout to see how things work out, and if things do not prove satisfactory the license may automatically become void after a certain date.

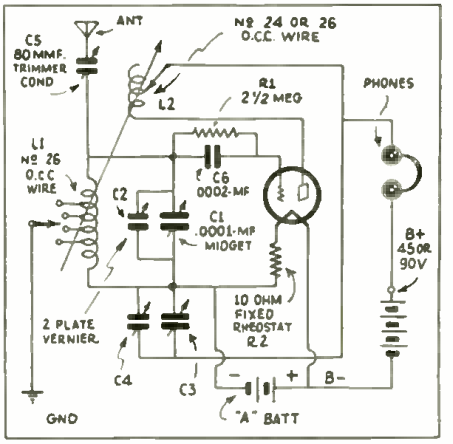
Joseph Zielinski,
1637 Blackhawk Street,
Chicago, Illinois

The Tinymite

(Continued from page 281)

C4—midget vernier—2 plate condenser; about 10 to 20 mmf.—Hammarlund (National).
C5—80 mmf. trimmer (Hammarlund) aerial condenser.
C6—.0002 mf. grid condenser; .0001 or .00015 may be used instead.
R1—2½ megohm grid-leak. Lynch (International).
R2—10 ohm fixed rheostat.

—L. S. Hoover, Tionesta, Pa.



Hook-up for the "Tinymite."

The Pentaflex

(Continued from page 269)

R1—Lynch 3 meg. metallized grid leak ½ watt
R2—400 ohm tubular wire-wound pigtail resistor
R3—50,000 ohm potentiometer
R4, R5—Lynch .25 meg. metallized resistor, ½ watt
L1, L2—Alden (Na-ald) plug-in coils (see text for details)
1—National type "BM" 3" dial (0-100-0)
1—National grid-clip, type 24
1—D. P. S. T. switch
1—Eby twin binding post assembly (laminated)
1—Eby twin speaker jack assembly (laminated)
1—Eby laminated 7 prong socket, small (.75" pin circle diameter)
1—Hammarlund 4 prong isolantite socket (S-4)
1—6A7 or 2A7 tube
3—FT. 5-conductor cable
1—Roll Hook-up Wire
1—Blan Aluminum panel, 14 Ga, 5"x7"
1—Blan Aluminum panel, 14 Ga, 5"x5", bent to form 3"x5"x1" subpanel.
1—Length varnished cambric tubing (spaghetti)
Miscellaneous nuts, bolts, solder, etc.

This 3-Tube Superhet Has "IT"

(Continued from page 275)

divider of 22,000 ohms, tapped at 12,000 ohms for the various screen voltages. The screen voltages are taken off the divider at a point 12,000 ohms from the high potential side of the resistor.

Grid-leak Detection

Grid-leak detection is used in the 2A5 second detector tube because this method gave by far the greater audio output, a one megohm leak seems to be about right and can be of the one-half watt variety.

Modulation of the second detector for CW reception is obtained by hooking the detector screen-grid in parallel with the oscillator plate and fed through an R.F. choke from the 100 volt tap on the voltage divider. In order to get full audio output from the 2A5 detector, it is necessary to bypass the screen with a .01 mf. condenser. To prevent the output of the oscillator from getting into the radio frequency stage, the connection from the plate of the oscillator to the screen of the detector is run through flexible shielding; this shield should be grounded to the base of the receiver at several points to hold it firm. Should this shield be left loose and rub against the chassis, it would cause considerable scratching noise in the speaker.

The power from the output tube is fed to the speaker by an output transformer or a choke and condenser arrangement, according to the type of speaker used. The output transformer is an affair used to work on a pair of pentodes and has a 12 ohm secondary for use with a dynamic speaker, the center tap on the primary is unused; the plate is connected to one side and the B plus is connected to the other. If it is desired to use a magnetic speaker this can be done by connecting one side of the speaker through a 1 mf. condenser to the plate of the tube, and the other speaker lead to the chassis; this keeps the high plate current of the tube out of the speaker or phones, should one wish to use them.

Beat Oscillator Details

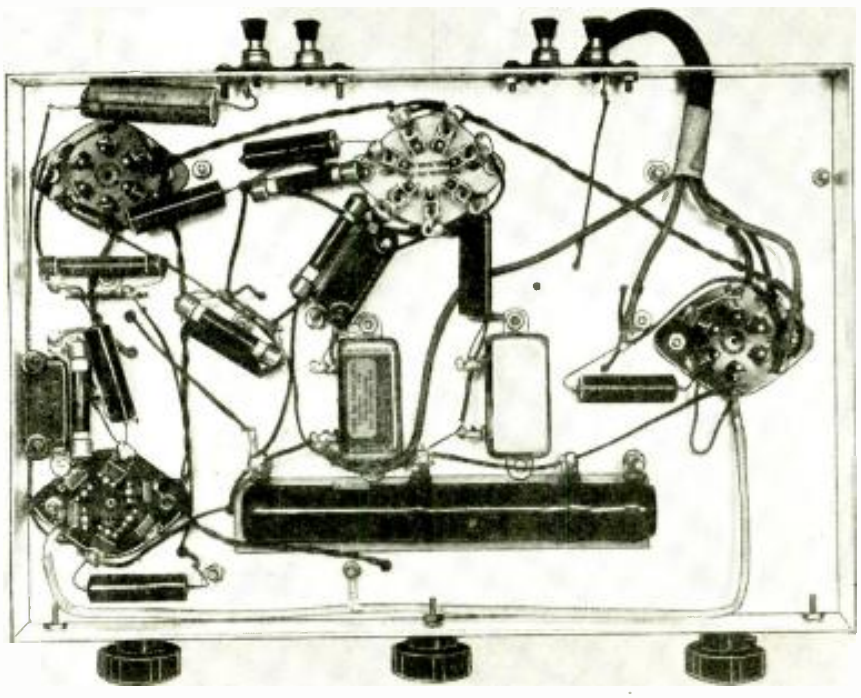
Last but not least, is the beat oscillator, used mostly for code reception and this unit can be left out of the set if the builder is interested only in short wave broadcast (phone) reception. The *tuning unit* of the beat oscillator is a home-made affair and can be constructed very easily. The entire unit is inclosed in a shield-can measuring 2½ inches in diameter and 3 inches high. A general idea of the construction and assembly of this can be seen by glancing at the photograph. It is not advised to try and wind the coil because it could not be made small enough to fit in the shield with all the other parts. The easiest way is to "buy, beg or borrow" a *universal-wound* coil of the same value as that used in the "IF." transformers; unwind about twenty or twenty-five turns and tie a loop in the wire and start to rewind, or, wind back the turns removed, keeping the loop which forms the cathode tap "out in the clear." The tap should be about five or six inches long. This coil, the 100 mmf. fixed tank condenser and the 100 mmf. grid condenser and grid-leak are all mounted on a Hammarlund 35 mmf. midget tuning condenser. The whole assembly is then mounted in the shield can, with the shaft of the tuning condenser projecting through the shield; in fact the condenser is mounted in a hole in the center of the can, being a single-hole mounting condenser.

Bring the grid lead out the top of the can on the rim, so that the operation of the knob will not interfere with or disturb it. This lead by the way should be shielded and the shield can grounded also. No switch is shown for shutting off the oscillator, but can be added if desired. The operation in the receiver shown is to turn the oscillator out of resonance with the IF. frequency when the oscillator is not desired, and back again when needed.

Hints On Operating Set

Operation and adjustment of this little set is very simple and requires very little experience. If the following explanation is followed carefully no difficulty should be had in getting the set to "perk" right off.

Check all wiring before any voltages are applied, to make certain no error has been



Bottom View of Mr. Shuart's 3-Tube Superhet.

made in conections and that all have been soldered firmly. Then apply filament and "B" voltages and connect a pair of phones to the out-put terminals; all adjustments should be made using phones. Set the condenser across the plate coil of the first IF. transformer at about half capacity. Then start up some "noise-producing" electrical instrument such as a buzzer or vacuum cleaner, near the set and proceed to adjust the other IF. tuning condensers for maximum volume. When this stage has been reached, tune the *beat oscillator* condenser until a slight hissing sound is heard in the phones, this indicates that the oscillator is in tune with the IF. frequency; then proceed to locate some kind of short-wave station. Of course the *noise-generator* has to be shut off at this point. When a station is once located then adjust the IF. *trimmers* until full efficiency or loudest signal has been reached. During this adjustment however, the condenser in the plate circuit of the first IF. transformer should not be touched unless the frequency of the IF. unit is to be changed. This is mentioned because the adjustment of this primary tuning condenser has a decided effect on the high frequency oscillator frequency, and will most certainly result in maladjustment. Therefore do all adjusting with the other three IF. condensers unless the intermediate *frequency* is to be changed.

Coil Winding Table

Make two of the following

COIL	Tickler or antenna		GRID	
No. 1—	4 turns	No. 34 wire	5 turns	No. 26 wire
No. 2—	5 turns	No. 34 wire	10 turns	No. 26 wire
No. 3—	8 turns	No. 34 wire	24 turns	No. 26 wire
No. 4—	10 turns	No. 34 wire	45 turns	No. 26 wire

All coils close-wound, Diameter of form 1" inch.

The above coils cover all of the popular S. W.-broadcast and Amateur bands.

Any standard commercial SW coils will work if designed for 100 mmf. condensers. Otherwise change tuning condensers to match coils that are designed to work with 140 mmf. condensers.

Spacing between grid coils and tickler or antenna coil is ¼ inch.

Parts List—Shuart 3-Tube Superhet

1—8x12x1 Inch Chassis 1/16 in. Blan.
1—7x12 Inch Panel 1/16 in. Blan.
1—drum dial—National.
1—100 mmf. Variable Condenser, Clockwise, National—270°
1—100 mmf. Variable Condenser, Counter Clockwise, National—270°.
2—35 mmf. Variable Condensers, Hammarlund.
8—5 Prong coil forms, small Hammarlund.
2—National Isolantite sockets (5 prong).
1—National Isolantite sockets (7 prong).
2—National "Airtuned" IF. Transformers.
3—Tube shields, Hammarlund.
3—6 prong tube sockets, wafer, Eby.
2—.5 MF. Bypass condensers.
1—.5 MF. Bypass condensers.
7—.01 MF. Bypass condensers.
3—.0001 MF. Mica grid cond.
1—22,000 ohm voltage divider, tapped at 12,000.
2—100,000 resistors—1 watt, Lynch (International).
1—20,000 resistors—1 watt, Lynch, (International).
1—300 ohm resistors— 1 watt, Lynch (International).
1—250 ohm resistors—1 watt, Lynch (International).
1—1 meg. resistor—1 watt, Lynch (International).
1—20,000 Volume control, Acratest.
1—Antenna-Ground binding post strip, Eby.
1—Speaker binding post strip, Eby.
1—4 wire cable.
For "Beat Oscillator tuning unit, see text."
1—2A7 or 6A7 tube, Gold Seal.
1—2A5 or 42 tube, Gold Seal.
1—58 or 78 tube, Gold Seal.
1—57 or 77 tube, Gold Seal.

Velocity . . . The Latest Microphone

(Continued from page 287)

phragm. When these waves strike the diaphragm the voice coil attached to it vibrates in a strong magnetic field, supplied by permanent or electro-magnets, and generates a very small E. M. F. This current is suitably amplified much in the same manner as in the case of the condenser microphone, previously described, by two or more stages of amplification.

Referring to Fig. 1, the *output level* of the average dynamic microphone is greater than that of the condenser, but lower than that of the carbon. The pre-amplifier is therefore necessary to bring it up to the output level of the carbon. Its *frequency response* does not differ very much from that of the condenser, inasmuch as this microphone belongs to the same group, namely the *pressure type*, which employs a diaphragm as the varying element.

The main advantage over the other type is the fact that the dynamic is impervious to average climatic conditions and does not have to be placed in proximity to the pre-amplifier; in fact, if the proper transformers are used, it can be placed even one hundred feet away.

Its construction, however, requires such precision as to render it far out of the reach of the amateur.

The Velocity Mike

The *velocity* type, the latest addition to the microphone family, embodies a different principle, which while not new in itself, has been only recently introduced in America.

The *velocity* or *ribbon* microphone is essentially an electro-dynamic device. It consists of a very thin corrugated aluminum ribbon suspended in a strongly magnetic field produced by electro- or permanent magnets. The sound waves striking the ribbon will cause it to vibrate, thus generating a small E. M. F., which when properly amplified, will perform as previously described.

The absence of a stretched diaphragm makes this microphone respond very faithfully to frequencies varying from 30 to 16,000 c. p. s. (cycles per second.)

By referring to Fig. 1, it will be noted that the curve is remarkably flat, sloping in a gradual way down to 16,000 c. p. s., and is free of any resonance peak. Its output is far below that of the carbon "mike"; in fact it ranks last, yet no more than two stages of amplification are necessary to bring it up to the necessary *sound level.*

Its sensitivity is controlled by the thickness, width and length of the ribbon. Another factor is the intensity of the magnetic field. Its remarkable frequency response is due to the proper corrugation, tension, and texture of the ribbon, which requires various temperature treatments. Commercial velocity microphones employ ribbons two-tenths of one thousandth of one inch thick (.0002"). If you stop to consider that the average human hair is fifteen times as thick, you will realize that an aluminum ribbon of this thickness would be almost impossible to handle, unless it was hardened by some process. Good results, however, are obtained with ribbon .0006" thick, which is the standard size of an excellent ribbon microphone recently placed on the market for amateur use.

Thicker ribbons make the microphone sluggish and insensitive. Soft aluminum ribbons will soon lose their elasticity and become useless.

Figure 4 illustrates a typical velocity microphone of excellent design which is fast becoming popular in the amateur and public address fields.

Velocity Mike Is Directional

The velocity microphone is decidedly a directional one. Its pick-up range is much narrower than the other three types. As a matter of fact, it is absolutely insensitive to sound generated 90 degrees to either face. This quality is very desirable in motion-picture work, where the noise of a camera located in the same plane of the microphone will not be picked up by the microphone.

Another very important feature produced by the inherent directional quality of the ribbon microphone is the *absence of feedback*, so troublesome in public address work.

These microphones require the use of a special low-impedance transformer to match the impedance of the ribbon. The design of this transformer is as important as the microphone itself and inasmuch as the impedance varies with the size of the ribbon, it is essential—for a perfect match—to determine the *exact impedance of the ribbon* before purchasing a transformer; or it is advisable to obtain at least the assurance of the manufacturer that a certain transformer will match a particular type of velocity microphone.

By the use of another transformer at the amplifier, it is possible to place the pre-amplifier away from the microphone. This distance can be over one hundred feet without serious losses. If it is desired to have the pre-amplifier near the microphone, a different type of transformer is to be used. Figure 5 shows the two methods of connecting a velocity microphone to a standard pre-amplifier.

A careful analysis of the facts stated above should not give the impression that any one of the microphones described is, in a general way, better than the other. Each one will perform better than the

(Continued on page 311)

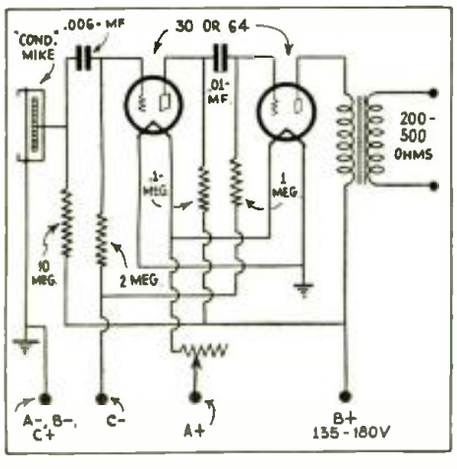


Fig. 2
Condenser "mike" pre-amplifier

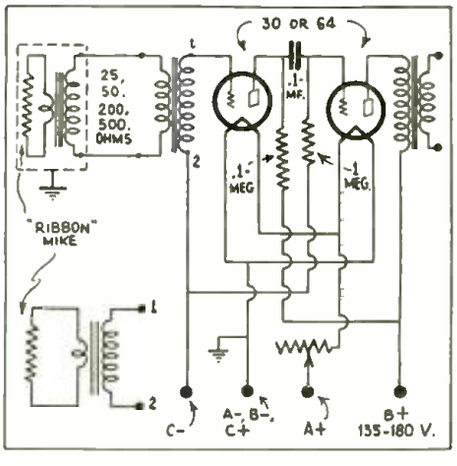


Fig. 3
Ribbon "mike" pre-amplifier

Velocity . . . The Latest Microphone

(Continued from page 309)

other under certain conditions; in fact at times one type cannot be substituted for another.

When in need of a microphone, therefore, it would be advisable to determine first which one is best suited for the work. The cost of installation is a very important factor. The need of pre-amplification, with the necessary extra power supply necessary to operate the condenser-dynamic and ribbon types, makes the carbon microphone the choice of the moderately priced installation.

The condenser and dynamic microphones are employed to cover large areas, such as orchestras, stages and far away "pick-ups." One is to be kept indoors, preferably, while the other can be taken outdoors without much worry.

The ribbon-velocity "mike," however, is the all-around microphone. Its fidelity of reproduction is unsurpassed. It is rugged, yet sensitive; it is unaffected by climatic condition and when used outdoors needs only to be protected from strong winds.

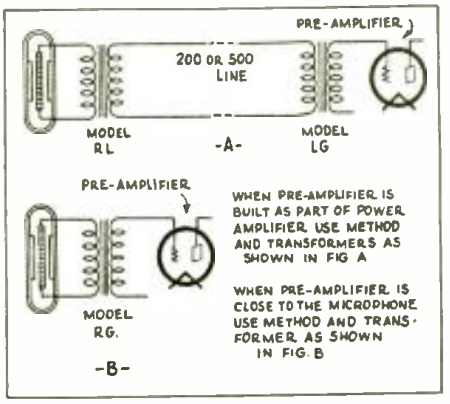


Fig. 5
How to couple "mike" over short and long circuits

Amateur Transmitters

(Continued from page 271)

TUNING UP

After the transmitter is wired and the antenna is up, the *monitor* is called into play. Suppose we intend to work in the 80-meter band, on 3,575 kilocycles. We have already cut our antenna according to the measurement in the table for that particular frequency. Put the 80-meter coils in the transmitter. Tune in the band on your *receiver* and set your *monitor* just inside the low frequency edge. Usually there are some stations operating right on the edge of the band, but always to be on the safe side, unless your monitor is already accurately calibrated, set it inside the first ten stations you hear. Plug your earphones in on the monitor and then press the key on the transmitter. Turn the transmitter dial until the current goes down to its lowest point, about 30 (milliamperes). Somewhere in the portion of the dial where the transmitter draws *minimum* current, a whistle should be heard in the earphones, signifying that the set is operating O.K. The grid coils will probably be all right, but it may be necessary to add on or take off a few turns until the transmitter draws least current (without the antenna) at the low frequency end of the band.

Now clip the antenna on the tank coil, one turn for 20, two for 40 and five for 80 meters, from the "cold" or plate blocking condenser end.

As the dial is turned through the frequency of the antenna, there should be a sharp rise in plate current, as shown on the milliameter. The antenna should be clipped as far up to the 'hot end" of the tank coil as is possible, without spoiling the note, because for good reliable operation the note must be pure D.C. The transmitter will work only on the frequency to which the antenna is cut, hence if a frequency well in the band has been chosen, there will be no worry about *off frequency* operation. Always operate right on the peak of the antenna, although in case of interference a shift can be made up to 15 kc. each side of the peak. When doubling the antenna, say using an 80 meter antenna on 40 meters, the peak will be much broader. *Always keep the note pure d.c.*

CONCLUSION

This set has been built to operate on the three most popular amateur bands, 20, 40 and 80 meters. Twenty is the big daylight DX band. Forty is usually good for about fifteen hundred miles, although in the early morning it is possible to work Australia and New Zealand.

However, the best band for the fellow just breaking in the game is the 80-meter band. There are plenty of stations on all day and all night, and hundreds of good operators who will "pull up" and send slow for a newcomer. After experience has been obtained on the 80 meter band, the outfit can be put down on 40 and 20 for a try at some big DX.

This is the first of a series of articles dealing with C.W. and phone transmitters of all types. In subsequent articles we will show you how to enlarge and improve your transmitter easily and how to add *phone* to it.

ANTENNA DATA

Frequency	Antenna Length	Feeder Length from center of aerial
3550 KC	134 ft.	18' 8"
3600 KC	132 ft.	18' 5"
3700 KC	129 ft.	18'
3800 KC	125' 9"	17' 6"
3900 KC	122' 5"	17'

For 40 meter aerials multiply the frequency by 2 and divide the aerial and feeder placement lengths by 2. For 20 meters multiply and divide by four. The bands are as follows:

80 m. 3500 to 4000 kc.
40 m. 7000 to 7300 kc.
20 m. 14000 to 14,400 kc.

Use good insulators, measure carefully, and solder the feeder on tightly.

Power Supply Parts List

1 Acratest power transformer (T)
2 Eby socket 4 prong (S)
2 Dual 8-mf. Acratest electrolytic cond. (C)
1 30-henry, 150 ma. choke (S)
1 10,000-ohm Bleeder resistor 50 watts (R)
1 Wooden base board
1 4 wire cable
1 4 wire socket plug

Grid and Plate Coil Specifications

Grid Coils No. 30 d.c.c. wire	80 m.—50 turns 40 m.—15 turns 20 m.— 6 turns	Wound on coil form—1¼" diam.
Plate Coils	80 m.—14 turns 40 m.— 6 turns 20 m.— 4 turns	¼" copper tubing

TRANSMITTER PARTS

1 set of grid coils (See specs.) L-2
1 set of plate coils (See specs.) L1
1 Acratest .00035 mf. tuning cond., C1
3 .002 mf. mica C2, C3
1 .00025 mf. mica C4
1 Hammarlund R.F. Choke R.F.C.
1 Acratest 150 ohm CT Resistor R1
1 Acratest 5 watt resistor 50,000 ohms R2
3 Eby Sockets
1 Wooden base board 7"x13"
1 O-100 Readrite milliammeter

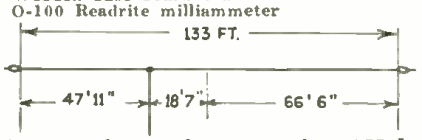


Diagram of typical antenna for 3575 kc. Ant. of No. 14 solid enamelled copper feeder of heavy rubber covered lead-in wire. Use good insulators. Solder feeder on carefully. Feeder at right angles to flat top for first 30% of distance.

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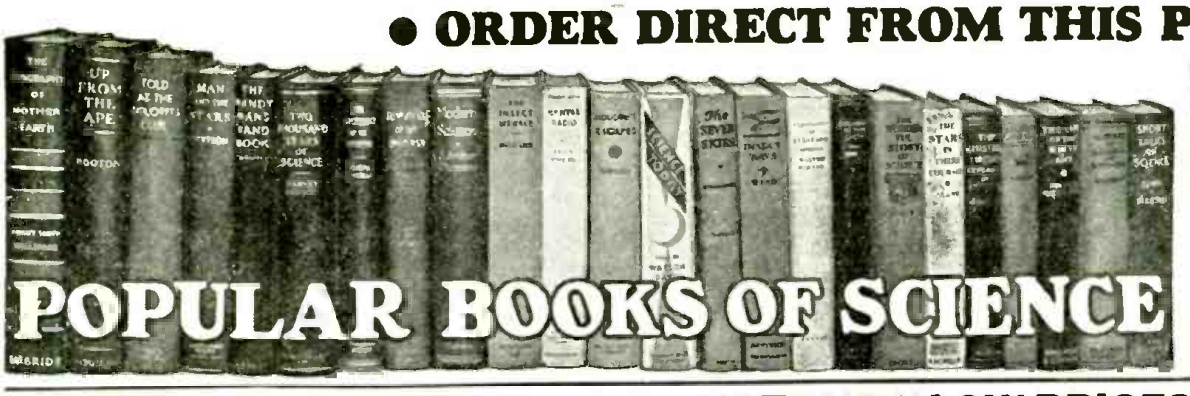

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When to Listen

By Robert Hertzberg

New Mexican Station

● THE sensation of the last month undoubtedly is station XETE, in Mexico City, which has been providing short-wave fans with interesting reception. We wish to thank all the SHORT WAVE CRAFT readers who were kind enough to send us reports on this new outfit.

In regard to XETE, Jerry Pilgrim, 5744 Kingsly Circle, Oakland, Cal., writes:

"XETE is on 31.25 meters from 11:30 a.m. to 2:30 p.m. and from 4:00 to 9:00 p.m., Pacific Standard Time, and later on Saturdays. It comes in with excellent volume after sunset, louder than W1XAZ and W2XAF.

"DUOK in Shanghai, China, is on 49.2 meters and is heard from 3:00 to 5:30 a.m. irregularly.

"YVQ in Maracay, Venezuela, has changed its wavelength to 22.48 meters and VK2ME has changed its schedule to 9:00 to 11:00 p.m. on Saturdays and 2:00 to 7:00 a.m. on Sundays, Pacific Standard Time.

"The short-wave stations that I have received on my two-tube set are W8XK on 48.25 and 19 meters; W1XAL on 25 and 48.25 meters; W2XE, W3XAL, W8XAL, YV1BC, W4XB, W3XAU, VE9CS, all on 49 meters; XETE, W2XAF, W1XAZ and VK2ME on 31 meters. I would like to hear from other short-wave fans."

German Stations Very Strong

The political upset in Germany has had one good feature, at least as far as short-wave listeners are concerned. The short-wave stations at Konigswusterhausen, which formerly transmitted only at irregular intervals, are now exceedingly busy broadcasting Hitler propaganda in both German and English, and can be heard in the East with roaring loud speaker strength. During the early evening DJC, on 49.83 meters, is without doubt one of the best stations on the air. It may be recognized quite easily by its between-program interval signals, which consists of a few bars of music on the piano. The announcer speaks excellent if somewhat accented English.

Bowmanville, Canada

Station VE9GW, located in Bowmanville, Ont., Canada, on 49.17 meters, is now operating on the following schedule:

Monday and Tuesday, 8:00 to 12:00 noon, Eastern Daylight Saving Time.

Thursday and Friday, 4:00 to 8:00 p.m.

Saturday, 4:00 to 12:00 p.m.; Sunday, 11:00 a.m. to 9:00 p.m.

The transmissions on 25.42 meters have been discontinued.

"Leviathan" Laid Up

Some short-wave fans must be classed with fishermen when it comes to recounting their achievements. One way of checking up their lists of received stations is to note what ships are listed. The favorite stumbling block is the much publicized *S.S. Leviathan*, which has been tied up at a New York dock and virtually abandoned since June. Although the main occupants of the vessel are a couple of escaped monkeys, we continued to see the *Leviathan's* call, WSBN, included in many logs!

He Hears Germany!

Harry V. Miner, 52 Pratt Street, Allston, Massachusetts, has kindly sent us a verification he received from the German Post Office stations. He has been able to hear DJD on 25.51 meters from 3:00 to 7:00 p.m., and DJC on 49.83 meters as late as 8:00 p.m., E.S.T. We have had this verification translated and are presenting it herewith because it contains specific data.

"The German Postal Administration thanks you for the report of reception of the German around-the-world radio transmitters. The transmitter is located in Zeesen, near Berlin. It operates daily between the hours of 2:00 to 6:00 p.m., Middle European Time (8:00 to noon E.S.T.) on the wavelength of 19.73 meters; from 6:30 p.m. to 12:30 a.m., M.E.T. (12:30 to 6:30 p.m. E.S.T.) and in some instances also up to 1:30 a.m. M.E.T. on 31.38 meters. Mainly it transmits the programs of the Deutschlandsenders, 1534.9 meters, i.e., the programs of the Berlin station. The antenna capacity of the carrier wave is 5 kw. The call letters of the transmitter on 31.38 meters is DJA, and those on 19.737 meters, DJB.

When transmitting to North America, the transmitter in each instance takes advantage of the most favorable conditions for transmission on the wavelengths of 19.737, 25.51, or 49.83 meters. In the two latter instances the transmitter has the call letters DJD and DJC. Every day at 4:00 p.m., M.E.T. (11:00 a.m., E.S.T.) the program of the following day is announced on 19.737 meters in both German and English.

"Just now the operation of the German around-the-world transmitter is being improved by the construction of new antennas and the erection of a second transmitter on a larger scale. After the completion of the whole installation, either one or two transmitters may operate on different wavelengths and antennas as may be desired. It is expected that the German around-the-world transmitter will always be heard in overseas service. We shall be grateful for further observations on the receptions every now and then."

This letter was written on the stationery of the Reichspostzentralamt, Berlin-Tempelhof, and is dated March 22, 1933.

Powertone-Wallace S-W Receiver

(Continued from page 287)

spread method, but such that an infinitely greater wavelength or frequency range is covered.

This new method of short-wave tuning makes *station finding* a relatively simple matter. It is particularly advantageous when the receiver is used for amateur code or voice reception. Special plug-in coils can be wound so that any narrow band in the short-wave spectrum can be "spread" at will by simply adding a turn of wire to the secondary winding of the coil, or by removing a turn or two of wire from it. The 75-85.7 meter amateur phone and code band, for example, can be tuned in two ways by means of this condenser switching arrangement. The 75-150 meter coil is first plugged in; the switch on the receiver panel is thrown to the *band-spreading* position. Almost over the entire sweep of the dial will be found many amateur phone signals, many stations widely separated from others, no crowding of stations. Contrast this method with that found in other receivers, in which the entire amateur phone band is crowded into a relatively few degrees on the tuning dial. Another snap of the condenser change-over switch and both amateur phone and code bands are tuned with one sweep of the dial, in addition to tuning in the airplane and ground stations, police calls and commercial signals on the uppor portion of the dial.

However, when this method of tuning is used the stations are not widely separated, because the full capacity of the condenser does not permit band-spread tuning. If, for example, the coil in use covers the amateur phones with band-spread tuning, and it is then desired to band-spread amateur code signals or airplane or police calls, it is merely necessary to add

a few turns of wire to the secondary winding of the plug-in coil, a turn at a time being added, until the minimum indication of the condenser tuning dial brings in the beginning of the wavelength or frequency band that is to be band-spreaded. Or the commercial short-wave broadcasts, likewise, can be tuned in *band-spread* manner. Those who desire to use the Wallace receiver for listening to a predetermined band can secure a coil for that particular band from the manufacturer of the receiver, or a coil can be wound by any experimenter by referring to the coil winding data given elsewhere in this article.

The two-tube Wallace receiver, illustrated herewith, can be operated with type 30 tubes and dry cells. The extremely low filament drain of the type 30 tubes enables the user to operate the receiver from an ordinary 4½ volt "C" battery for filament lighting and a single 22½-45 volt "B" battery for plate current. A reasonable amount of volume is secured when this method is used but the receiver will still bring in all stations that are otherwise heard when a larger number of tubes is used. In fact, a one-tube receiver will bring in as many stations as a 3- or 4-tube receiver, but the signals are not received with sufficient volume to make reception enjoyable. The two-tube receiver, with the special antenna coupler winding on the coil form, the band-spread system of tuning and the use of a Wallace antenna of specified size, has brought in stations from 26 countries when headphones were used.

The coil winding data are as follows:

15 to 40 meter coil, antenna coupler—16 turns (2 windings of 8 turns each). Secondary coil, 6½ turns, double space wound, No. 14 DCC wire. Regeneration coil 6½ turns, closely wound, spaced ½" from secondary winding. Use No. 14 DCC wire.

40 to 75 meter coil. Antenna coupler—Same for all coils. Secondary coil—16 turns, closely wound. Use No. 22DCC wire. Regeneration coil—15 turns, closely wound, spaced about 1¼" from secondary coil. Use No. 22 DCC wire.

75 to 150 meter coil. Antenna coupler—Same for all coils. Secondary coil—28 turns, closely wound. Use No. 22 DCC wire. Regeneration coil—26 turns, closely wound. Use No. 22 DCC wire. Space as far as possible from secondary coil (about 1").

150 to 200 meter coil—Antenna coupler—same for all coils. Secondary coil—70 turns No. 26 DCC wire, closely wound. Regeneration coil—20 turns, No. 26 DCC wire, spaced about ½" from secondary coil.

Coil forms 1⅜" diameter.

Powertone-Wallace Two-Tube Short Wave Set

Parts List

1—Hammarlund 43-plate midget condenser, 325 mmf.
1—Hammarlund special "Wallace" band-spread condenser, 75 mmf. total.
1—Hammarlund 34-plate midget condenser, 240 mfd.
Fixed condenser, .00025 mf.
Special filament resistor, 8 ohms
10-megohm grid-leak, Lynch (International)
40 mmf. midget condenser
.0001 mf. mica condenser
.0002 mf. mica condenser
.5 mf. condenser, Pigtail type.
.01 mf. condensers, Pigtail type
10 mf. electrolytic condenser
8 mf. each electrolytic condenser
16 mf. electrolytic condenser
Set of four plug-in coils (15-200 meters). Bruno
1—Audio impedance
25 henry choke
15 henry choke
5 megohm resistor
50,000 ohm Potentiometer
60,000 ohm resistor, Lynch (or International)
250,000 ohm resistor, Lynch (or International)
625 ohm resistor Lynch (or International)
175 ohm resistor, Lynch (or International)
1—power switch
3—wafer sockets, 6 prong, Eby (National, Hammarlund, Na-ald.)
1—wafer socket, 4 prong, Eby (National, Hammarlund, Na-ald.)
1—Vernier illuminated dial
1—Stamped metal chassis
1—metal cabinet
1—terminal strip, Eby (or other make)
1—dual antenna and ground binding post strip, Eby (or other make)

Attention! All Squads!

(Continued from page 281)

His weak little voice couldn't do much," disparaged Bill.

"Oh yeah!"

Doc put the record on the turntable, turned on the motor and connected the pickup leads to the speech input.

The record scratched badly; occasionally the shrill but unintelligible voice of a child sounded through. Doc grinned evilly as he watched the milliammeter needle dance back and forth in step with the youngster's voice.

"That kid's doing his good turn for today," bantered Doc.

Bill, sullen and motionless, had all to do to disguise his rapid breathing. Inside, his heart beat like a trip-hammer.

Doc, manipulating the record, became talkative, almost friendly.

"Have a smoke," he offered, handing the amateur an expensive brand of cigaret.

"No!"

"Okay," he laughed amiably, "maybe it's for the best. I've got to see a politician tonight yet and I'll have to feed plenty of these costly babies to that bird to get what I want."

Bill's expression of contempt did not escape the crook's eye.

"Look here," he said, laughing for the express purpose of irritating the amateur, "this will put you in a pretty bad light. I'd hate"—ironically—"to see you take the rap for operating off-frequency and interfering with police work. Say, you ought to get a cut out of this haul. I'll speak to the boys about it when they meet me here."

Then, for some reason or other, Doc was seized with a fit of laughter. It ended only when the door of the shack opened.

Capture!

"Drop that gat, Mr. Doc Turk," came from the uniformed man obstructing the doorway.

But the order was unnecessary; Bill, smiling triumphantly, had in a flash knocked the automatic from the gang chief's hand.

It was only a matter of a few seconds and the speechless Mr. Turk was just another handcuffed criminal. His bewilderment was not lessened when he saw his entire gang herded into the shack, all like himself—handcuffed.

"We caught them on the way up here," explained Captain of Police, Carlsen, to the smiling amateur. "I got to hand it to you, son," went on the officer admiringly, "that was a neat trick you pulled. And such a tough bunch of . . . ."

The captain stopped, interrupted by the raucous guffawing of one of his men.

"Clancy!"

"I . . . I can't help it, Captain," choked Clancy, "just . . . just look at him!"

He pointed to Doc, and indeed, that one wore a ludicrous expression. Taken, as he was, unawares, Doc looked like an African native shown for the first time the Empire State Building.

Captain Carlsen fought back laughter but so did this unnatural repression strain and ache his diaphragm that the good man threw decorum to the winds and enjoyed a hearty laugh.

"Better tell him, boy, I can't stand that funny-looking face much longer!"

Bill nodded and addressed the perplexed gang chief.

"You made a big mistake," he began sarcastically. "In fact, for an ex-commercial operator, I'm surprised at you. Why I wonder with all your superior technical knowledge, did you put that record of my small brother's voice on the air? Don't you know that a child's voice is of higher frequency or pitch than an adult's.."

"Don't you remember," Bill continued patronizingly, "that a pure DC. note pierces through the air much easier than a low-frequency R.A.C. note? The same applies to voices. My little brother's voice pierced through the heterodyne squeal while the deeper-pitched rougher voices of the police did not. Yes, Mr. Turk, the kid did do his good turn for today!"

Doc Turk was still in a daze. He understood how a child's voice could pierce interference, but what of it? How . . . ?

Bill smiled.

"I think I can clear up all you'll want to ask by turning on the record that you, by your own hand, broadcast to the police!"

Bill pushed the pickup plug into a receiver jack labelled "phono" and the following piping voice of a child came through the loudspeaker.

"Dear Sanny Claus, bring me a great big elephunt, a rockin' horsey, a . . . a . . . (here the mother prompted the child) . . . Oh yes, Sanny Claus, and I want a whole big box of choclits. *My name is Tommy Jensen and I live at 346 Grant Street . . .*"

"That's enough," interrupted Captain Carlsen hearing the siren of the "Black Maria." Then turning genially to Bill: "To tell you the truth, son, I'm more interested in another kind of record—these hoodlum's police records!"

$20.00 Prize Monthly For Best Set

● **THE editors offer a $20.00 monthly prize for the best short-wave receiver submitted.**

If your set does not receive the monthly prize you still have a chance to win cash money, as the editors will be glad to pay space rates for any articles accepted and published in SHORT WAVE CRAFT.

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

Sets must be sent PREPAID and should be CAREFULLY PACKED in a WOODEN box!

The closing date for each contest is sixty days preceding date of issue (September 1 for the November issue, etc.)

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

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

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

Making An Automatic Key

(Continued from page 295)

posts, the two contact posts, and the lower bearing. Drill these holes in corresponding places to the diagram. Since the locations are not critical no dimensions are given. However, care should be taken to place the contact points exactly opposite the contact posts respectively and the lower bearing directly opposite the upper, i. e., in a perfectly vertical line.

The contact posts are adjustable binding-posts set on half-inch high bushings. A nail forms the contact arm. The point is sawed off and a brass contact is soldered on the head. Two of these are made, one for the dot and the other for the dash contact. The end stop is made the same with the contact omitted. As the middle stop requires precise adjustment and must hold its adjustment, it is constructed differently. A tapped bushing is the support. On this is soldered a quarter-inch bushing, threaded, with the hole in a horizontal plane. A 1½-inch bolt is screwed into the horizontal bushing with a nut to lock the adjustment. With this arrangement precise adjusting can be accomplished. The lower bearing is simply a short bolt and two nuts. The end is drilled so as to give a cone-shaped hollow in which the pivot can rest. The two nuts (one above, the other below the base) lock this bearing into place. The pillar posts support the upper bearing plate. Through each of them is drilled a hole to accommodate a one-eighth inch bolt, one inch long, which holds the spring connected to the vibrating arm.

The upper bearing plate is triangular in shape and cut from the 3x3 piece of hard rubber. An old end bearing from a defunct Cardwell condenser is mounted in this piece. This provides a good top bearing. This plate is then mounted on the pillar posts. Next, the spring is cut in half and each half is connected between the arm and the pillar posts on each side.

Wiring the Key

The key is wired by running a wire from the lower bearing to one binding-post; the other binding-post is wired to both contact posts. After wiring, the key can be connected to an audio oscillator and the final adjustments can be made. The bearings are adjusted until good electrical connection is obtained as well as a flexible but not too loose movement of the arm. The dash contact arm is set between 1/32 to 1/64 of an inch from the dash contact on the vibrating arm. The springs are adjusted so that the contacts do not touch when the arm is in a neutral position. The center stop keeps the dot contact from resting permanently against the dot contact post. It also regulates the speed of the dots to some extent. The end stop is so set as to prevent the dash contact from touching when the arm assumes the neutral position. A small weight on the end of the arm controls the rate of keying as it is adjustable. Though not essential, a knob may be placed on the side of the handle. This knob may be either a standard telegraph key knob or a replica moulded from plastic wood, painted black, and glued on. The knob adds both to the appearance and the ease of operation of the key.

This automatic key, if constructed with care, is very smooth in operation and neat in appearance. The speed can be regulated up to about thirty words a minute. As to operating such a key, dots are made by pressing the handle to the right, dashes to the left. The number of dots made is determined by the length of time that the handle is pressed to the right. For "e" only a very quick touch will suffice; for "i" a little longer, etc. A loose wrist motion is good with the hand resting on the small finger side. The hand is then swung from left to right, the thumb on the left side of the handle and the first two fingers on the other side.

2-Tube A.C. Receiver

(Continued from page 279)

resistor used with the detector tube, but this method is used in obtaining the bias for the second tube. The cathode of the detector connects direct to ground.

Tests made with a Weston 547 type testing outfit, under normal operating conditions as I use the outfit, reveal the following characteristics: detector tube, fil. voltage, 1.50; plate current, 1.3 milliamperes, plate voltage 37 volts; amplifier stage, fil. voltage, 1.65; plate current, .7 milliampere.

Circuit Found Very Stable

I find that it is rarely necessary to vary the coupling between antenna coil and grid coil—but if regeneration can be controlled to the point of maximum sensitivity (point of oscillation), it is best to bring down the antenna coil to the closest possible coupling, so as to secure the strongest input signal. The circuit is remarkably stable in operation, possibly because of a happy chance in the location of the various circuit-assembly layouts. I find that despite the theory that placing the tuning coil assembly directly between the grounded tube caps should, in a sense, introduce losses—it seems to result in greater stability. I can adjust the oscillation condenser to a point of greatest regeneration, without going off into "sudden oscillation." In fact, there is a leeway of ten points on the dial, in the case of receiving broadcasting. For a fellow who has made such outfits before, and has found that his oscillation condenser had to be worked to a "hair," as it were, he will appreciate such stability. The only shielding I have on the set is at the tube caps. I found it necessary to have at least one of them, on the detector, or the tube started to "howl." The other one on the second stage was put on merely for the sake of better symmetry of appearance. During the past weeks, I tried other and additional methods of shielding, copper sheathing the outside of the wooden case, etc., but found it "pulled down" my signal strength, and provided no better stability than it had before. Where the wiring penetrates up from the top of the base to tubes, coils, etc., I still have a layer of copper sheathing, which is ungrounded; to remove this would have necessitated unsoldering the various connections, which I declined to do. Perhaps it helps, but I know it doesn't hinder,—so it stays on. All other shielding has been purposely removed—for I find I do not need it.

No "Dead-Spots"!

Here is another thing I appreciate on this receiver—there are no "dead spots" in tuning, and again I hit the nail on the head "right smack," the first time I wound the various coils on the tube-bases. The turns were about right—a little overlapping between coils, which is desirable, and when capacity for oscillation was needed, the 17 plate condenser had it on hand. It is possible I could dispense with some of its plates, but it is better to let well enough alone. Using an antenna tuning coil was nothing new to me, but the happy part of this particular layout is that the set "perks" and uses the antenna coupling—you don't have to move it a mile away from the grid tuning coil, for fear the set can't be made to oscillate, if you want it to. Close coupling is helpful, instead of detrimental, as some amateur set-builders have so frequently found in the past, to their amazement!

The point of my story is, that this set "perks" better than any I have ever made before. Daventry, England, GSA, is received nightly at will, and its next door neighbor, DJC, Germany, is always there when you want it. In fact, I just tune 'em in and sit back and relax. Sometimes I have to get up and reduce the volume a bit, for the Zenith 12 inch speaker can deliver plenty of output, and you don't have to sit close to the speaker to hear it. EAQ, Madrid, is a "regular," as well as some Latin station, (not XDA, Mexico City,) who fails to announce in English. Have heard France, and of course, the usual number of "foreign" code stations.

If any owner of a Zenith radio receiver desires to build a set of this type, I shall be glad to hear from him and give him further information, if he so desires it. Of course it is entirely possible that the *power supply* can be taken direct from the Zenith receiver, but it will involve some difficulties. Off-hand, I would advise a separate power supply.

The value of the grid tuning condenser is .00012 mf.; oscillation control condenser .00025 mf. Detector grid-leak value is 4 megohms and its by-pass condenser capacity .0001 mf.

Parts List

Antenna coil—5 turns of No. 20 enameled wire, wound on 1⅞" diameter bakelite ring.

Coil No. 1 (grid-filament) 6 turns, No. 24 enameled wire, close wound, on tube base. (Plate) 6 turns, No. 24 En. wire. Spacing between both windings approx. 3/16".

Coil No. 2 (grid-filament) 14 turns, No. 24, En. wire, close wound. Plate coil, 8 turns, same wire. (Spacing between grid and plate coils, 3/16".

Coil No. 3 (grid-filament) 30 turns, No. 24, En. wire. (Would advise adding about 4 to 6 turns additional). Tunes short of 200 meters. Plate coil 10 turns, No. 24 En. wire, close wound. Spacing between grid and plate coils, 1/16" to ⅛".

Grid-coil tuning condenser, 8 plates, 2½" circular rotor, obtained from old style TRF receiver. Capacity .00012 mf. (Removed 9 plates for better tuning control.)

Plate-Grid coil variable condenser, (regeneration and oscillation control) a 17 plate type, same specifications as that above, but use all of the plates. Capacity, .00025 mf.

R.F. Choke—80 MH. inductance.

Audio Transformer; 3:1 ratio.

Cathode resistor, R1, (audio stage,) 1000 ohms, 2 watt metallic type. Cathode by-pass condenser C1 same stage, .0001 mf.

Plate resistor, R2, (audio stage) 20,000 ohms.

Coupling condenser, C3, to input jack of Zenith "Phono" connection; 1 mf. (fixed).

Aerial selector switch—home-made; used assembly of old type battery-operated Atwater-Kent 1 dial TRF receiver, consisting of mounting for filament toggle switch and filament resistor, (variable). The switch (toggle) opens or closes connector lead between phone jack and output from plate of 2nd tube.

U. S. W. Transmitter and Receiver

(Continued from page 283)

in the grid and plate circuits of the detector are the usual tuning and regenerative coils of the tuned circuit. The values of these coils as well as those for the tuned grid and tuned plate of the push-pull transmitter can be found by experiment, depending on the wavelengths to be used.)

A Lot of New S-W Circuits In the October Issue!

Don't Miss IT!

SWAPPERS

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Preventing "Tuning Holes"

(Continued from page 284)

as the fundamental of the open circuit, or to any one of the harmonics of that fundamental frequency. This does not apply to those receiving sets employing a screen-grid buffer tube between the detector tube and the open circuit. By the open circuit is meant that circuit to which the aerial and ground leads are connected. The trouble is caused by the open circuit absorbing so much energy from the receiving set at those particular frequencies that there is not enough energy remaining to keep the set oscillating; and it seems that this always happens at a point on the scale where some station whose reception is particularly desired is transmitting.

A simple remedy for this condition is to connect a winding of about two turns of heavy wire, with a diameter of approximately two inches, in series with the antenna and primary coil. This winding should be placed far enough away from the secondary circuit so that no coupling will exist between them. This two-turn winding is normally short circuited by a switch; but when the receiving set is tuned to one of the frequencies at which it normally stops oscillating, the switch is opened, putting the coil in circuit. This changes the fundamental frequency of the open circuit which now allows the set to oscillate at all of those frequencies which were harmonics of the former open circuit frequency.—*Charles Felstead.*

5 to 7 Meter Super-Regenerative Set

(Continued from page 283)

of 50 mmf. (0.00005 mf.) and is of the type usually employed for trimming purposes.

The two H. F. (R. F.) chokes, Choke 1 and Choke 2, come within the category of special components and can, if desired, be home-made. A coil consisting of 50 turns of fine gauge wire spaced to occupy 1" and wound on a ½ inch former would do.

The quenching coils, L3 and L4, are wound on a two-section bobbin built up from thin plywood ⅛ inch thick. The outside diameter is 2¼ inches, while spacers of the same wood, 1 inch in diameter, separate the three larger discs, thus forming two adjacent spools of wood. A machine screw through the center secures the wooden discs. Each slot contains 500 turns of No. 34 enamel wire, and both the coils are wound in the same direction. Their respective inner and outer ends are connected as marked on the circuit diagram.

For the small tuning coils, L1 and L2, three turns only of No. 14 B&S tinned copper wire are required in each case. They are wound on a ¾ inch former, and the turns spaced to occupy ½ inch in length. Both coils are wound in the same direction and when assembled this relation must be maintained. That is to say, ignoring the presence of C1, coils L1 and L2 may be regarded as one continuous winding. The aerial coupling coil L is a single turn having the same diameter as the others, and all three coils are spaced ⅜ inch apart.

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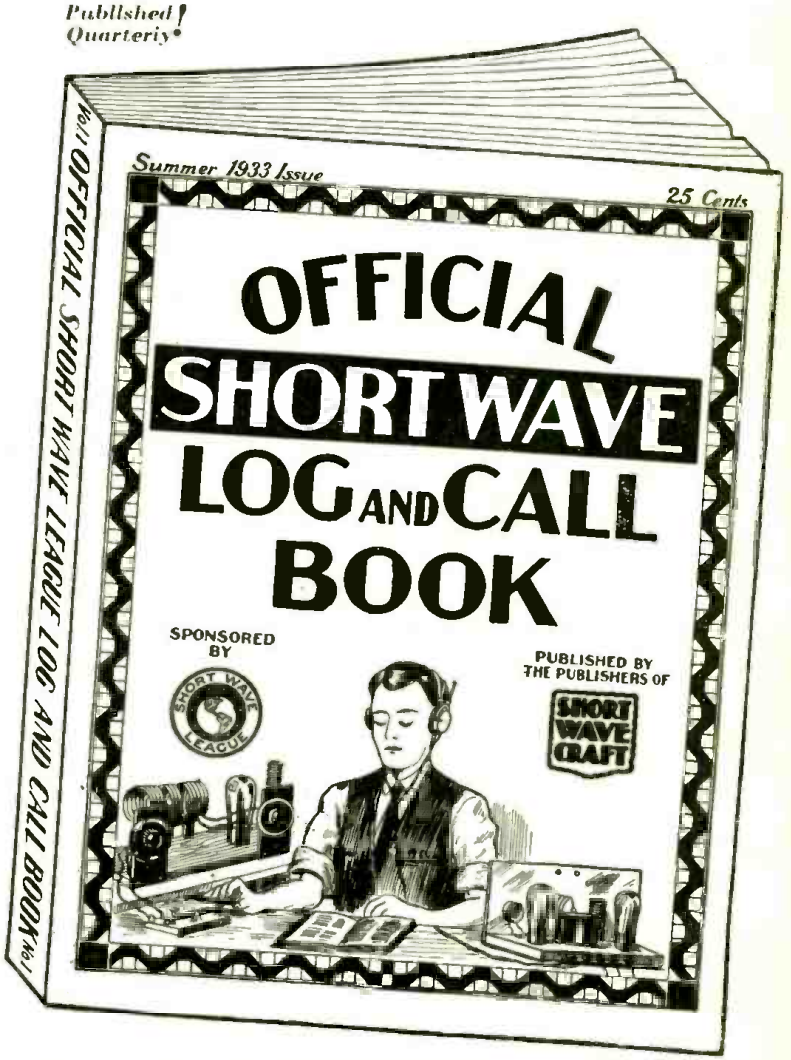

PARTIAL CONTENTS

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

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

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

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

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

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

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

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

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

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