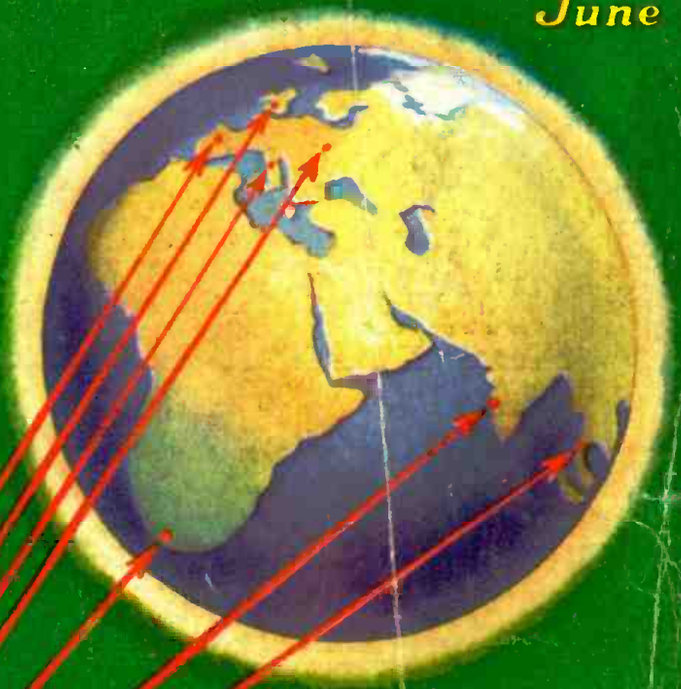
THE RADIO EXPERIMENTER'S MAGAZINE

June

# SHORT WAVE CRAFT

Edited by
HUGO GERNSBACK



THE
Duo-Amplidyne
Receives Foreigns
on 1 Tube

See Page 74

25¢
IN CANADA
30¢

# Here's what you have been looking for!

Here it is panel mounted

Now you can build your ideal receiver. Just use the No. 700 Universal Coil Selector in any set new or old and secure the utmost convenience in changing coils. The new No. 700 Coil Selector Unit instantly swings any coil into circuit by turning knob. All 4, 5 and 6 prong coils are rigidly held by the specially constructed socket without adjustments of any kind.

Knob and indicator plate on face of panel show what coil is in circuit. Simple—compact—rugged—thoroughly efficient. Reliable, self-cleaning pressure contacts for troublefree operation at all times. Don't fail to use it in sets you are building and new equipment you are designing.

Arranged in tandem as shown at right, eight coils may be used—regular—band spread—broadcast and long wave. Use any assortment desired.

**No. 700 COIL SELECTOR UNIT without coils.....List Price $3.50**

Here it is mounted in tandem

## SOCKETS FOR SHORT WAVE SETS ARE IMPORTANT

### Here Is What You Buy in Na-Ald Sockets

484

New No. 484 Laboratory Socket. Easy to mount. Just drill two small holes with hand-drill. Each terminal has convenient jack-top binding post for plug-in connections or binding wire under knurled nut. Handy solder terminals at each contact. Each contact has new standard R.M.A. numbering. Jumper connections for kits, experimenting, etc. may be used with the jack-top binding posts Below panel wiring may be brought thru chassis by drilling small holes at terminals. The finest breadboard-mount socket obtainable.

484 4 hole Lab. Socket.....List 50c
485 5 hole Lab. Socket.....List 50c
486 6 hole Lab. Socket.....List 50c
487 7 Large hole Lab. Socket.....List 50c
487A 7 Small hole Lab. Socket.....List 50c

425

This is the neat below panel socket which **covers the raw edge of the chassis hole.** Two mounting ears pass 6-32 screws for easy mounting above or below panel. Makes fine commercial appearance. Fits 1-3/16 in. hole with 1-19/32 in. screw spacing.

424 4 hole Panel Socket.....25c
425 5 hole Panel Socket.....25c
426 6 hole Panel Socket.....25c
427 7 Large hole Panel Socket.....25c
427A 7 Small hole Panel Socket.....25c
438S 8 hole Panel Socket.....35c

422

For simple drilling use the button socket. All holes drilled with hand drill. Single hole mount. Contacts below panel. Neat and compact. Where space is limited here is the socket to use.

422 4 hole Button Socket.....List 25c
423 5 hole Button Socket.....List 25c
426 6 hole Button Socket.....List 25c
427 7 lg. hole Button Socket...List 25c
427A 7 sm. hole Button Socket...List 25c

404

New Self Mounting Socket gives manufactured precision appearance to any set. This socket screws in place with a ½ turn in a 1-1/16 in. hole. Threads engage two projections in hole easily made with prick punch. Easy to assemble. No screws, nuts, rivets, springs, clamps or other material necessary. Has long resistance path for low losses and high insulation. New R.M.A. standard numbering system on all sockets above and below panel. Neat filament prong locator with color dot. Tube number ring on top of socket.

404 4 hole Self Mount Socket.....List 10c
405 5 hole Self Mount Socket.....List 10c
406 6 hole Self Mount Socket.....List 10c
407A 7 hole Self Mount Socket.....List 10c

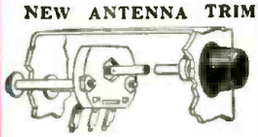
## NEW TRIMMER CONDENSERS WITH STAND-OFF MOUNTING

CT-80

Using the latest development in ceramic insulation for lowest losses. Highest quality mica dielectric. Adjustable from either side with screw-driver. Solder tab terminals. Complete with stand-off mounting hardware.

CT-80 7—80 mmfd.....List 35c
CT-180 27—180 mmfd.....List 35c

## NEW ANTENNA TRIMMER ASSEMBLY



ANT. TRIMMER
INSULATED SHAFT EXTENTION
CTA-80

Complete assembly for placing the ant. adjustment where it belongs—on the front panel. Extra long insulated extension shaft fits adjustment screw of trimmer condenser which mounts on back of chassis near antenna binding post. Collar and knob supplied for front panel. Condenser stand-off mounted for best results. The handiest thing in short wave.

CTA-80 7—80 mmfd. Trimmer Assembly.
List 75c complete

984

## SPEAKER and CABLE PLUGS and CONNECTORS.

485F

You will need these speaker plugs and connectors for speaker extensions and connections as well as pack connections and extensions. Fine for experimental work.

981 4 pins Sure Grip Plug.....List 35c
985 5 pins Sure Grip Plug.....List 35c
986 6 pins Sure Grip Plug.....List 35c
987 7 lg. pins Sure Grip Plug....List 35c
987A 7 sm. pins Sure Grip Plug...List 35c

984F 4 contact Sure Grip Connector.....50c
985F 5 contact Sure Grip Connector.....50c
986F 6 contact Sure Grip Connector.....50c
987F 7 lg. contact Sure Grip Connector.....50c
987FA 7 sm. contact Sure Grip Connector.....50c

## ANTENNA GROUND STRIP

600

The handy Ant. Gnd. binding post strip for any receiver. Ground post connects to metal chassis with single mounting screw. Knobs are marked and are non-removable. No hole to fish for—takes any size wire up thru the largest used without any difficulty.

No. 600 Ant-Ground Strip Assembly.....List 10c

## DE LUXE DIAL

3044

Here is the finest looking dial for general purpose work. Has ¼" shaft hole and available in 3" or 4" diameter. 0-100 degrees graduations.

3034 3" dial ¼" shaft hole...List 50c
3044 4" dial ¼" shaft hole...List 50c
3054 5" dial with vernier plate...$1.00

5" model supplied with vernier plate for precision recording to .05 of 1%. Fine for capacity bridges, frequency meters, etc.

## 50-WATT SOCKET

450

A rugged well insulated socket for all tubes with 50-watt base. Has insulated shell and stop-rim for positively preventing prong to chassis flash over. Handy double solder tabs at all terminals. Triple lamination—dual wipe contacts. Terminal identifications molded in socket.

450 50-watt Socket.....List Price $1.00

## INSULATED TUBE CAP LEADS

91L 92L

Neat molded insulated clips for all tube caps. Has newly developed contact clip giving perfect connection without sticking. Twelve-inch lacquered lead attached. Thoroughly insulated for protection against shock.

91L For all receiving tube caps.....20c
92L For 866, 872, etc., lg. tube caps..35c

## KEY KNOB

KK

Key knob for making practice keys, knobs, etc. 8-32 terminal fits usual telegraph key. Has comfortably shaped finger grip.

KK Key Knob.....List Price 10c

**ALDEN PRODUCTS CO.**
Dept. SW 6 715 Center St.
**BROCKTON, MASS.**

NA-ALD

## NA-ALD INSIDE FACTS

**Short wave coils are not just cylinders wound with wire.** For illustration, the new Na-Ald Band Spread Coils are the result of a solid week of concentrated research by a competent engineer. Theory was checked by practice and the resulting coils before final approval were rechecked by seven other engineers who are coil designers for manufacturers of long and short wave receivers.

Result of this design and other factors—the serviceman's expert for one of the largest jobbers in the country tells us that our coils with the smaller size wires—the wire correctly spaced on each individual coil for efficiency—outperform other coils. He knows. Each week he confers with hundreds of set builders who cannot be fooled.

We have purposely chosen a form with a solid backing for the winding because a canvas of engineers felt that this construction insures the wire staying on the form as originally wound and prevents a change of inductance as when handling an unsupported winding.

Also note that the higher frequency coils have plated wire. The finger grip makes it easy to remove and the color coded ring easy to identify.

Regular standard 2-circuit 4-prong coils. Primary and secondary on each coil. 15-200 meters with usual 140 or 150 mmfd. short wave condenser UX base 4 coils to a set.
No. 704SWS S-W Coil Set...List Price $2.00 set

Broadcast coils same as shown but tune 100-550 meters with above size condenser. UX bases 2 coils per set.
No. 704BCS B-C Coil Set.....List Price $1.50 set

Regular standard 2-circuit 5-prong coils. Primary and secondary on each coil same as 704SWS but 5-prong base interchangeable with band spread coils. UY forms of 4 coils to a set.
No. 705SWS S-W Coil Set...List Price $2.50 set

Broadcast coils same as above but tune 100-550 meters UY bases 2 coils per set.
No. 705BCS B-C Coil Set...List Price $1.75 set

Regular standard 3-circuit 6-prong coils. Primary and secondary and tickler on each coil. 15-200 meters. Uses 140 or 150 mmfd. tuning condenser. Std. 6-pin forms. 4 coils to set.
No. 706SWS S-W Coil Set...List Price $3.50 set

Broadcast coils same as above but tune 100-550 meters. 6 pins. 2 coils per set.
No. 706BCS B-C Coil Set...List Price $2.00 set

Band Spread Coils with low loss ceramic padding condenser mounted on each coil. Spreads all bands for convenient tuning with usual 140-150 mmfd. condenser.
No. 705SWB 20-40-80-160 for amateur bands.
List Price $4.00 per set, or $1.00 per coil.

Long wave coils with highly efficient band windings. Used in any short wave receiver using usual S.W. tuning condenser. Transatlantic code, ship traffic. European broadcast, etc., from 450-2000 meters.
No. 704LWS Set of two coils. Write for price.

New 7 and 8 prong coil forms. For latest band spreading, electron coupling, detector-oscillator super-het circuits.

No. 704 4 prong coil form.....List Price 25c ea
705 5 prong coil form.....List Price 25c ea
706 6 prong coil form.....List Price 30c each
707 7 prong coil form.....List Price 30c each
708 8 prong coil form.....List Price 30c each
438S 8 hole socket.....List Price 35c each

New Band Spreading UY Coil Forms. Complete with high quality ceramic padding condenser mounted on coil form top.

No. 705BSC- 80 Form with 80 mmfd. cond. 50c
No. 705BSC-180 Form with 180 mmfd. cond. 50c

NEW SPECIAL LOW-LOSS Synthetic Natural Color Coil Forms. Available in 4, 5, 6, 7 or 8 prongs.....List Price 50c each

**FREE**—Send for catalog and give the name and address of your dealer or jobber. You will be mailed without cost a sample laboratory socket and pressure clips if your letter is mailed on or before June 15th.

Na-Ald items are widely stocked—try your regular supplier—if he hasn't them and does not care to get the genuine Na-Ald products order direct from us.
Discount 35%-40% if order totals $10.00 list price.
ALDEN PRODUCTS CO.

NA-ALD ALDEN MANUFACTURING CO. NA-ALD

# I WILL HELP YOU

## START A SPARE TIME OR FULL TIME RADIO SERVICE BUSINESS WITHOUT CAPITAL

### HERE ARE A FEW EXAMPLES OF THE KIND OF MONEY I TRAIN MY MEN TO MAKE

**Clears $4500 in 18 Months**

"Before taking your Radio Course I was making $18 a week. I came here three years ago and in the past months I made about $4500 in Radio. I cannot say too much for the wonderful help I have received from N. R. I."—NOEL W. RAY, American National Bank Building, Gadsden, Alabama.

**Spare Time Work Pays $18 a Week**

"I only do spare time Radio work and average $18 a week. People who in good times would buy a new Radio, now have the old one fixed."—STEPHEN J. DRAPCHATY, 407 Wunderlich Avenue, Barberton, Ohio.

**Now Owns Own Business**

"If I had not taken your Course I would be digging ditches instead of running my own business. One week I made $75 on repairing alone, and this doesn't count sales. If a fellow wants to get into Radio, N. R. I. is the starting point."—R. S. LEWIS, Modern Radio Service, Pittsfield, Ill.

### Free Book Tells How Mail Coupon!

The world-wide use of Radio sets for home entertainment has made many opportunities for you to have a spare time or full time Radio business of your own. I give you instructions early in your Course for doing 28 Radio jobs common in almost every neighborhood. Many N. R. I. men make $5, $10, $15 a week extra in spare time almost at once. I show you how to install and service all types of receiving sets. I give you Radio equipment and instructions for conducting experiments, for building circuits and testing equipment, and for making tests that will give you broad, practical Radio experience. Clip the coupon below and get my free 64-page book, "Rich Rewards in Radio"—it gives you a full story of the success of N. R. I. students and graduates, and tells how to start a spare time or full time Radio business on money made in spare time while learning.

### Many N. R. I. Men Make $5, $10, $15 a Week Extra in Spare Time Almost at Once

Many of the seventeen million sets now in use are only 25 per cent to 40 per cent efficient. I will show you how to cash in on this condition. I will show you the plans and ideas that have enabled many others to make $5, $10, $15 a week in spare time while learning. Ford R. Leary, 1633 Davison Road, Flint, Mich., wrote: "My part-time earnings while taking the N. R. I. Course were $651."

### Get Ready Now for a Radio Business of Your Own and for Jobs Like These

Broadcasting stations use engineers, operators, station managers, and pay up to $5,000 a year. Radio manufacturers use testers, inspectors, foremen, engineers, servicemen and buyers, and pay up to $7,500 a year. Radio dealers and jobbers employ hundreds of servicemen, salesmen, managers, and pay up to $5,000 a year. Radio operators on ships enjoy life, see the world, with board and lodging free, and get good pay besides. My book tells you of the opportunities in Radio, Set Servicing, Aircraft Radio, Television, Police Radio, Short Wave, and other fields. Get it.

### I Will Train You at Home in Your Spare Time

Hold your job until you're ready for another. Give me only part of your spare time. You do not need a high school or college education. Hundreds with only a common school education have won bigger pay through N. R. I. J. A. Vaughn jumped from $35 to $100 a week. J. E. McLaurine increased his earnings 100 per cent. The National Radio Institute is the Pioneer and World's Largest organization devoted exclusively to training men and young men by Home Study for good jobs in the Radio Industry.

### You Must Be Satisfied

I will give you an agreement to refund every penny of your money if you are not satisfied with my Lesson and Instruction Service when you complete my Training. And I'll not only give you thorough training in Radio principles, practical experience in building and servicing sets, but also Advanced Training in any one of five leading branches of Radio opportunities.

### Free Book of Facts

Mail the coupon for "Rich Rewards in Radio." It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time opportunities; about my training; what Mail coupon now in an envelope, or paste it on a 1c post card.

**J. E. SMITH, Pres.**
**Dept. 4FB3**
**National Radio Institute,**
**Washington,**
**D. C.**


### SPECIAL Radio Equipment for Broad Practical Experience *Given Without Extra Charge*

My Course is not all theory. I'll show you how to use my special Radio equipment for conducting experiments and building circuits which illustrate important principles used in such well-known sets as Westinghouse, General Electric, Philco, R.C.A., Victor, Majestic, and others. You work out with your own hands many of the things you read in your lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, how to make them work.

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Let me PROVE that my Course is clear, easy to understand, and fascinating to study. Send the coupon for a free lesson, "Trouble Shooting in D.C., A.C. and Battery Sets." This interesting lesson gives 132 ways to correct common Radio troubles. I am willing to send this book to prove that you too can master Radio — just as thousands of other fellows have done. Many of them without even a grammar school education and no Radio or technical experience have become Radio experts and now earn two or three times their former pay. Mail the coupon now.


*This Coupon is Good for One* **FREE COPY OF MY NEW BOOK**

J. E. SMITH, *President*,
National Radio Institute, Dept. 4FB3,
Washington, D. C.

NRA MEMBER — WE DO OUR PART

Dear Mr. Smith: I want to take advantage of your Special Offer. Send me your two books, "Trouble Shooting in D.C., A.C., and Battery Sets" and "Rich Rewards in Radio." I understand this request does not obligate me. (Please print plainly.)

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*Address* .....

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

*Find out about the* **World Famous Course that Pays for Itself**

**IN THIS ISSUE: PROMINENT SHORT-WAVE AUTHORS**

**Gradenwitz . Smith . Shuart . Victor . Johnson . Malsberger . Herzog**


**HUGO GERNSBACK**
**Editor**

# SHORT WAVE CRAFT

**H. WINFIELD SECOR**
**Managing Editor**


## Contents for June, 1934



## Features in July Issue

**New 2-Tube Short Wave Portable, 110 volts A.C. or D.C., as well as 6 volts battery, by George W. Shuart, W2AMN.**

**The "Screen-Grid 3" Battery Receiver, by Leonard Victor and E. Kahlert.**

**Interference-Reducing Antennas, by Louis R. Huber.**

**A German Ultra Short Wave Transmitter.**

**Voice-Operated Relay Simplifies Two-Way Phone.**

**Power Supply from Ford Coils, by C. V. Crane.**


## Certified Circuits

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

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

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

## OUR COVER

● THE Duo-Amplidyne receives "Foreigns" on 1-Tube—this set was thoroughly tested by the editors and gave very surprising results. Foreign stations were heard clearly and distinctly on the Duo-Amplidyne and the editors feel certain that it will make many friends. See full details on page 74




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# Indispensable

## say these Short Wave fans—

**'CLASSIEST BOOK"**

Gentlemen:—

Your "Official Short Wave Manual" just received. It is the classiest book I have seen for a long time, a fine binding, very good paper, good readable printing and diagrams. Who could ask for more?

It was well worth waiting for.

Many thanks.

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

**"WOULDN'T TAKE $10.00 FOR IT"**

Gentlemen:—

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

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

Verly truly yours,
(s)LOUIS SCHMADELBECK
Beaver Dam, Wis.

**"WORTH MORE THAN YOU ASK FOR IT"**

Dear Mr. Gernsback:

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

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

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

**"GLAD TO OWN ONE"'**

Gentlemen:—

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

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

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

## WORLD'S GREATEST SHORT WAVE BOOK!

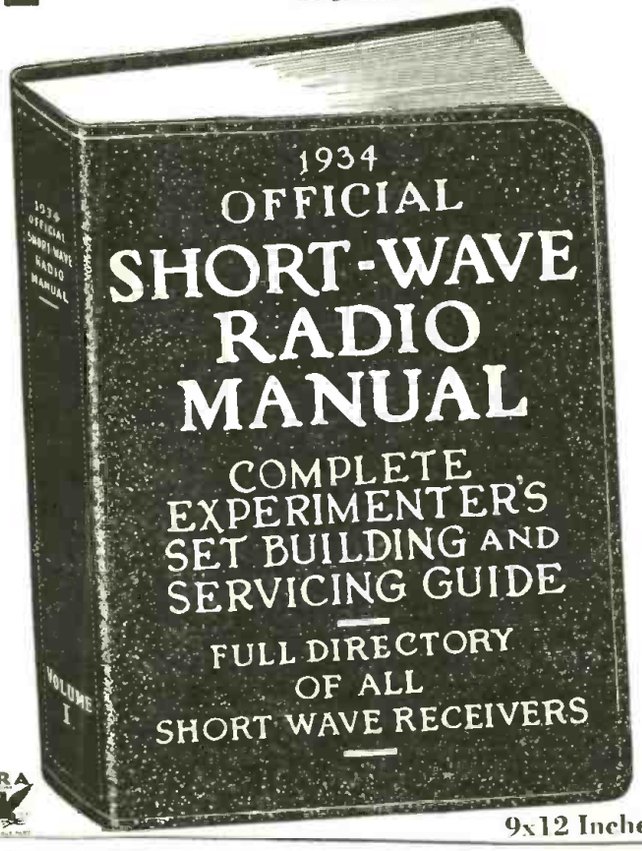
We are proud to present the first modern and complete book on Short Waves which has appeared in the field.

There has been a big boom in short waves during the past two years in spite of the depression. Tremendous progress has been made, but up to now there has not been an adequate book depicting all the progress that has been made. The 1934 OFFICIAL SHORT WAVE RADIO MANUAL now fills this need completely.

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

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

**$2.50 List**

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## 15 VALUABLE FEATURES

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

Name .....

Address .....

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

# • • • SHORT WAVE ESSENTIALS

## FOR MEMBERS OF THE SHORT WAVE LEAGUE • • •

### A FEW WORDS AS TO THE PURPOSE OF THE LEAGUE

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

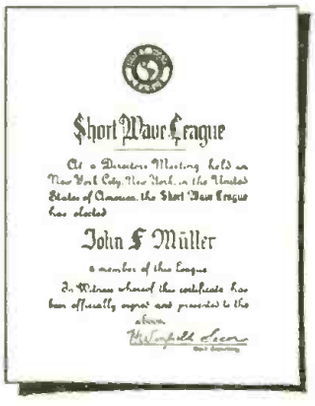
**Dr. Lee de Forest, John L. Reinartz, D. E. Replogle, Hollis Baird, E. T. Somerset, Baron Manfred von Ardenne, Hugo Gernsback, Executive Secretary.**

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

### MEMBERSHIP CERTIFICATE

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

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




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

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

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

### SHORT WAVE LEAGUE LETTERHEADS

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

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

A—50c per 100

### OFFICIAL SHORT WAVE LEAGUE LOG AND CALL MAGAZINE

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

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


B—25c per copy

### RADIO MAP OF THE WORLD AND STATION FINDER

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

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

### GLOBE OF THE WORLD AND MAGNETIC COMPASS

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

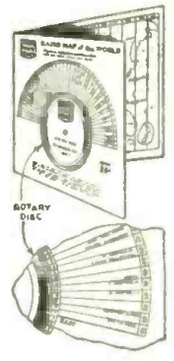
D—Globe of the World ..... Prepaid **$1.25**

### SHORT WAVE LEAGUE LAPEL BUTTON

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

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

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




C—25c each

### SHORT WAVE LEAGUE SEALS

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

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

### SHORT WAVE MAP OF THE WORLD

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

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

**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


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.)

Name.....
Address.....
(6-34) City and State.....
Country.....

HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR


# Power in Short-Waves

## An Editorial By HUGO GERNSBACK

● WHEN we are listening to a foreign short-wave broadcast station or, for that matter, one in our own country, the thought must occur to us, "Why do they do it?" When we listen to England, to France, to Australia, we vaguely wonder why these stations are so good to us, and why they supply us with such interesting programs. Indeed, we begin to wonder even more, as we listen to a German broadcaster who broadcasts in *English*, or to a Spanish short-wave broadcaster who also broadcasts in *English*. "What is the reason?"

Of course, these nations, or their various commercial companies who thus broadcast their programs don't do it out of the generosity of their hearts. If it is the Government who does the broadcasting, it may be for propaganda purposes. Thus, for instance, the German government at the present time frankly uses its powerful short-wave broadcast stations for one purpose only—and that is *political propaganda*. The British have somewhat similar aims in mind, although they may not be political in all cases. Great Britain has an excellent reason for "Empire" short-wave broadcasting; and that is to reach her far-flung dependencies by supplying the various dominions and colonies with instantaneous news, incidental music and addresses and programs for good-will purposes. In fact, a goodly percentage of the various nations use short-wave stations for good-will purposes; mainly, to acquaint foreigners with the attractions of the country "sponsoring" the program.

But behind it all, there is one most important purpose; and that is, the ever-hovering cloud of war. The next war, which is always uppermost in the minds of the governments which control these stations and their broadcasts, is chiefly responsible for the erection of these stations; and while the directors of the foreign stations may not admit it, the primary purpose of these powerful transmitters is unquestionably for military purposes.

The next war will be totally unlike the past World War. It should be remembered, that there was no broadcasting in 1914-1918. Whatever radio-telephone communication there had been, was purely experimental; receiving sets were few, mostly of the amateur type. When war broke out, experimental radio was promptly suppressed, so far as the public was concerned. No private individual, anywhere, could own a radio set. If he had one, he was immediately suspected of being a spy. All of this has been changed. With millions of receiving sets in use today, every government will be most anxious to keep up its radio broadcasting service in order to instantaneously inform its own citizens of the latest war news, threatening air raids, and other military announcements. *During the next war, radio reception will be of the utmost importance to every government.*

But more important than this, short-wave reception will be possible at the same time. If there is a war between two nations, the two governments will send out radio propaganda not only on the broadcast waves, but on the *short waves* as well. Thus everyone in possession of a radio set will be forced to listen to the propaganda of both nations; until the interesting situation will prevail where one nation will broadcast on the wavelength of the other, and try to "drown" it out, so that no foreign reception will be possible for its own nationals. In a case where many nations were at war with each other, this would be most difficult, and would destroy the broadcasts which each nation would address to its own citizens. Our guess, therefore, would be that the people of each country would be allowed to listen to the propaganda of the enemy nation, and do their own thinking. And perhaps this is not the worst idea because, if carried to its logical conclusion, it is simply one more step to make war more difficult; *and, the more difficult war can be made, the better it is for peace in general.*

In the meanwhile, the race for power between the various nations is going along at an ever-increasing rate. When short-wave broadcasting first started, only a few watts were used by the various stations. Even a 500-watter was a powerful transmitter about 1925, when the first systematic experiments with short-wave broadcasting began. Nowadays, we have become more ambitious. The most powerful short-wave broadcast stations follow: 40 K.W. Pittsburgh, Pa. (W8XK); 40 K.W. Schenectady, N. Y. (W2XAF); 20 K.W. Khabarovsk, Siberia (RV15); 20 K.W. Daventry, England (GSA); 20 K.W. Eindhoven, Holland (PHI); 20 K.W. Moscow, Russia (RNE); 18 K.W. Radio Nations, Switzerland (HBL); 18 K.W. Bound Brook, N. J. (W3XAL); 15 K.W. Radio Colonial, Paris (FYA); 15 K.W. Wayne, N. J. (W2XE).

That is, however, nothing to what will prevail in the future. During the next twenty years, there will be short-wave broadcasters with 5,000 to 10,000 kilowatt stations, broadcasting from the various points of the earth. This will, of course, be done in order to lay down a signal so powerful that even a man with a one-tube set 10,000 miles away will have no trouble in listening to the broadcast, even through a burst of static which, at the present time, would blot out any program.

It is to be hoped that, for many years to come, this rivalry between the stations will be for peaceful purposes. If so, not much fault can be found with it; and short-wave broadcasting will certainly help, more than any other agency which one can think of, to make for universal peace. It is increasingly the tendency, now to use the English language in international broadcasting; and the day draws nearer when war will become unlikely, because those who speak the same language, and understand each other, are not so anxious for war. Speaking the same language is a powerful deterrent to war.

*More power to short waves!*

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

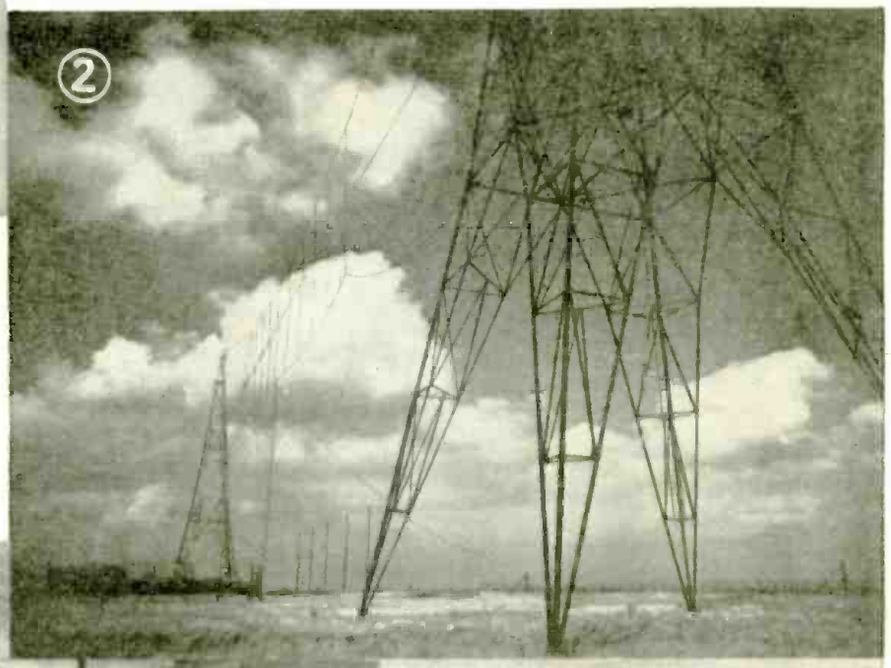
This is the June, 1934, Issue—Vol. V, No. 2. The next Issue Comes out June 5th

*Editorial and Advertising Offices - 96-98 Park Place, New York City*

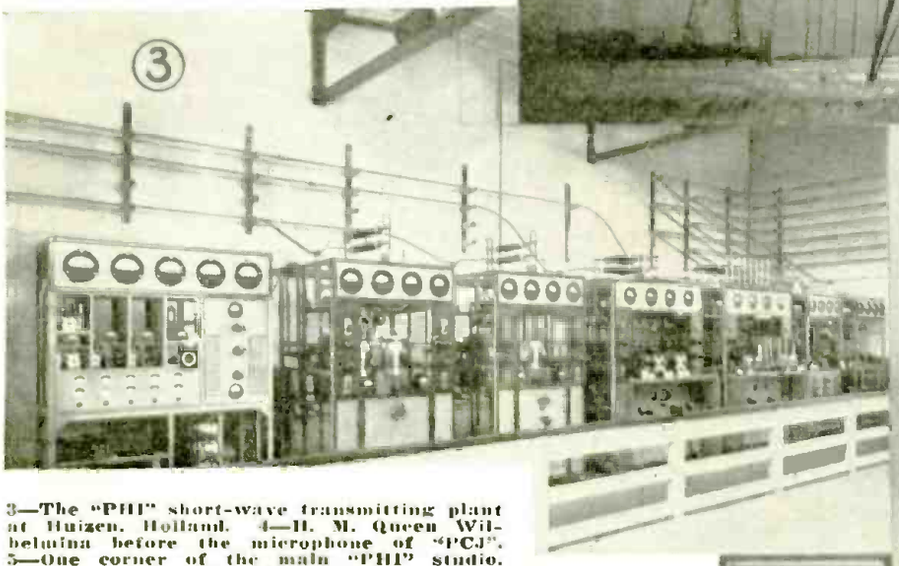
# When HOLLAND Broadcasts Via "PHI"

One of the best known short-wave stations in the world is "PHI", also known as "PHOHI"; this is the new Dutch station, the forerunner of which was PCJ at Eindhoven, Holland. PHI is heard on 16.88 meters, May to September.

Above—Mr. E. Startz, famous announcer formerly with "PCJ" and now with "PHI", who speaks several languages. 2. Right—The excellent short-wave transmitting antenna of "PHI" at Huizen, Holland.



● TRANSMISSIONS intended chiefly for the Dutch Colonies in the East and West Indies were commenced in March, 1927, by a short-wave transmitter (PCJ) established at Eindhoven (Holland).



3—The "PHI" short-wave transmitting plant at Huizen, Holland. 4—H. M. Queen Wilhelmina before the microphone of "PCJ". 5—One corner of the main "PHI" studio, located at Hilversum.

The call letters of this transmitter are: PCJ.

Wavelength: 32 meters.

In 1931 this transmitter was temporarily closed down.

It was before the microphone of this transmitter that Her Majesty Queen Wilhelmina addressed her subjects in both colonies for the first time in 1927.

### The PHOHI (PHI) Station

In 1929 a new transmitter was put into service with 25 Kw., the management of which was also established at Eindhoven. The transmitter is situated at Huizen, 23 kilometres S.E.E. of Amsterdam. The studio is at Hilversum, 23 kilometres S.E. of Amsterdam.

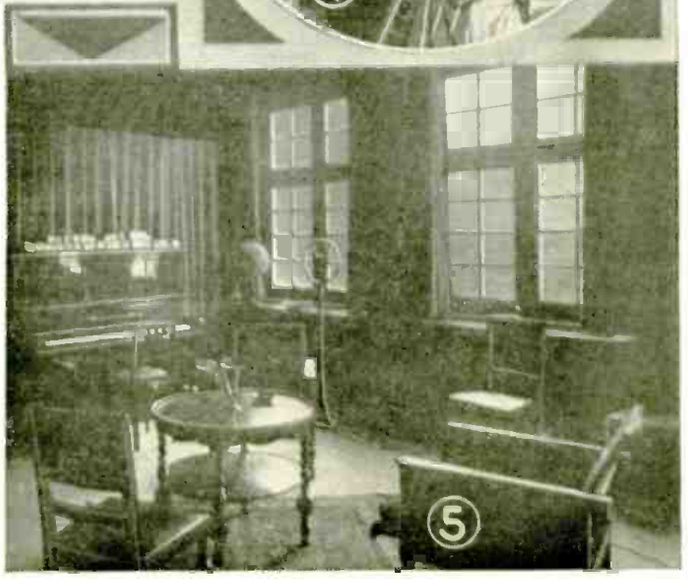
The wavelengths are: From May to September, 16.88 m. From September to May, 25-57 m.

The transmissions take place daily (except on Tuesdays and Wednesdays) between the hours of 13 and 15.30 Central European Time (7 to 9:30 A.M., E.S.T.).

The purpose of these transmissions is to give Dutch nationals in the colonies a vivid picture of the mother-country.

The composition of the programmes is calculated to achieve this object. The principal items are:

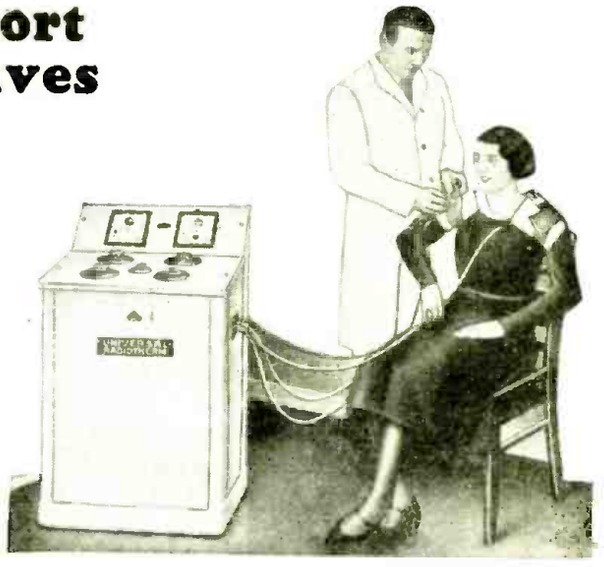
(*Continued on page* 110)



# HEALTH from Short Waves

Latest European report shows interesting therapeutical results obtained in treating stubborn physical ailments with short waves.

**By DR. ALFRED GRADENWITZ**
Berlin



Physician applying the electrodes for simultaneous ultra-short wave treatment of both shoulder joints.

● AFTER securing for themselves an important place in the field of radio, Ultra-Short Waves, i.e., waves intermediary in wavelength between 2 and 15 meters, are fast invading the medical art, where they are proving an invaluable asset, operating many a well-nigh miraculous cure.

Experiments made by Dr. Schereschefsky in the United States, and independently of him, by Prof. Esau and Dr. Erwin Schliephake of Jena, Germany, showed, as far back as 1927, that small animals, such as mice, can be killed within a very short time in a field of ultra-short waves. It has in the meantime been proved that this fact is solely due to the development of excessive heat and that harmful effects can in the case of human subjects be guarded against by preventing any excessive increase—local or general—of the temperature of the body.

Again, in the early days of short-wave radio, there would be an occasional reference to cases of ill health induced in operators of ultra-short wave transmitters, a marked fever being among the more striking symptoms.

Now, it is a fact of common experience that many agents producing harmful effects can, by proper dosing, be made to exert a beneficial action. This has been confirmed in the case of ultra-short waves, it being shown that there is in their case, a particularly large margin, i.e., an ample "toleration zone" between the harmful and beneficial actions, which, of course, would seem to make for increased safety.

### A Surprising Cure With S-W's

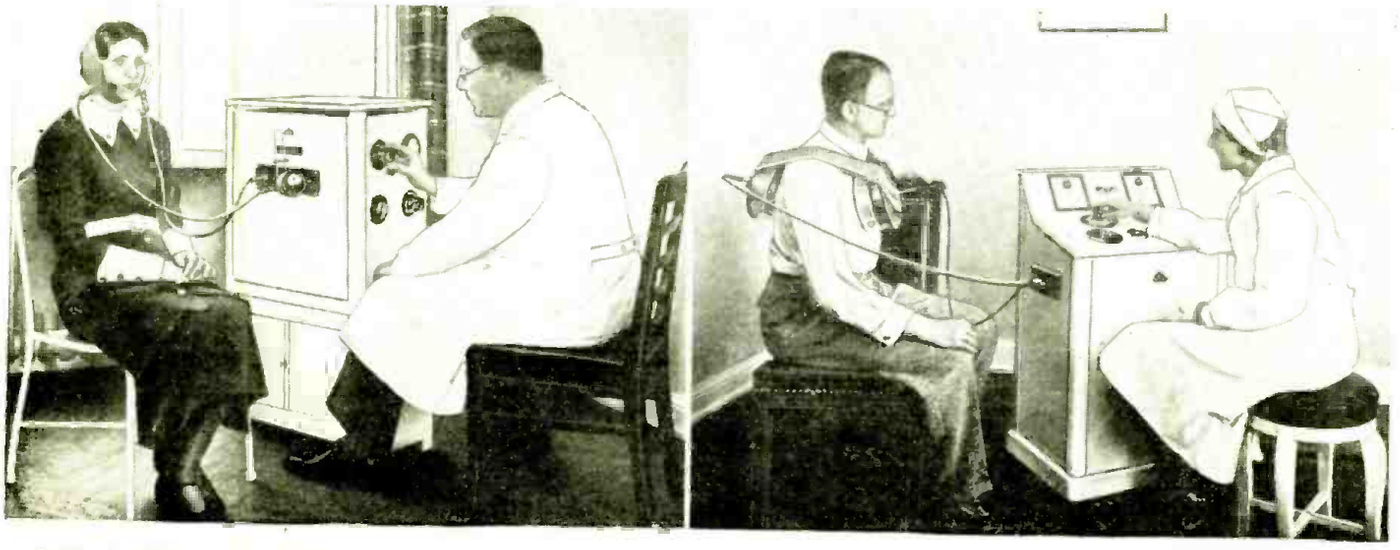
The starting point of these medical applications of very short waves was in a most suggestive test which Dr. Schliephake, in connection with the experiments above referred to, made on himself: Being affected with a rebellious furuncle of the face, it occurred to him that the application of ultra-short waves might afford some chance of a cure. A test was soon made with results exceeding his most sanguine expectations, for the abscess, on which all other methods of treatment had been ineffective, *definitely disappeared within 36 hours*, thus pointing the way to a new and most promising method of electrical therapy.

The waves used in this connection are, like those of radio, produced by electric charges oscillating in appropriate circuits. Such a circuit is constituted, e.g., by two discs facing one another and carrying opposite charges of electricity, which are connected together by a loop of wire. As the connection is made the opposite charges, so far from compensating one another immediately, will start oscillating pendulum fashion between the two discs.

Applying special electrodes for the treatment of the patient's ears.

If now the two discs are recharged and discharged over again, e.g., across a spark gap—oscillations are set up ever anew. When using electronic tubes similar to those employed in radio, in the place of spark-gaps, these oscillations will continue with constant amplitude. If, again, such a circuit be coupled to an aerial (which, in the present case, may be a simple metal rod), the waves thus generated may be sent out into space and used for the transmission of news. However, for curative purposes, radio energy should not be sent out broadcast, but on the contrary, held together and concentrated upon the part of the body actually under treatment. This is done by causing the larger portion of the available energy to pass be-

(*Continued on page* 103)



Left—Applying ultra-short wave therapy in dental practice. Right—Note special electrodes used for treating patient's thorax.

Collecting airway weather reports at the Weather Bureau station, Oakland, Calif., airport.

# HAND-LENGTH Waves to Operate Airways Teletype

One of the newest developments in ultra short waves is the flashing of weather reports by teletype to aircraft pilots. It is also expected that weather maps will soon be similarly transmitted.

**By J. E. SMITH***

● HAND-LENGTH radio waves—ultra short waves having a length of only 17 centimeters, or less than one-sixth of a meter (6.8 inches)—are very much in the limelight at present as a means of actuating mobile teletypes by remote control. The teletype—"tell it to the type"—has heretofore, because of the complicated nature of such automatic telegraph printers, been considered practical only for fixed station work. However, recent experiments and inventions have resulted in the fashioning of a teletype which can be attached to a moving vehicle such as a ship, a truck, a train, or even an airplane. Messages are transmitted from a central sending station on the proper wavelength and these radio impulses cause the teletype machine to bring forth the typed message.

### Radio Teletype for Airplanes

At present, one of the chief aims of this new invention is to send out hourly weather reports for the benefit of aircraft pilots, and, as an extension of this service, possibly to send out teletype weather maps. Although the inventions described herein are new, the idea itself is not, for some twelve years ago, an article appeared describing an experiment of teletype remote control conducted at that time by the Anacostia Naval Radio Station. The teletype in question was attached to an aircraft, but the experiment was not unqualifiedly successful. However, such progress has been made since then that the United States Department of Commerce is investigating the possibility of abandoning the 13,000 miles of leased land wires now required for its teletype service, and substituting in their stead, radio impulses to actuate the automatic printing machines. Indeed, it is predicted that the aeronautics branch of the Department of Commerce will soon be shooting the micro waves to send these weather reports. In Europe, such a radio teletype system was recently established between Lympgne, England, and St. Inglevert, France, a distance of more than 38 miles, for the purpose of notifying each end of the arrival and departure of aircraft crossing the English Channel. It has been found that the hand-length waves can be utilized not only to send teletype messages, but also alternately for a duplex telephone service. Uninterrupted communication is provided, free from interference and atmospherics. In the United States, tests are now being made between New York City and Washington, D C., for the transmitting and receiving of radio actuated teletype messages.

There are three principal devices for the means of transmitting and receiving radio actuated teletype messages. The first is one recently patented by Eugene Sibley of Chevy Chase, Maryland. Sibley, who is a pioneer in radio aircraft, was formerly with the Radio Airmail Section of the United States Post Office Department and is now with the Bureau of Aeronautics of the Department of Commerce. Mr. Sibley has granted free license to the government for the use of his invention, but this license does not apply to commercial planes.

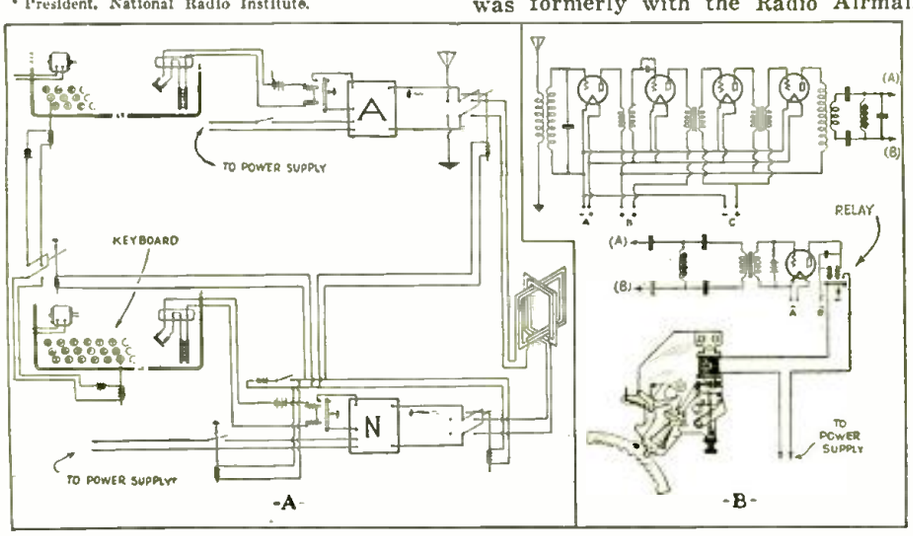
### Printed Signals by Radio

Mr. Sibley's invention provides for an automatic radio beacon system, which will aid a pilot of a mobile vehicle to follow a predetermined course according to a system of automatically operated printed characters, thus giving instructions to the pilot as to the direction of flight with respect to the beacon transmitter, and to the general directional course of the vehicle. This system further provides for the transmission of automatic printer signals on *directional radio beams* to actuate the teletype to indicate visually the position of the mobile vehicle with respect to the predetermined course of safe flight. It also provides for non-directionally transmitting message signals in print, thereby giving the pilot of the mobile vehicle warning of adverse weather conditions or imparting other pertinent information.

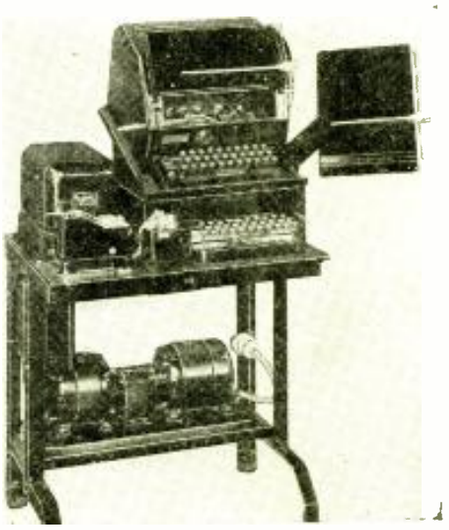
As may be noted from the above objectives, in this system, printer signals may be directionally or non-directionally

(*Continued on page* 106)

* President, National Radio Institute.



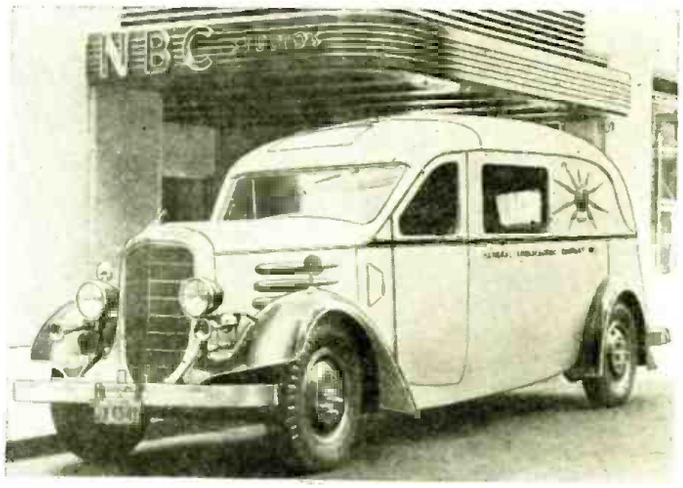

Above—Diagram of general arrangement of the Sibley teletype system; at right of diagram, typical radio receiving circuit for teletype signals is illustrated.



Complete teletype apparatus which types out the received message.

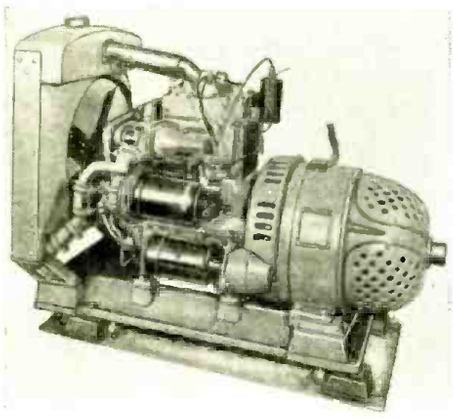
# N.B.C. Broadcasts From "Pick-up" on Wheels

Frequently broadcast programs are picked up from remote points by a mobile short-wave transmitter, then picked up and relayed over the usual station network.



Right—The latest N.B.C. mobile S.-W. transmitter which picks up programs from outlying points and relays them to central broadcasting stations by short waves.

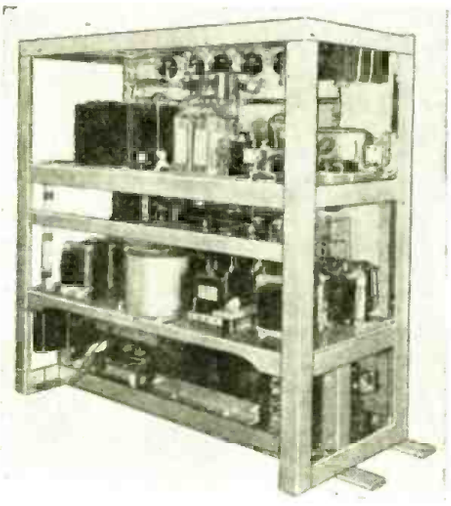
Below—Rear view of the audio or speech amplifier.

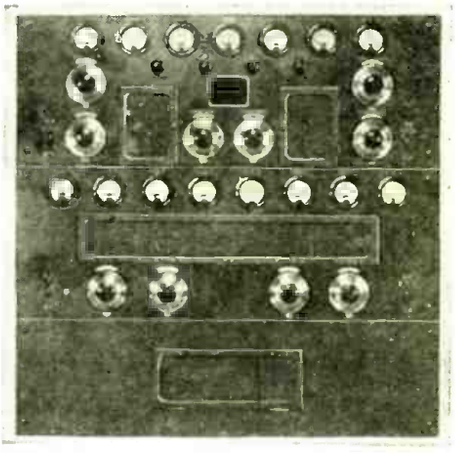


This gasoline-electric generating plant provides the power to operate the transmitter.

● THE N.B.C.'s new mobile transmitter, mounted in a specially built automobile, represents a new departure. The car is twenty-two feet long. It is capable of a speed of sixty-five miles an hour and is sturdy enough to stand all existing road conditions. It is streamlined and aluminum painted. The short-wave transmitter which is housed in the car was designed and installed under the direction of George Milno, N.B.C. eastern division engineer. It has a

(*Continued on page* 102)



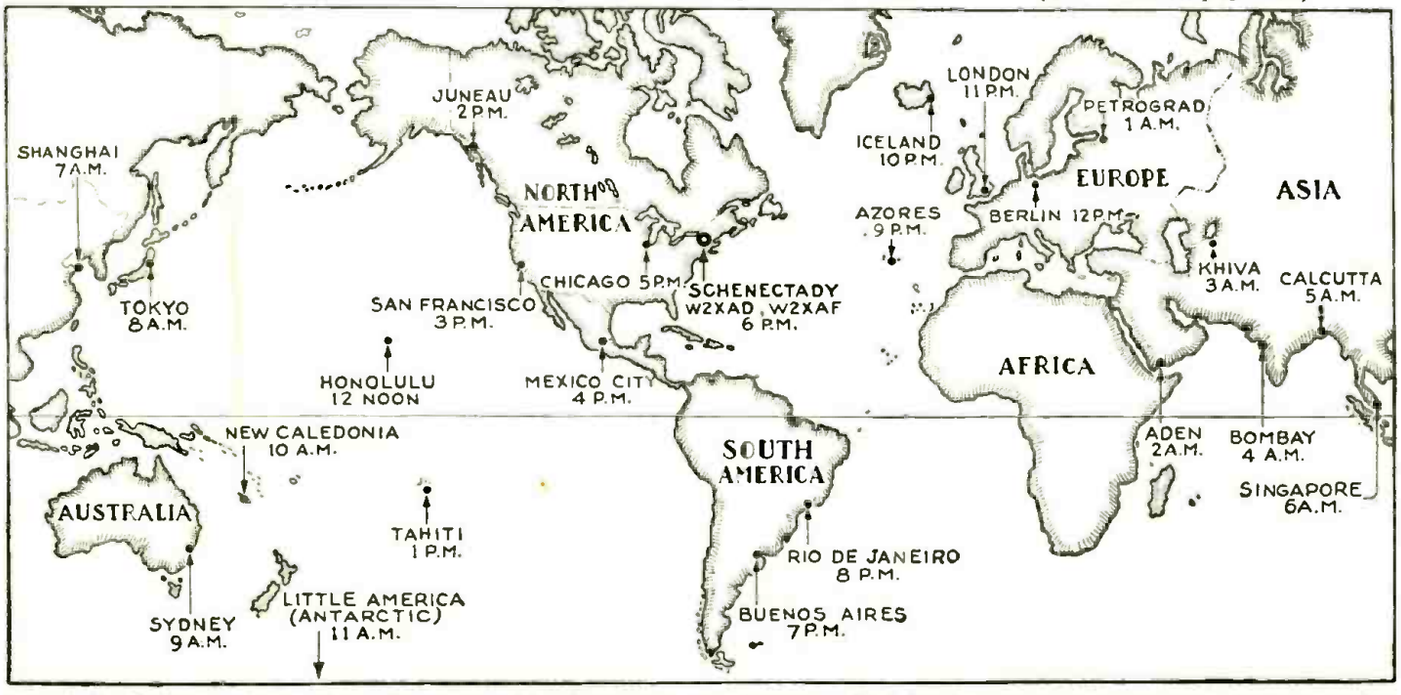


The radio control unit for the new N.B.C. Mobile Transmitter.

# 24 Hours of Broadcasting in a Single Hour

● TWENTY-FOUR hours of broadcasting in 10 or more different languages, all crowded into a single hour, "highlighted" a radio program broadcast by General Electric's short-wave stations W2XAD and W2XAF in Schenectady on March 16 This broadcast "to the world" was unique in that it was the first attempt to reach the four corners of the globe from a single station, without using relays in foreign countries. The program started at 6 o'clock, E. S.T., and continued for one hour. The program was heard in various parts of

(*Continued on page* 102)




One of the startling things about the world-wide short-wave broadcasting which has become so common today, is the fact that while a program is being sent out at a certain hour, as the map shows, this same program is being heard somewhere at all the intervening periods of 24 hours around the clock.

# DUO-AMPLI-

## *Ideal 1-Tube Set for the*

The "Duo-Amplidyne" impressed the editors as a crackerjack 1-tuber; on test, "Europeans" came in strong!

●THE receiver shown in the photographs is a combination of the Twinplex and the Oscillodyne. It makes use of the type 19 twin tube One set of elements is used as a *super-regenerative detector* and the other set as a *resistance-coupled audio amplifier.* This combination results in a very sensitive "one-tube" receiver.

For the beginner it is an ideal set inasmuch as it is very economical to build and extremely easy to operate. If the instructions are followed carefully, no trouble will be had in making it work right off. Tuning with this type of receiver is not at all critical, due to the super-regenerative detector; the regeneration control does not need to be adjusted as critically as an ordinary regenerative receiver. There is only one draw-back with a set of this kind and that is the slight hissing sound which is present in the earphones when a station is not tuned in. However when a moderately strong signal is being received the hiss completely disappears. As the station gets weaker the hiss will increase in proportion to the decrease in signal level. It will be noticed when comparing this set with another of the regular type, that there is decidedly less *fading* and *swinging* of the short-wave stations. This is due to the set being rather broad in response and also to the automatic action of the detector tube which tends to hold the signal at a more or less constant level. During a fade the station will remain at a nearly constant level and the hiss will increase and decrease in amount. Stations which are effected with very rapid fading can be copied "solid" on this set where on other sets it is almost impossible to get their call letters. So even though it has that bothersome hiss it has several advantages which outweigh its disadvantages.

### Foreign Stations on 10 Foot Aerial

It will work on the smallest type of antenna. Foreign stations can be brought in on a ten-foot wire with nearly the same volume as on a long out-door antenna. With a large antenna the small antenna coupling condenser can be loosened to a point where no trace of a "dead-spot" can be found. When this condenser is once adjusted it needs no further attention. Loose coupling does not decrease the sensitivity and it allows greater selectivity with greater tuning ease, due to lack of "dead-spots".

After reading this far the reader will gather that this set as is the case with all super-regenerative receivers is no good for CW (code) reception and is only good for phone or modulated signals. Well that is not the case for with the regeneration turned below the point where the set breaks over into irregular oscillations, it will work as a regular regenerative detector and one stage of audio. Regeneration is controllable from nothing right up to super-regeneration.

### Set Built On Wood or Metal Chassis

The set as shown in the photographs is built up on a metal chassis, however. it could easily be built on a wood baseboard with a metal panel. The three controls on the panel are, the filament control rheostat, main tuning condenser and the potentiometer which controls the regeneration. In order to obtain smooth action from the set it is advised that the parts values specified be used. The two most important values are the one megohm grid-leak and the .002 mf. fixed plate by-pass condenser. If either of these are changed it will be impossible to obtain smooth super-regeneration over the entire dial on all the coils.

The plug-in coils can be any number

### PARTS LIST

1 Metal Chassis. Try-Mo Radio.

1 set of Plug-in Coils, 15 to 200 meters. (See data.) Na-Ald (I.C.A.; Bruno; Gen.-Win.).

1 .00014 mf. Variable Condenser. (Hammarlund; I.C.A.).

1 .01 m.f Fixed Condenser. Polymet.

1 .1 mf. Fixed Condenser. Polymet.

1 .0001 mf. Fixed Condenser. Polymet.

1 .002 mf. Fixed Condenser. Polymet.

2 50,000 ohm 1-watt Resistors. Lynch.

2 1-meg. Fixed Resistors. Lynch.

1 50,000 ohm Potentiometer, with switch. Acratest.

1 10 ohm Rheostat.

1 6-prong Wafer Socket. Na-Ald.

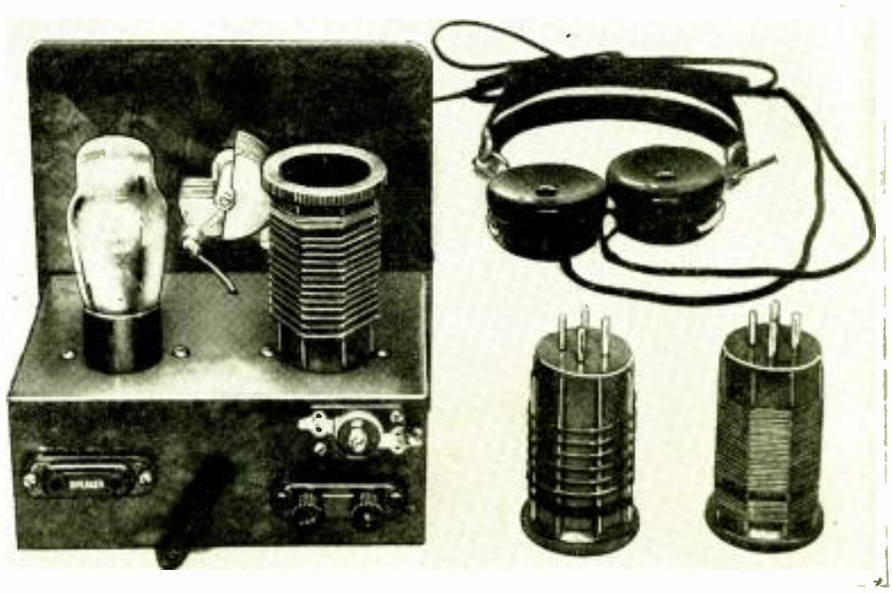
1 4-prong Wafer Socket. Na-Ald..

1 Antenna Trimmer Condenser (low minimum capacity); 35 mmf. max.); Hammarlund.

1 Antenna Ground Terminal Strip. I.C.A.

1 Type 19 Tube, R.C.A. Radiotron (Arco.)

For Coil Data see page 89.



This picture shows a rear view of this unusual "1-tube" receiver—the Duo-Amplidyne, developed especially and exclusively for SHORT WAVE CRAFT readers by the author.

# DYNE

## *Beginner*

**By GEORGE W. SHUART**
**W2AMN**

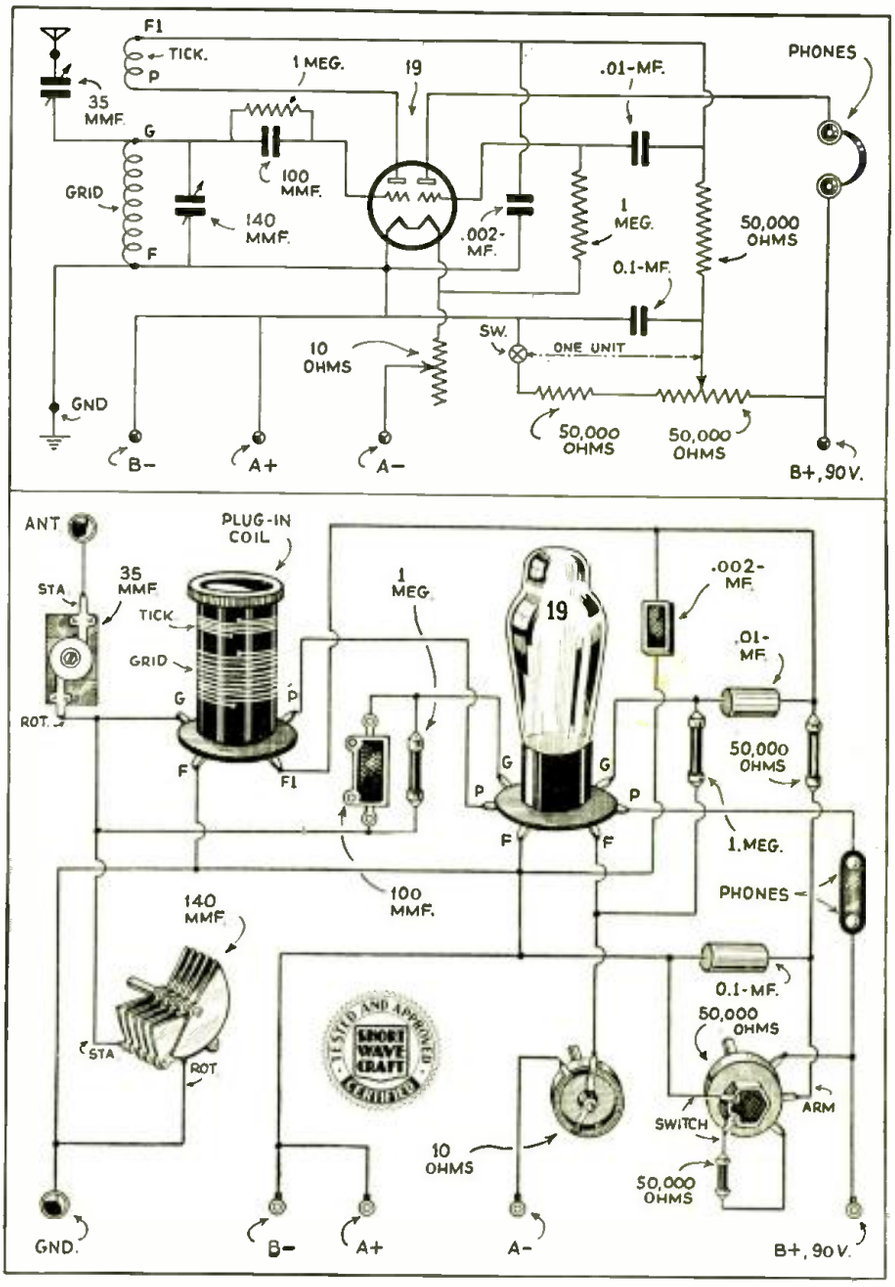
of the standard manufactured variety which have large tickler windings. For manufactured coils having less turns on the tickler than specified in the coil table, it will be necessary to add a few turns. In order to obtain either straight or super-regeneration without changing the plate voltage on the detector tube, a 50,000 ohm fixed resistor is connected between one side of the potentiometer and the B negative. Unless the rheostat or the potentiometer is provided with a switch it will be necessary to disconnect the B negative battery lead in order that the 50,000 ohm resistor will not run the B battery down when the set is not in use. It is advisable to use a potentiometer which has a switch attached in order to break the B circuit when the set is turned off. The .1 mf. by-pass condenser connects from the rotor of the regeneration control to B— and reduces any noise caused by the control. Some units will require more than .1 mf. to render them quiet in operation; as high as 1 mf. may be found necessary in some cases.

### Wiring Details

The builder should have no difficulty in constructing this set. After all the parts are mounted, wire the filament circuit first. Then proceed to wire the rest of the set, making sure that the grid return of the detector is connected to the filament positive and the grid return of the audio part of the circuit to the negative. The connections for the plug-in coil used may differ from those shown in the diagrams. In any case *make sure that the out-side winding of the grid coil is connected to the grid-leak and condenser with the end nearest the tickler connected to the filament positive. The outside connection of the tickler will be connected to the plate of the tube, with the end next to the grid coil going to the* 50,000 *ohm plate resistor and the* .01 *mf. audio coupling condenser.* If these rules are followed carefully there will be no trouble with the set not working, due to improper coil connections.

After the set is wired, connect the A battery and if the circuit is correct, the filament will glow a dull red when the rheostat is turned up. Needless to say the entire circuit should be checked before any batteries are connected. With all batteries connected and the phones inserted, adjust the antenna coupling condenser to minimum capacity; insert the largest coil and connect the antenna. Rotate the regeneration control until a decided hissing sound is heard in the phones; we are now ready to tune in either amateurs or police calls. It will be noticed after the set is in operation a while, that there is one definite point of feed-back which gives best results, and this point is where the carrier wave of the station being received will kill the hiss entirely and as the station is tuned out the hiss will reappear. The adjustment of the antenna condenser is not critical and when an optimum setting is found it can be left alone.

As for results actually obtained during tests made with this receiver, we can safely say that all of the "foreign" stations can be brought in with good earphone volume, and without any real fussy adjustments to make or hold. This little receiver brought in German stations right in the heart of the congested down-town district in New York City—and that is more than lots of multitube receivers have been able to do for the author. Anyone building this set will be more than pleased with its smooth performance and simplicity.



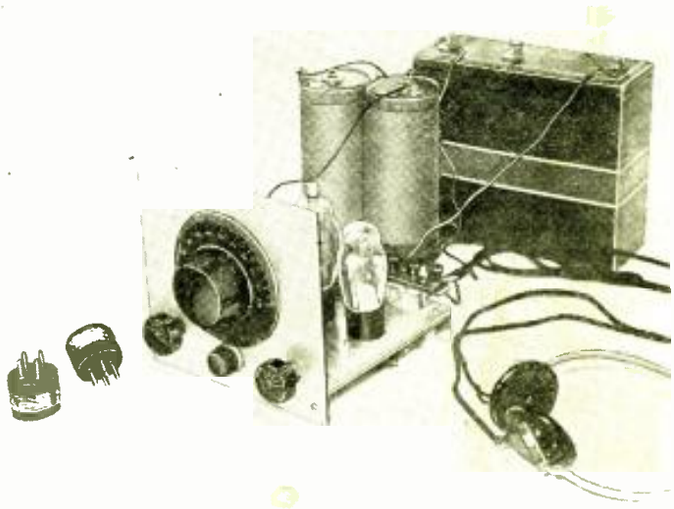

**Practically anyone can follow the extremely simple wiring diagrams given above, both in schematic and picture style, so that they can enjoy the really surprising performance afforded by this ideal 1-tube set, which employs a single 19-tube. The set works on a 2 volt "A" battery.**

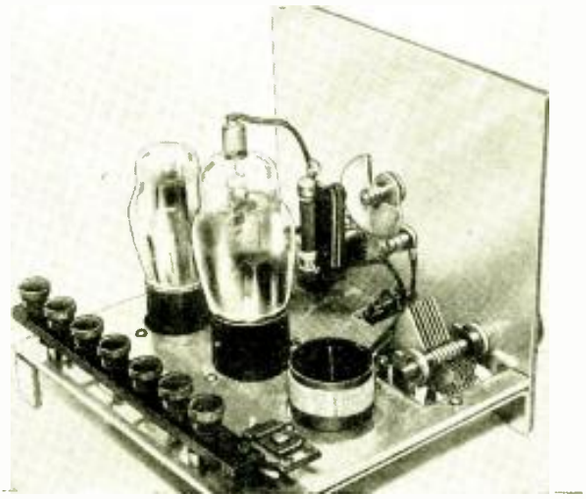
- The circuit of the DUO-AMPLIDYNE represents a considerable amount of research and what this one tube receiving set can do, even on a 10-foot antenna, will certainly surprise you! It may seem a little hard to believe, but extensive tests repeatedly showed that the "foreign" broadcast short-wave stations, such as German, British, and others, could be picked up in fine shape, using only a 10-foot wire as an antenna. The high efficiency of this circuit is partly due to the use of the type 19 "twin-triode" tube, coupled to the fact that the circuit also operates in "super-regenerative" fashion, with a consequent tremendous increase in the signal amplification.

# The VICTOR "EASY-TUNE" 2-Tube Band-Spreader

By L. Victor and E. Kahlert

This 2-Tube receiver will prove a popular one with the short-wave beginner. This very fine set embodies several excellent features, including "band-spread." This feature makes it much easier for the beginner to tune in those distant stations.



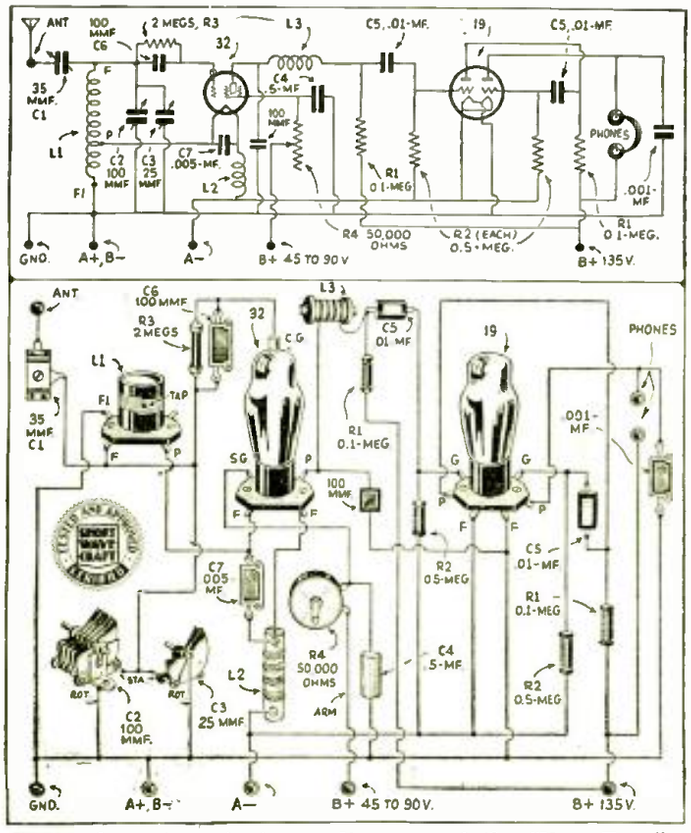


The 2-Tube "Easy-Tune" Band-Spreader here illustrated is intended primarily for headphone reception and makes a dandy job for those just starting in the short-wave game. A rear view of the receiver is shown at left.

● ELECTRON coupling has been used for a long time with very good results on A.C. operated detectors. It has been unanimously agreed that the electron-coupled form of detector is the most stable and sensitive type ever designed. These admirable qualities "carry over" in every point to the battery-operated version of the electron coupled detector. The set shown incorporates a sensitive detector with the addition of a two-stage audio amplifier, of very high gain and low background (noise) level.

The extremely sensitive E.C. detector, and the audio system used make a fine combination that we believe it hard to beat in the line of detector and two stage audio sets.

While testing the set. we logged 12 foreign countries, and something else which gave us quite a thrill, the "Byrd Expedition." All the European broadcast stations came in on the loudspeaker with enough volume to be heard all over the room. EAQ, Madrid; DCJ, Germany; GSB, England, were "standbys" that could be tuned in practically any evening for the edification and bewilderment of visiting BCL's.




Both schematic and picture diagrams of the "Easy-Tune" 2-Tube Band-Spread Receiver are given above, so that even the most inexperienced may easily construct this excellent and inexpensive S.W. receiver.

## The Audio System

The 19 is a twin tube, 2 volt filament type, that was originally designed for "Class B" work. The two separate tubes in the glass envelope when used in a resistance-coupled circuit, provide excellent gain, and the very good quality, that is a characteristic of all resistance coupled amplifiers. This two-stage amplifier likewise has the very low background or noise level that is so essential for short-wave reception.

## Layout Details

The set is built on an aluminum chassis, 7"x6", ⅛-inch thick. Metal brackets are used to raise the chassis and bolt it to the panel, which is also 7" by 8". Extremely heavy aluminum is used to provide real rigid mechanical stability, for no matter how stable the set is electrically, the chassis that the set is built on must be solid, or else the set will not be really steady in operation. On the chassis, from right to left (rear view), are the isolantite sockets for the plug-in coil, the '32 detector tube, and the '19 audio tube. Behind these is the binding post strip for antenna, ground, battery, and earphone connections. The controls on the panel, from left to right, are: band-finding, *band-spreading* (the main control), and regeneration controls. A very simple and rather old-fashioned system is used for getting a vernier action on the main tuning control. A smaller knob, with a rubber ring around it is mounted just below the main control. This knob rubs against the main dial, and friction provides a very smooth, and quite high ratio vernier, without any perceptible backlash. Some of you fellows that cannot afford costly verniers might try this gadget, and we are sure that you will be delighted by the fine and very inexpensive results it gives.

The filament and plate chokes are mounted under the chassis. The plate R.F. choke is mounted on the back edge of the chassis with a small brass angle. The filament choke is mounted near the front edge of the chassis, in front of the detector and audio tube sockets. The filament choke is wound on a piece of four inch dowel, ½ inch thick. It has four *pies* of No. 28 D.C.C. wire. The entire audio system.

(*Continued on page* 104)

The author adjusting the D.C. converter while bringing in a distant short-wave station.

# A D. C. Battery-Operated S-W CONVERTER

## By GEORGE W. SHUART, W2AMN

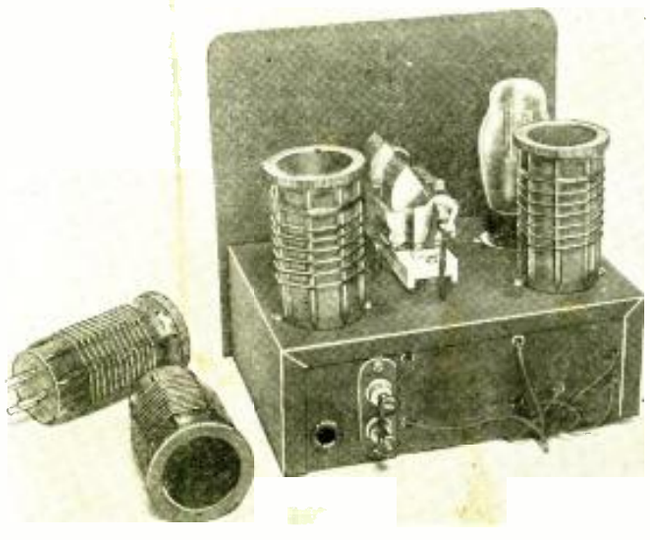
Here is a simple, yet highly efficient, short-wave converter of the D.C. type. It is operated from batteries and employs a type 19 tube, acting both as detector and oscillator. Exceptionally fine results were obtained on numerous tests.

● THERE are plenty of battery type broadcast receivers still in use and many set manufacturers are making up-to-date battery operated sets using the two-volt type tubes. The converter to be described is designed primarily for these sets. When using a converter it is necessary to have a broadcast receiver that has plenty of radio frequency amplification. Just because your battery set brings in stations with great volume is no sign that it will work well with a converter. Many battery sets are lacking when it comes to R.F. gain but have plenty of audio frequency amplification. Audio gain means very little when using a converter. So if you don't pick up good distance on your set, you can rest assured that you will have little fun with this converter. If you have a superheterodyne using the two volt tubes, then this converter will provide plenty of excitement on the short-wave bands.

This converter is not restricted to battery sets alone, it will work very well with regular electric sets, provided batteries are used to run it; it cannot obtain its power from the broadcast set.

Many "fans" hesitate to build a converter of the electrically operated type because of their complications. In their case this little unit will appeal to them as it is very simple and economical to build and it only needs two dry cells and one 45-volt "B" battery to operate it. The battery drain is very very low, which means that the batteries will last many months.

Plug-in coils are used in order that all bands will be covered and with less constructional complications, as would be the case if a switching arrangement were used. *Two pairs of coils are needed for each wave band.* They can be wound at home or purchased, which ever the builder wishes, as they are standard windings with no alterations necessary.

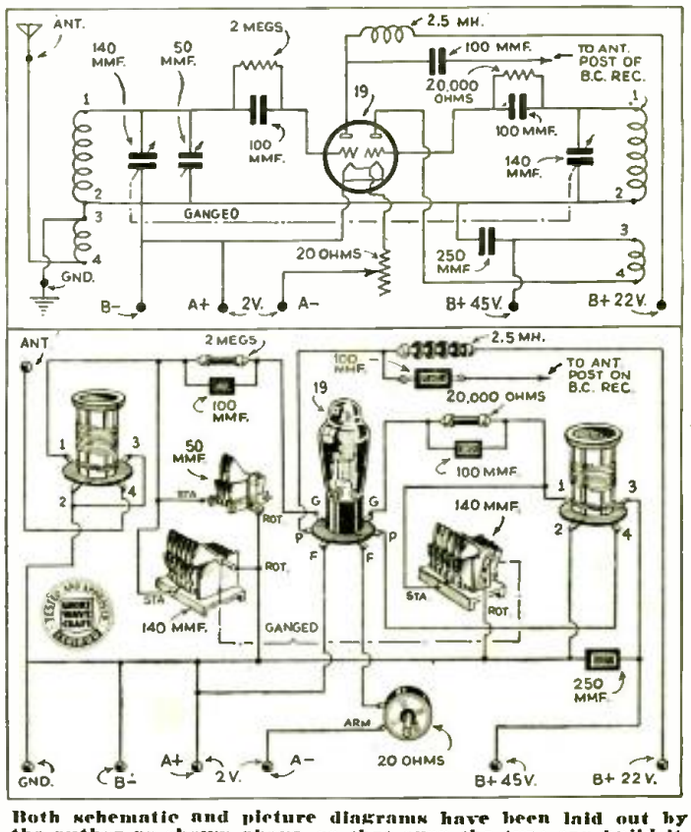


Rear view of the D.C. converter, which is operated from batteries and uses only a single 19 tube.

### Single 19 Tube Does the Work

A single type 19 tube is used to do the work of *first detector* and high frequency *oscillator*. The 19 is a twin triode tube intended for class "B" audio amplification in two-volt broadcast receivers. However, either of the triodes connected in a grid-leak detector circuit makes a very sensitive detector. When connected as an oscillator either of the triodes will oscillate very nicely at frequencies as high as 56 megacycles. It was because of these facts that the 19 was chosen for the converter rather than some of the other tubes which were designed for frequency conversion in superheterodynes.

The small windings on the coils are used for the plate feedback coil in the high frequency oscillatory circuit, and for the antenna *pick-up* coil in the first detector circuit. However the antenna winding on the detector coil might be used to introduce regeneration in the first detector to bring up the sensitivity of this part of the circuit. In this case the small winding would be connected in the plate circuit of the detector, the same as in (*Continued on page* 108)




Both schematic and picture diagrams have been laid out by the author as shown above, so that even the tyro can build it.

The photo above shows the authors, Mr. Johnson at left, together with National receiver and R.F. Booster. The SHORT WAVE SCOUT "Trophy" is also observed on top of the Booster Amplifier cabinet.

# R. F. BOOSTER STAGE—

## Used by Winner of First "Scout" Trophy

Designed and Built
**By E. F. HOUSER**
Tested and Used
**By HEINIE JOHNSON**

Heinie Johnson, winner of the first SHORT WAVE SCOUT "Trophy Cup," whose "log" appeared in the January issue, was enabled to roll up his surprisingly fine list of DX stations, thanks to the use of a radio frequency booster. The method of connecting such an R.F. booster amplifier to a National receiver is here described; also the doublet antenna employed.

● SO much interest was shown in the receiver that won the first SHORT WAVE SCOUT *trophy* awarded by SHORT WAVE CRAFT, that Mr. Johnson was asked to write an article describing it. In compliance with that request we offer the following.

When Mr. Johnson logged the stations that won him the trophy, he was using only one stage of radio frequency, feeding into a National 45 receiver. Since then, however, we have added another R.F. stage. In this article both circuits are described and the various ways of overcoming the obstacles that the application of such stages present.

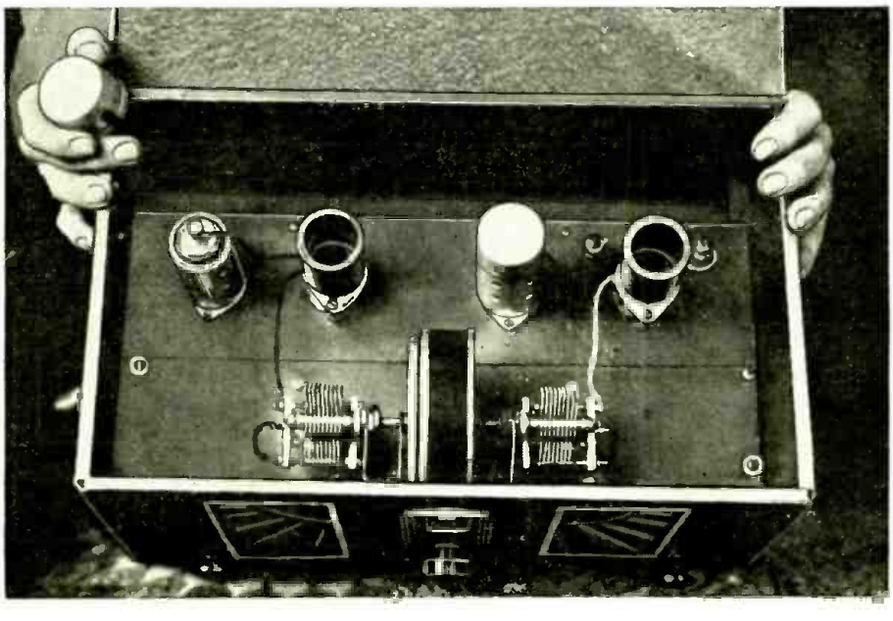
Diagram No 1 is the circuit of the National 45; being a tuned R.F. receiver, obviously its selectivity is lower than the average super, and equally obvious is the fact that the addition of further R.F. stages will serve to broaden, rather than narrow (sharpen) the selectivity curve. This would occur because the volume control would, quite naturally, have to be cut to a much lower level and since the volume control is in the screen-grid circuit of the detector, functioning as a regeneration control, decreasing the volume decreases the regeneration. As perhaps most of you already know, the greatest selectivity is secured from a regenerative detector when it is operated just at the peak of slopping over into oscillation. With the volume control on a low position, the regeneration would almost be nil, and the circuit much broader than it ordinarily would be. To permit us to get the maximum selectivity out of the circuit, another volume control is installed across the grid circuit of the *first* audio stage; this addition is shown in diagram No. 1. It is merely a 250,000 ohm potentiometer with the variable arm connected to the grid of the tube. A 500,000 ohm control would serve equally as well as the value is not critical. This is a desirable improvement in the National 45, even when additional R.F. stages are not added, and in addition to improving the selectivity will permit the detector to self compensate fading signals on strong stations.

Tone control was also added to make reception more enjoyable under bad conditions by making the static less prominent. This addition is also shown in diagram No. 1.

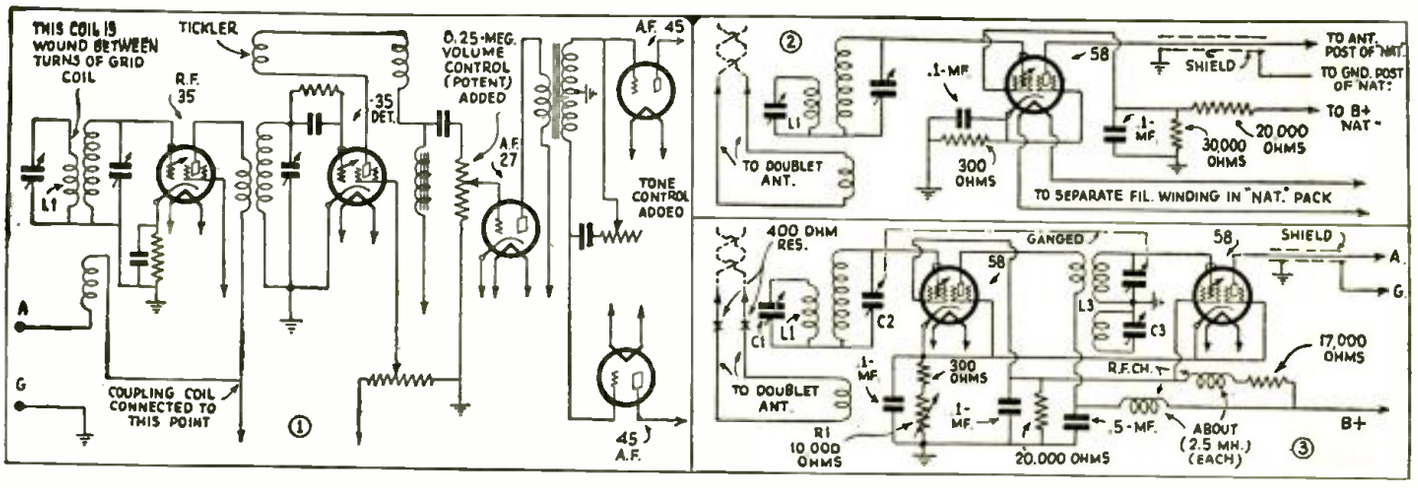
### Value of Quality Parts

The stage of R.F. was first constructed from composite parts and after its advisability was proven, rebuilt with National parts throughout. To those doubting or questioning the advantages in using standard short-wave equipment in view of the increased cost, we can only say that about 30 per cent increase in selectivity and considerable more in sensitivity was achieved. This improvement we attribute entirely to the use of National equipment and highly recommend it for the construction of any short-wave unit. If the writer's own experience does not seem enough to justify such a recommendation, then a slight review of the National Company's achievements in the field of short-wave radio reception will prove the advisability of using their parts in the construction of any short-wave receiver or unit. Another decided advantage is that the coils and condensers will track perfectly, as is to be expected, with either the National 45 or their later supers, such as the FB7 or the FB7X.

In the construction of the R.F. unit the coil sockets are mounted on upright fiber supports, raising them about 1¼ inches above the subpanel, to eliminate any capacity losses due to the contacts and the sub-panel being close together, and more important still—permitting all grid wiring (leads from grid cap to coil, and from coil to stator of tuning condenser) to be above the sub-panel. This is a very important point towards the elimination of circuit losses and the stability of the circuit. The tube sockets are dropped about one inch below the sub-panel in the same manner, to do



Interior view of the 2 stage Booster Amplifier which is fitted with National drum dial and condensers.




**Wiring diagrams, above, show hook-up of National 45 receiver: above—at right, single stage R.F. Booster and below, 2 stage R.F. Booster.**

away with capacity losses and to bring the grid cap closer to the coil contact. At this point let us state that larger tube shields than those shown in the photos should be used. The ones shown are for 58 tubes, but the larger ones will prove more efficient, having lower capacity losses. To many perhaps, such precautions against losses seem extreme, as well it might seem, but bear in mind that you are working with *short waves* now, and that they have a habit of *coupling*, when coupling is not desired, and does not even seem possible.

Something else to consider is that we are using one receiver to tune from 16 meters up to, and in some cases including the broadcast band, and if unwanted capacity effects are not avoided we shall discover that through a freak combination of inductance and capacity some parts of the band will be partially or totally "dead." Pages could be written, and have been for that matter, on the cause and elimination of "dead-spots," but regardless of what might have been said, it is the authors' opinion that *dead-spots* will invariably be found to be due to the construction of the receiver in such a manner that the unwanted capacity values and the unnecessary inductive values have resulted in "trap circuits," either series or parallel, that create these *dead-spots*. If, however, you build the stage or stages with these points in mind you will, no doubt, be spared the unpleasantness of finding no response on some station that you wish to receive.

### Constructing R.F. Stage

Let us continue our construction of the R.F. stages. All *ground* connections and *ground returns*, such as those

(*Continued on page* 115)

# A Universal Power-Pack and Amplifier

**W. H. Balderston**
**W9CKV**

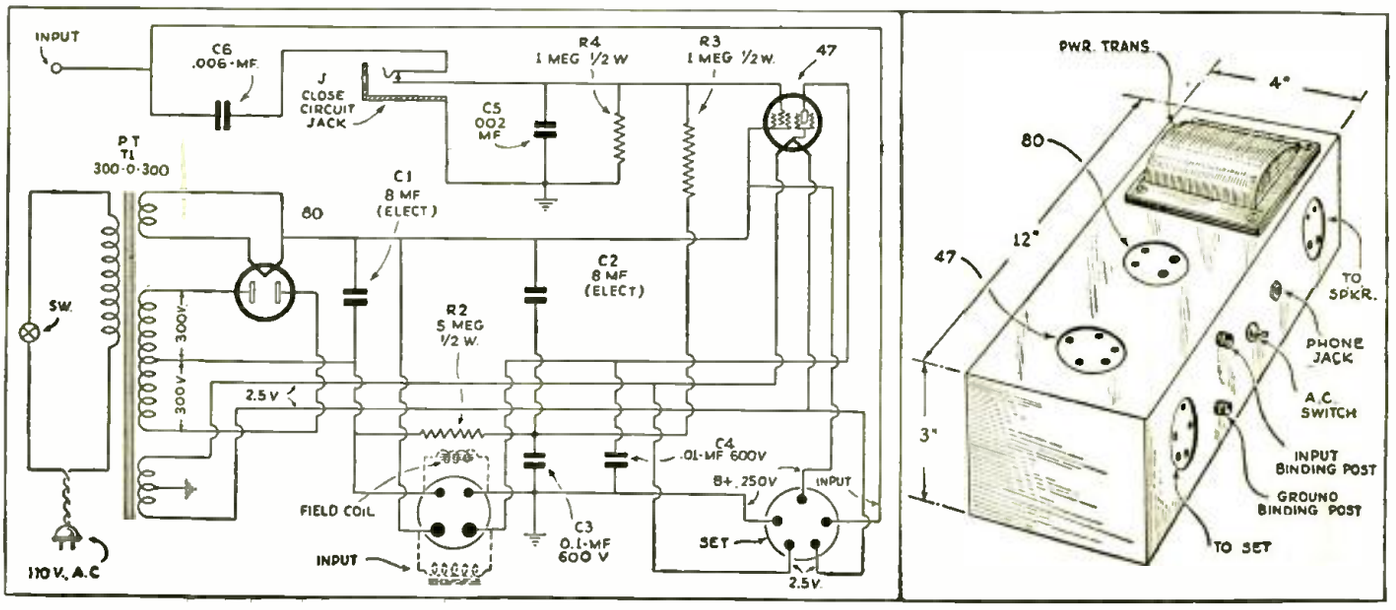
● FOR the average experimenter or "ham" who is continually building or rebuilding S-W sets it is a convenience to have a combination POWER PACK AND AMPLIFIER which can be used on any set. The UNIVERSAL POWER PACK AND AMPLIFIER which is used at this station has been used on all kinds of sets,, not only A.C. but also battery and portables, for speaker reception.

It is built on a 3"x4"x12" sub base and arranged as per diagrams, incidentally being built in an old radio cabinet here. The sub base can either be of metal, wood or whatever happens to be in the junk box that is at all suitable.

In the diagram it will be noted that a four-prong socket is mounted on the front of the sub base for speaker connections, although speaker could be built in if it was found more suitable to mount the speaker on a 2 foot by 2 foot piece of ½ Celotex separate from the power pack in which case some sort of plug-in system had to be used. An old four-prong tube base correctly wired is used for this connection.

It will be noted that an uncommon method of obtaining the bias voltage for

(*Continued on page* 110)




**Useful circuit diagram is that given above, which shows how to wire up a Universal Power-Pack and Amplifier.**

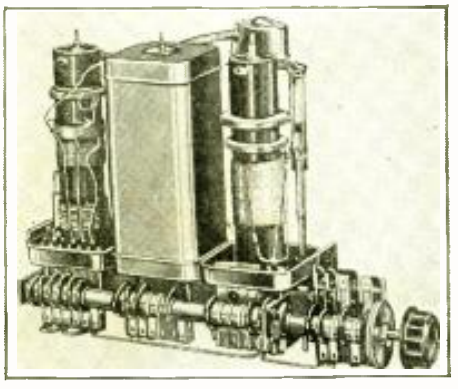
# WORLD-WIDE SHORT-

## A German All-Wave Coil

● IN the accompanying illustration, is shown a photograph of the coil and switch system used in a popular German all-wave set which was described in a recent issue of *Europa Stunde*, a Berlin magazine.

It will be noticed that the switching is accomplished by a series of cams on the shaft of the switch, very similar to the method used in one of the most popular American receivers.

The photo shows two of the coil shields removed to reveal the inductances within. The center coil shield is in place and the combination of the two open coils and the central shield, combined with the cam shaft at the bottom suggests a large engine, such as a marine Diesel engine.

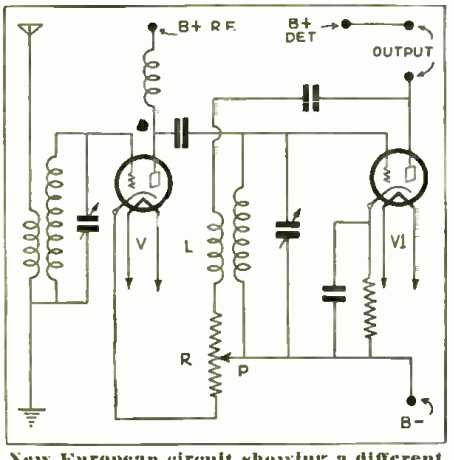


**Looks like a Diesel engine—doesn't it? But it isn't. It happens to be the latest European idea of an all-wave "switch-type" coil.**

## Regeneration Control

● THE accompanying circuit appeared recently in *The Wireless Engineer and Experimental Wireless* as an explanation of a new patent issued in Germany. The regeneration coil L of the detector tube V1 is connected in series with a resistance R and the cathode of the preceding R.F. amplifier V. Control of regeneration is effected by the movable arm on potentiometer R connected to the cathode of the detector. At the same time, a compensating bias is applied to the grid of the R.F. amplifier which tends to offset any variation in amplification caused by the change in regeneration.

As this was published as a patent disclosure, no actual values were given. However, the experimenter interested in this development can soon arrive at suitable sizes for the various parts, by the trial and error method.




**New European circuit showing a different method of regeneration control, utilizing a potentiometer connected to detector cathode.**

**● 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.**

## Transmission Without An Aerial

● A RECENT issue of *Radio Welt* contained an account of some interesting experiments on ultra short waves.

A well known Dutch engineer, Mr. Strut, found that at certain wavelengths it is possible to transmit *without an antenna* without materially reducing the radiation. The wavelength of 1.42 meters, happened to be most suitable for these experiments at which a series of tests and exact measurements were made.

In the tests, the transmitter and receiver were mounted on masts in such a way that they could be raised or lowered at will.

It was found that as long as the transmitter was not less than 12 meters (approx. 12 yards) above the ground, the reception was not affected, when the transmitter was operated without an aerial. On the other hand, the reception disappeared completely when the aerial was taken from the receiver.

In addition to these effects, it was found that as soon as any body came within a distance of 5 meters of the transmitter, the strength of the signals decreased. Also if any body came between the transmitter and receiver, similar effects were noticed.

These experiments led to the development of a new application for ultra short waves. This is a *burglar alarm* system. The armature of a relay, which is operated from the receiver remains attracted as long as the incoming signal does not decrease. When a person crosses the path of the waves, the weakening of the received signal causes a decrease of the current which flows through the relay; the armature is released and closes the alarm circuit.

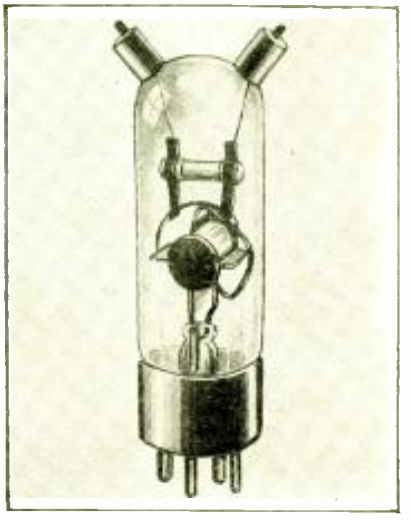
Unlike previous electrical alarm systems, this new arrangement permits protection of a large place or a considerable area. The protection is particularly effective because the waves are invisible. The uninformed person who enters the protected area does not know that he is within the protection limits of the alarm system and receives no warning. Alarm systems of this type may find their application in the patrol or border lines or for effective protection of grounds against trespassing.

## A Magnetron Oscillator Tube

● IN the July, 1933, issue of SHORT WAVE CRAFT we explained how the *magnetron* tube can be used to produce oscillations on short waves. This tube has a split plate which is fed into opposite sides of an oscillatory circuit. This split plate is in the field of a strong electric magnet, from which it gets its name of *magnetron*.

The figure shows a practical magnetron tube of German origin, which was described in a recent issue of *Radio Welt*. The split plates are easily seen in the illustration.

Those who are interested in investigating the magnetron system further, should read the description on page 160 of the July, 1933, issue of SHORT WAVE CRAFT.

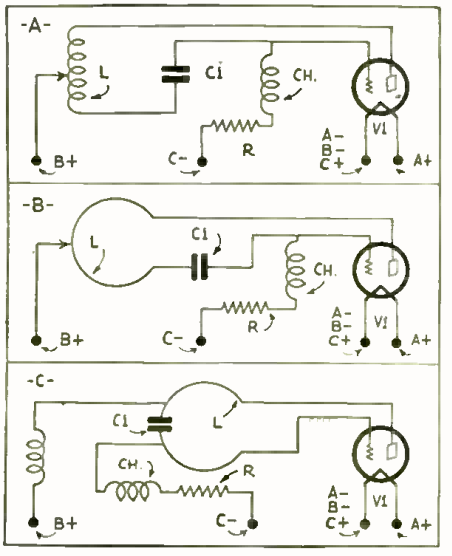


**The latest practical form of Magnetron tube of German origin.**

## Ultra-Short-Wave Oscillators

● MANY experimenters in the field of ultra short waves do not realize that the apparently new and unusual circuits used for these waves are simply adaptations of very popular circuits.

This fact is brought out quite clearly in the three circuits shown. This circuit is reprinted from a recent issue of *Radio Für Alle*, a German radio magazine. The explanation accompanying these circuits is, briefly, as follows:




**The above diagram shows the interesting development of an ultra short-wave oscilator circuit from the popular Hartley.**

# WAVE REVIEW .. Edited by C. W. PALMER

The development of an ultra-short wave oscillator circuit from the popular Hartley circuit is shown in the drawing. The differences between the circuit for long waves and for short waves are indicated at A and B. Even an inexperienced person would notice the similarity of the two circuits. Only the values of the parts are changed—the coil consists of a single turn, instead of many turns, and a tap on the circumference of this single turn provides the necessary "node" tap for the plate supply.

As soon as we increase the frequency in that portion of the frequency band known as ultra-short waves, though, the appearance of the circuit varies so much that the inexperienced experimenter no longer recognizes it as the old favorite Hartley.

Instead of placing the blocking condenser C1 between the grid and the inductance coil, it is placed in the central point of the coil, which is thus divided into two semi-circles. The grid and plate voltage supplies are fed to the opposite sides of the condenser, through suitable chokes. It will be noticed that both the plate and grid are equipped with chokes to prevent the high frequency currents from passing through the plate or grid voltage batteries to the filament, and thus reducing the tendency of the circuit to oscillate.

## A French 5-Meter Transmitter

● A NEW radio magazine which has made its appearance among French technical publications, and called *Toute La Radio*, contained details about a novel 5-meter transmitter in its second issue.

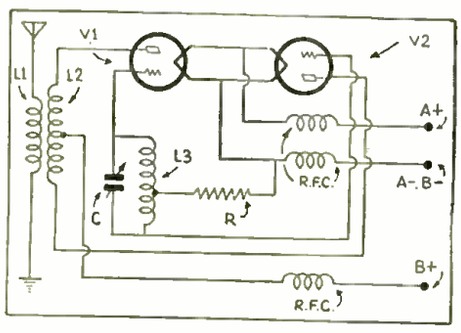
A photo of this transmitter, with a full-wave unit, using two tubes is here shown. The mounting method which permits very short leads is quite unique.

The circuit of the transmitter is shown in the diagram. It is a tuned grid circuit, with center-tapped inductances for both the grid and plate coils. The plate and filament supply leads are isolated in the usual way with R.F. chokes.

The output of the transmitter is fed by a coil coupled to the plate inductance. This coil may be connected to any of the usual radiating systems, such as a half-wave dipole using a transposed lead-in in the accepted fashion (described in past issues of SHORT WAVE CRAFT) or a simple aerial and ground as shown in the circuit.

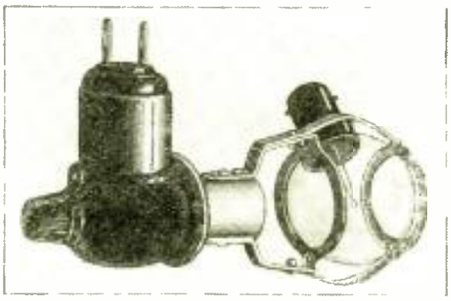
The details of the coils which, by the way, plug into the coil socket on the top of the transmitter assembly are made in the usual way. The antenna coil consists of ¾ of a turn, wound to a diameter of 2¼ inches. The grid coil consists of ¾ of a turn wound to a diameter of 1¾ inches, with a tap at the center, to which the grid resistor is attached. The plate coil consists of 1¼ turns also wound 1¾ inches in diameter. The coils are self-supporting and are wound with wire equivalent to No. 14 bare copper wire in the wire gauge used in the U. S.

The grid resistance, R, has a value of 50,000 ohms—the variable condenser contains 17 plates and is one of the midget type.

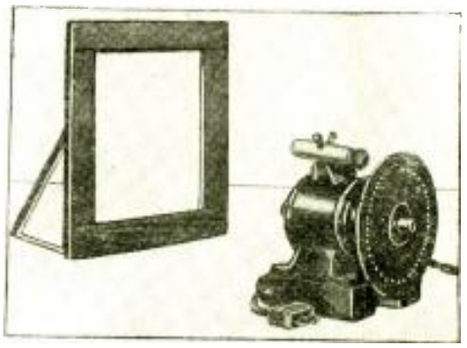



A novel 5-meter transmitter of French extraction—note the unique method of mounting the tubes so as to provide balanced wiring.

## Television Process in Europe



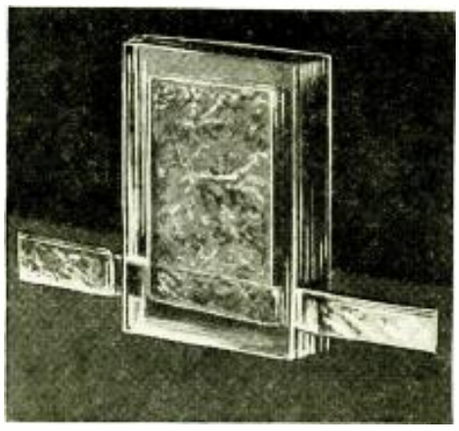
New light source (lamp) with Kerr cell.



Newest television screen type projector with scanning disc and Kerr cell.

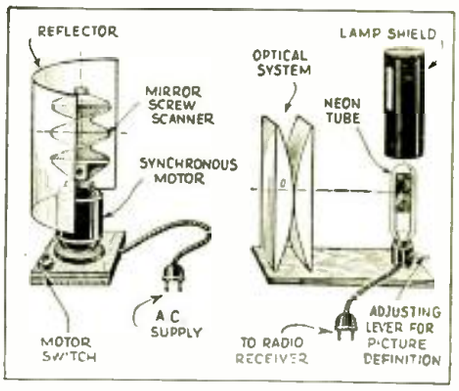
● A RECENT issue of *Radio-Amateur*, a radio magazine published in Austria, contained an interesting summary of recent developments in television reception that have taken place in Europe. The description is translated in part for interested readers.

The gaseous glow-lamp is still used in most television receivers. Two types are used—the *flat-surface* type and the *crater* type. These tubes are familiar to anyone who has followed the progress of television during the past ten years.

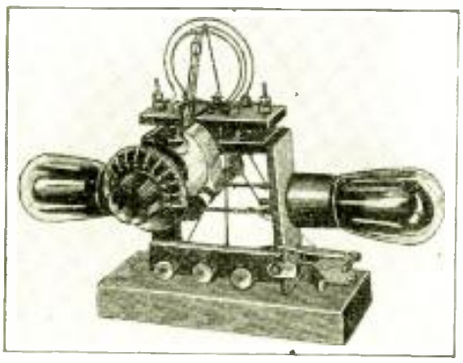


New light cell for television, employing a crystal of zinc blend.

The first development of note is one which uses the flat-plate type of glow or neon tube. As the drawing shows this is the helicoidal mirror developed by V. Okoliszany. The tube is used edge-wise, which creates the impression of an illuminating line. In order to lengthen the apparent size of this line, without recurring to an actual size of the tube, an optical system is used. The scanner consists of a large number of mirrors arranged in a cylindrical spiral, which is turned by a synchronous motor. The individual mirrors reflect the modulated light of a single line of the picture, so that the entire picture can be viewed straight at wide angles from the plane of the neon tube, without the usual narrowing or effect.




The latest Helicoidal spiral mirror for viewing the television image.



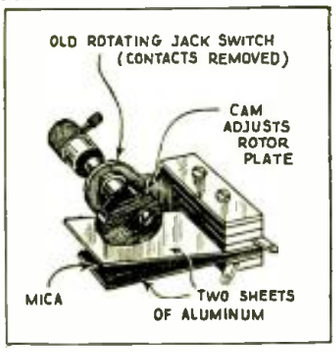
The Kerr cell method of light modulation used in the Baird television method is shown in one of the illustrations. In this unit, a strong light is cast through a cell containing nitrobenzole and metal plates which has the effect of modulating the light which is scanned by any of the usual methods, such as the scanning disc, the mirror scanner or the spiral mirror system mentioned previously.

The inventor of the spiral mirror scanner has also developed a type of Kerr cell which overcomes the difficulties of the nitrobenzole cell—such as the danger of the explosive and the fact that the liquid is difficult to use in a commercial unit.

The Okoliszany cell is a crystal of zinc-blende which is ground in such a way that it modulates the light passed through it similar to the wet Kerr cell. One of these zincblende cells is shown, with the plates at which the television signals are applied. A complete Kerr cell scanner is also shown. The cell is mounted in the small cylinder over the motor which also contains several Nicol prisms to complete the optical system. The screen on which the pictures are projected is shown at the left of the photo.

## IMPROVISED CONDENSER
**$5.00 PRIZE**

A smooth tuning antenna condenser can be made from an old rotating jack switch as illustrated. All that is needed to make the necessary changes are two small pieces of aluminum (these cut to suit your capacity) and a strip of mica the same size. First you remove the two contact points and substitute the two pieces of aluminum, but before securing them slip the mica strip in between them. Your condenser can now be tuned by rotating the switch knob.—Douglas Hess.

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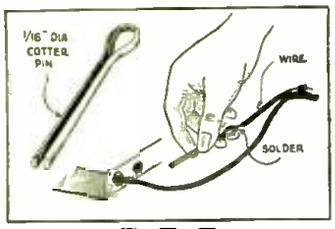
## "COTTER-PIN" CORD TIPS

When you get stuck with a phone cord with the tip broken off, reach in the junk box and produce a cotter pin with the bottom part about 1/16" in diameter. Then solder the wire to the ring part of the pin. If you find that this doesn't fit a tip jack, then take a pair of long nosed pliers, and bend the lower side out a little. For battery operated sets this makes a neater job of connecting to the spring clips of "B" batteries than the wire does (especially if it is stranded.)—Walter Freeman, Jr.

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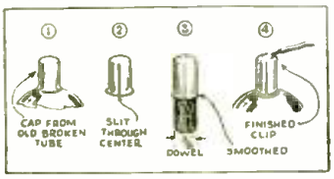
## SCREEN GRID CLIPS

I have found that excellent screen grid clips can be made quickly and cheaply from the caps of defective screen-grid tubes. To do this, twist the cap from the old tube with your fingers. Next clean the inside of the cap well with a knife and sand-paper. With tin snips, make one slit from the top of the cap to the bottom. Next place the cap over a 5/8" round rod and tap the top several times to shape the top. Wrap a piece of thin tin once around the bottom of the cap and with pliers, shape the bottom. (The tin prevents the cap from being torn.) Take the "cap" off and you have a good Screen Grid Clip. The clip already has enough solder on the top to make a good connection.—T. J. Kelly.

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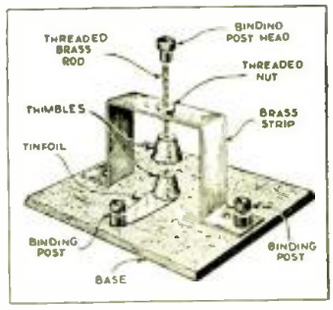
## HOME-MADE "THIMBLE" CONDENSER

Here is a very handy "kink" which I have always used when hunting for foreign DX station, and when the utmost must be gotten from the Ant. I have also found it handy when listening in on the amateur bands, for the coupling between the aerial and set varies, in regard to different coils. In order to get best results adjust this condenser as far in as possible without blocking the detector tube. Here it is. It is nothing more than two common sewing thimbles cast from aluminum. A hole is drilled through the top of one of them to take a piece of 1/16" threaded brass rod which is fastened in place by two nuts. A hole is drilled also in the top of the second thimble. A bolt is passed through this and through a piece of insulating material which forms the base of the instrument. A piece of brass is bent into a U-shaped bracket as shown, and three holes drilled in it, one in the bend, and the others in each end for mounting purposes. A nut to take the threaded brass rod is then soldered over the hole in the top of the cross-piece. This hole and nut allow the rising and lowering of the upper thimble in respect to the lower one. A binding post can be fastened to the end of the threaded rod for use as a handle. All the insulation necessary between the two thimbles is a heavy coating of shellac on the lower one. This prevents a short-circuit in case the upper thimble is lowered too far and touches the bottom one. In all order to make connections to the two plates of this condenser, one wire is connected to one of the screws holding the square brackets, and another to the metal strip which is fastened beneath the edge of the thimble mounted on the base; this strip can be made of tinfoil, brought out to a binding post on the base.

# $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.**

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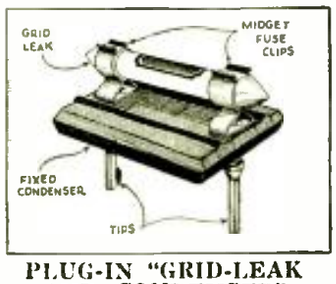


## PLUG-IN "GRID-LEAK AND CONDENSER"

Here is a drawing and explanation of a "plug-in grid-leak and condenser assembly." The assembly consists of a fixed condenser fitted with two midget fuse clips to accomdate grid-leak, and a pair of jack pins as shown, to ease mounting. Completely interchangeable, the assembly can easily be seen to have many advantages..—G. C. Mandigo.

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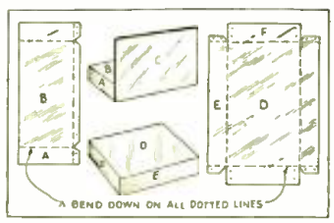
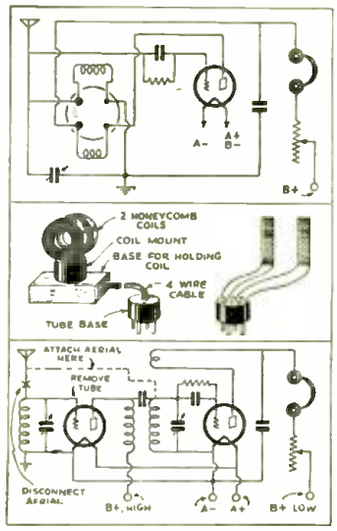
## LOW-PRICED CHASSIS




I procured some old aluminum sheet from the local junk dealer at 10c per pound. This had been used in auto bodies and plenty of it can be gotten in big sheets, large enough for all radio purposes. After burning off the paint and rubbing it with some fine emery paper, I cut the sheets as shown and bent them on the dotted lines. Then bolting it at the points marked, I had a chassis for both a tuner and a combined power-pack and amplifier. All this for about 30c, as compared to the two or three dollars that new sheet aluminum would have cost. Cheap enough! Hi!—H. C. Grant.

## LONG WAVES ON A SHORT WAVE SET

Many fans like to listen to the short waves, but at times they would like to be able to listen to the long waves as well, without changing their set. This is accomplished by attaching a set of the old honeycomb coils to the coil socket. As shown in the illustration, the honeycomb coil mount is made fast to a base, for stability, and the four leads are taken out and soldered to an old tube base, which is inserted in the coil socket. Naturally, the same tuning condenser is shunted across the grid honeycomb coil, and the tickler feed-back is controlled as in the same manner as before. In the event the set contains one or two stages of R.F., these will have to be "shorted" out of the circuit entirely, as shown by the circuit in figure 2.—H. M. Leech.

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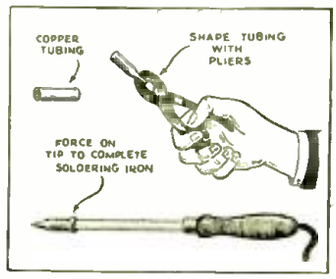
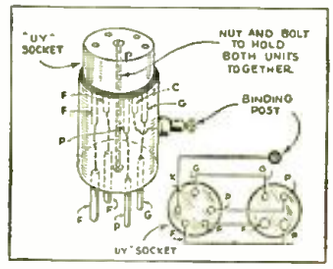
## SOLDERING IRON TIP

An emergency soldering iron tip can be made with a short piece of copper tubing, such as amateurs use in constructing transmitting inductances. First, cut the tubing to the desired length; then fashion a tip by squeezing the tubing together at one end with pliers. Itemove the broken tip from the iron and insert the new one; if the hole is too small for the tip, the tip may be made smaller by hammering it on a rod of slightly less diameter, and then forcing it into place. Tubing of ¼" diameter will fit the average soldering iron. I have used such an improvised tip for over a year, and have found it so efficient that I have not bothered replacing it.—Roland C. Nowrey.




## 4 TO 5 PRONG TUBE ADAPTER

Here is an adapter to change from 4-prong tubes to 5-prong tubes. I have used it repeatedly in changing from the 2-volt, 30 tube to the type 33 pentode in short wave receivers for greater volume. Parts needed—1 UY sub-panel socket; 1 4-prong tube base; 1 small binding post. The UY tube socket is placed on the UX tube base with the prongs inside. Then leads are soldered to the corresponding leads on the tube base and soldered to the prongs as in the coils. The "C" lead goes to the binding post on the side of the UX tube base. Insulated tubing should be used over the leads. To change a set for a pentode output tube you simply plug in the adapter where the 230 tube was. Plug the 33 pentode into the UY socket in the adapter; bring the highest B plus lead to the socket on the adapter.—Paul Tabolinsky.

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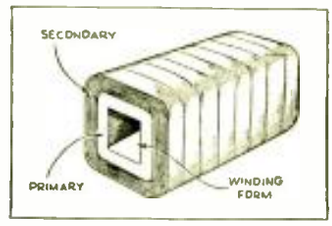
## MICROPHONE TRANSFORMER

In building my phone transmitter I found myself in need of a microphone transformer, and having a number of audio frequency transformers with "open" primaries, I proceeded to disassemble one to see what could be done. Following are details: Remove the primary by cutting it out with knife. Sometimes if care is exercised the winding form can be saved and a new one need not be made. Proceed to wind 200 turns of No. 30 enameled magnet wire on the form, placing a layer of paper between each layer of wire. Usually four layers of wire will do the job. When the coil is finished wrap enough wax paper around the coil to make it fit snugly when again placed inside the secondary. Assemble the core as before, connect secondary wires to same binding post, using care to get secondary hooked up as before. Attach the primary (the coil you made) to old primary posts, replace case and the job is done. The primary will now be the "microphone" input. By slipping the winding form over a wooden block and turning with a hand-drill it took fifteen minutes to wind the coil and an hour for the entire job.—Kenneth Hanifan.

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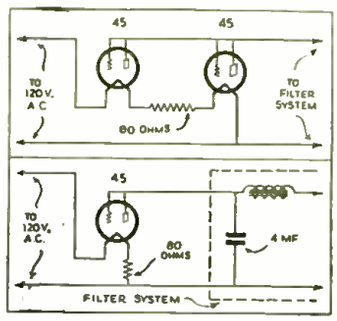
## A.C. TO D.C.

To convert A.C. to D.C. without the use of a power transformer, all that is needed is an 80 ohm resistor, which can be obtained from an old electric iron, or similar apparatus, which can always be found around the work bench. If greater current is needed, two or more tubes can be used with their filaments in series, and all the grids and plates shunted as shown in the diagram. Any three-element tube can be used in this circuit providing the resistor is altered to allow the correct current to pass through the filament. I have found 45's to have the advantage in current emission.



# SHORT WAVE SCOUTS

**Fourth "Trophy Cup" Winner—Fred Bente, Brooklyn, N. Y.**

● The editors are pleased to award the fourth *Scout Trophy Cup* to Mr. Fred Bente of Brooklyn, N. Y., who submitted the longest list of short-wave stations with the qualification of at least 50 per cent verifications (he has 60 per cent "veries", in fact).

Like one of the previous winners of the *Trophy Cup*, Mr. Bente used a standard broadcast receiver, in conjunction with a *short-wave converter*. This is quite a surprising fact, as many of short-wave fans do not seem to care so much for short-wave converters; but it seems that there is more behind the *converter* than has probably been dreamed of by many fans. Mr. Bente is to be congratulated on the very fine list of 60 stations which he heard.

Get busy, SHORT WAVE SCOUTS, and try and send us a longer list than those we have received up to the present time. With the hundreds of short-wave stations to be heard on the air in all parts of the world, the editors are daily expecting to receive a "log" containing at least a couple of hundred stations!

Many readers and "would be" entrants in the SHORT WAVE SCOUT "Trophy Contest" have written to the editors inquiring as to the exact 30-day period over which the list of stations is supposed to be compiled. We wish to mention that it is not essential that the list of stations shall be collected through the month preceding date of issue, but, on the contrary, the list of stations and verifications submitted may be for any given 30-day period. This will clear up any doubts in the minds of our readers, and will provide more time for the receipt of verification cards from "foreigns".

### "HONORABLE MENTION" Awards

**Herman Borchers, 234 Federal St., Greenfield, Mass. 56S; 29V.**
**Hobart W. Leonard, 26 Lindsey St., Dorchester, Mass. 34S; 21V.**
**Dick C. Overholt, 710 Clayton St., San Francisco, Calif. 34S; 17V.**
**John J. Hannigan, Jr., 331 Washington St., Norwood, Mass. 22S; 15V.**
**Clifton Smith, Jr., 409 E. Lane St., Shelbyville, Tenn. 14S; 7V.**
**Harold Hansen, Route 5, Box 169, S. Omaha, Nebr. 8S; 4V.**
**George Tuellman, Box 176, Bloomfield, Nebr. 8S; 4V.**

### THE FOLLOWING HAD LESS THAN 50% VERIS

**James L. Davis, 420 E. Henry St., Savannah, Ga. 26S; 12V.**
**J. J. Simpson, 159 88th Ave., Jamaica, L. I. 67S; 24V.**
**Sydney Mines, Box 25, Cape Breton, N. S., Can. 50S; 17V.**
**Samuel J. Emerson, 1097 Galewood Dr., Cleveland, Ohio. 59S; 23V.**

**S = Total Number Stations Submitted**
**V = Number of Verifications**

*Editor*, SHORT WAVE CRAFT:

Herewith you will find my list of stations which I would like to enter for the Scout Award.

I have followed all rules and ran my list from January 15, 1934, to February 15, 1934.

In three cases where verifications have not been received until this date, I enclosed old verifications as further proof.

My set consists of an 8-tube Atwater Kent No. 70 (broadcast) set and a 4-tube Pilot *short-wave converter*. Both sets are four years old and still have the *original* tubes! The aerial is a single wire on the roof, about 50 feet long. The contest which you are running is a wonderful thing and I want to thank all involved in it.

Hoping everything proves satisfactory to you, I am,

FRED BENTE,
687 E. 43rd St., Brooklyn, N. Y.

## FOURTH "TROPHY CUP" WINNER

Presented to
SHORT WAVE SCOUT
**Fred Bente**
Brooklyn, N. Y.

For his contribution toward the advancement of the art of Radio by

SHORT WAVE CRAFT
Magazine

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

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

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

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

### Fred Bente's "Trophy" Winning List

VE9HX—49.1; 1-15-34; Halifax, Nova Scotia; 6:00 to 12:00 M.
W8XAL—49.5; 1-15-34; Cincinnati, U. S. A.; 6:30 to 8:30 and 11:00 P.M. to 5:30 A.M.
YV3BC—48.7; 1-15-34; Caracas, Venezuela; 7:00 P.M.-11:00 P.M.
W8XK—48.86; 1-15-34; Pittsburgh, U. S. A.; 4:30 P.M.-12 M.
W2XE—49.02; 2-1-34; New York, U. S. A.; 6-11 P.M.
COC—49.8; 1-16-34; Havana, Cuba; 4-6 P.M.
DJC—49.8; 1-16-34; Zeesen, Germany; 8-10 P.M.
DJB—19.68; 1-24-34; Zeesen, Germany; 9-11 A.M.
W2XK—35; 1-18-34; New York, U. S. A.; 7-8 P.M.
W3XL—47; 1-19-34; New York, U. S. A.; Friday.
W3XAL—49; 1-20-34; New York, U. S. A.; Saturday.
W3XAL—16.8; 1-15-34; New York, U. S. A.; 10-12 A.M.
W9XAA—49.34; 1-21-34; Chicago, U. S. A.; Irregular.
HBL—31.3; 1-27-34; Geneva, Switz.; Saturday.
HBP—38.47; 2-10-34; Geneva, Switz.; Saturday.
HIX—49.5; 1-30-34; Santo Domingo; Tues., 8:10 P.M.
CT1AA—31.25; 1-26-34; Lisbon, Portugal; Fri., 4:30 to 7 P.M.
GCW—30.5; 1-22-34; Rugby, England.
GSF—19.82; 1-24-34; London, England; 8-10 A.M. Heard.
GSE—25.28; 1-20-34; London, England; 7-9 A.M. Heard.
GSD—25.53; 1-15-34; London, England; 1-2 P.M. Heard.
GSB—31.4; 1-15-34; London, England; 12 Noon to 1 P.M. Heard.
GSA—49.59; 1-16-34; London, England; 6-8 P.M. Heard.
W2XAF—31.4; 1-18-34; Schenectady, U. S. A.
EAQ—30.4; 1-18-34; Madrid, Spain; 5:30-7:30 P.M.
KNRA—45; 1-26-34; 7:15 P.M.
HJ4ABE—50.6; 1-23-34; Medellin, Colombia, S. A.; 7-11 P.M.
LSN—30.3; 1-23-34; Buenos Aires, Argentina, S. A.; 5-6 P.M.

*(Continued on page 120)*

# SHORT WAVES and

## He Likes "Underground" Aerials


**A real "live" Ham station that handles plenty of traffic, is that owned by Max Otto at Iowa City, Ia.—Call W9LFF.**

*Editor*, SHORT WAVE CRAFT:

Here is a description of my experience with an *underground antenna*.

I am using both the standard *overhead doublet* with the transposed leads and an *underground doublet* of the same type.

The overhead antenna is 47 feet long (each side of the leads) and the underground is 20 feet. The leads to the overhead are about 38 feet and run almost vertical, while the underground leads are only about 15 feet long. I have been using this system for about 2 months now and find some peculiarities on all bands.

I use a Scott All-Wave DeLuxe and so the antenna are connected to the primary of the Scott tuner. A double-pole, double-throw switch gives me a chance to cut over from one to the other.

This is what I find: Of course the length of the antenna has a lot to do with the results, but I think that this will give a very good idea of what can be expected. On the 16 meter band I can find no noticeable difference as yet (by this I mean time of year), but it may in the Spring. The 19 meter band is very good on both, but there is lots less interference of all kinds, both man-made and natural and the tuning is much sharper. I have a lot of trouble here with a C.W. station that cuts DJB's signal very badly at times, but the underground antenna has overcome this. I might say that both antenna run east and west. The 25-meter band is best on the overhead so that is all here. I believe that the length of wire has a lot to do with this. The 30-31 meter band is very odd; some stations come in better on one and some on the other. For instance, EAQ has a decided "quiver" to the signal on the overhead, while on the underground *it is as clear as a bell* and comes in with as much strength as W8XK or any of the locals. On this same band GSB and GSC are both very poor on the underground but come in very good on the overhead. Going up to the 48-meter band

(*Continued on page* 105)

## W9LFF—A "Live" Iowa "Ham" Station

W9LFF is the station of Max Otto at Iowa City, Iowa. This station has been in operation since April 25th, 1933, when it went on the air with a phone outfit on 1,970 kilocycles. Due to the lack of power on May 7th the frequency was shifted to 3,537 kilocycles. The transmitter is a single UX 210 tube in a tuned-plate, tuned-grid circuit with five hundred volts on the plate, derived from a power supply under the table. The receiver, which is on the right side of the table, is a National SW-3, which is run by a "B" eliminator. The transmitter on the left side of the table is a single UX 210 tube in a Hartley circuit, which is operated on 14,140 kilocycles. The power for this rig is obtained by means of a cable that goes up behind the transmitter shelf and plugs into the tube socket. In this way the same meter serves for both transmitters. The big meter is a 0 to 300 milliammeter, and is connected in the plate circuit. The smaller one is a 0 to 100 milliammeter, which is in the grid circuit. The control dials are tapped so that nothing in the way of a shock can shift the frequency. The switch on the right edge of the table changes the antenna from the receiver to the transmitter. The antenna used is a 132 foot, voltage-fed radiation system.

The station is on every morning, noon and night on 3,537 kc., but Sunday afternoons when transmissions take place on 14,140 kc. The station has made 817 "contacts", and has been "logged" in Peru and San Domingo.

The station keeps a few "skeds" but always has time for more. Any one wishing to make schedules to handle "traffic", please drop a card to Max Otto, 824 North Gilbert Street, Iowa City, Iowa.

(*"F.B." Max—Keep up the good work. —Editor.*)

1 Year's Subscription to
SHORT WAVE CRAFT
F R E E
for the "best" STATION PHOTO.

Closing date for each contest—60 days preceding date of issue; June 1 for August issue, etc. The editors will act as judges and their opinions will be final. In the event of a tie, a subscription will be given to each contestant so tying.

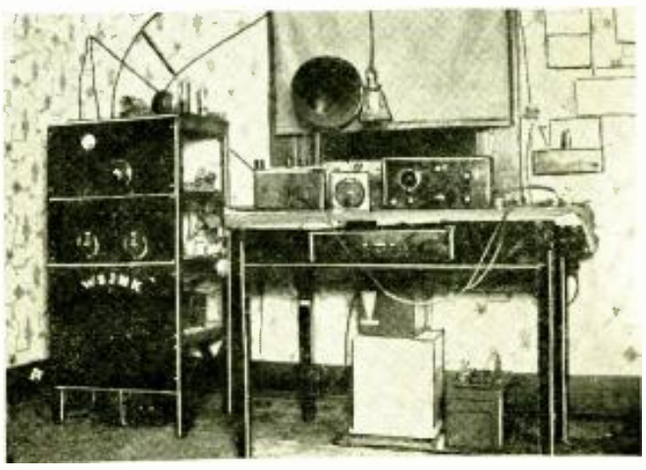
## W8JNK Will Welcome Visitors—Hi!

*Editor*, SHORT WAVE CRAFT:

I am an ardent reader of your magazine and always read the S.W. Fan's Department. You asked for photos of "Ham" layouts—here's mine. I will describe it for the benefit of future *hams* who happen now to be S-W *listeners*. The transmitter is C.C. using a 47 osc., the doubler stage uses a 46 tube and may be neutralized for operation as a buffer for 3.55 m.c. band. The final amplifier is a pair of 46's in parallel with about 35 watts input. I use variable condenser excitation to all stages. This transmitter has worked all U. S. districts, including 35 states, CM1 and HC1 with an R7 report in all districts excepting CM1 using 17 watts input. The antenna is a 66 foot flat-top, Zeppelin. The receiver is home-made, using a 201A det., 201A audio and 212A last audio; regeneration control being of the resistance regulated type. I wish SHORT WAVE CRAFT every success—let's see some of those visiting "hams" and "listeners". All S.W. enthusiasts are very cordially invited to visit and inspect W8JNK.

WALTER KING, W8JNK,
17½ Parkway,
Niles, Mich.

(*Thanks for the "invite"—Walter. If we or any of our friends get out Niles way, we'll sure look you up, W8JNK. Editor.*)




**When you are out Niles, Michigan, way, drop in on W8JNK, owned and operated by Walter King.**

# LONG RAVES . . . OUR READERS' FORUM

## W6DJI Has C.W., Phone and Everything!

*Editor*, SHORT WAVE CRAFT:

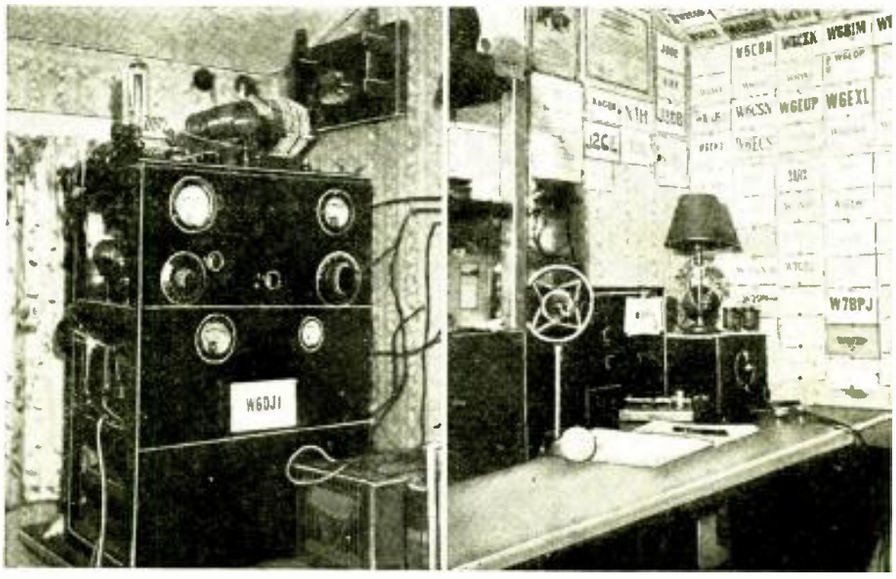
In answer to your call for more station photos, I am sending you two pictures of my "shack," the transmitter (C.W.) and the receiver. I also have a 160-meter fone "rig," but could not get it in the picture. The C.W. transmitter operates on 7128 kc. and consists of a '47 xtal (crystal) oscillator, '47 doubler, 210 buffer, and a W.E. 211D in the final with 275 watts input. It is entirely home-made and sure works fine. The DX so far is J1, J2, J3, J5, K6-7, X1, X29, XU1, V56, AU1, OM1, VE3, 4, 5, 9, All W's., VP4.—R. E. R. A. (ship off the coast of Africa) Report R6, and also have been reported heard by VK stations, but so far no QSO's have been made. The antenna is a Zep type with 33-ft. feeders.

The 160 meter fone "rig" is a type '47 xtal oscillator and a 210 final amplifier modulated by two 250's in parallel, and two stages of speech—'27 into '47. Universal D.B. (double-button) "mike" type X.

The receiver, as you can see, is a National S.W. 3.

I have been taking SHORT WAVE CRAFT for over a year now, and would never be without it. Let's have more fiction stories, they sure take the cake—Hi!

(*Continued on page* 105)




**A "humdinger" of a station—this grand layout is owned and operated by John Wendt—Call W6DJI.**

## Our Sets the "Berries"


*Editor*, SHORT WAVE CRAFT:

I have been a reader of SHORT WAVE CRAFT ever since you have been publishing it. I can not wait until the issues are off press to see them.

I have built five of the sets from the plans that the boys send in to SHORT WAVE CRAFT and "*they are the berries.*" But of all the sets that you have published, I find that the ALLEN prize-winner beats them all.

I have received programs from a great many European stations, including the following:

EAQ, Madrid Spain;
VK3ME, Melbourne, Australia;
DJD, Zeesen, Germany;
GBW, Daventry, England.

I also get "Ham" stations from all over the globe.

The following is a description of the sets that I use. The one on the left is a 2 tube GLOBE-TROTTER; this works fine. The set on the right is a three-tube ALLEN. This works better than any of the others that I have built as yet. The one inside the cabinet is my "old faithful"—it has three tubes—35 Det., 27 and 45 output. The power supply on the right supplies the set in the cabinet.

(*Continued on page* 105)

**Left — Efficient short-wave "Listening" station operated by Cecil Hinkley, at Binghamton, N. Y. One of the sets is a 2-tube "Globe - Trotter," built after our plans.**

### UTICA, N. Y., FAN GETS "DX" ON OUR RECEIVERS

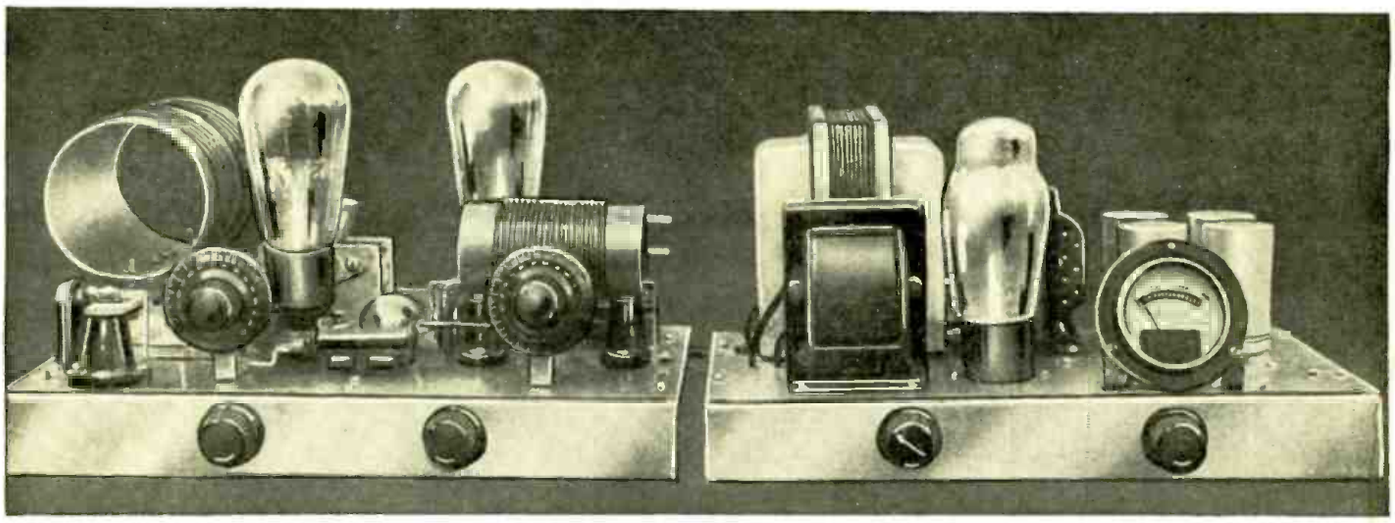
*Editor*, SHORT WAVE CRAFT:

The accompanying picture shows my short wave listening station; the two receivers shown on the table were constructed from descriptions published in SHORT WAVE CRAFT. Very good DX results have been obtained. The two receivers shown are unshielded, as may be seen, but very good results have been obtained without shielding. The source of "B" supply is shown in the background.

JOHN J. C. DEPAOLIS,
1220 Kemble Street,
Utica, N. Y.

**WANTED ! !**
**More "Good" Station Photos**
**Don't Forget to pose yourself in the photo or send separate one with station photo.**


**Youthful John J. C. De Paolis has had some very interesting results with these two receivers, built from articles appearing in this magazine.**



Low-power crystal controlled M.O.P.A. with its power supply.

# Transmitter and Power-Pack

## Of 12 Watts Output for Less Than $30.00

**By Curtis E. Malsberger**

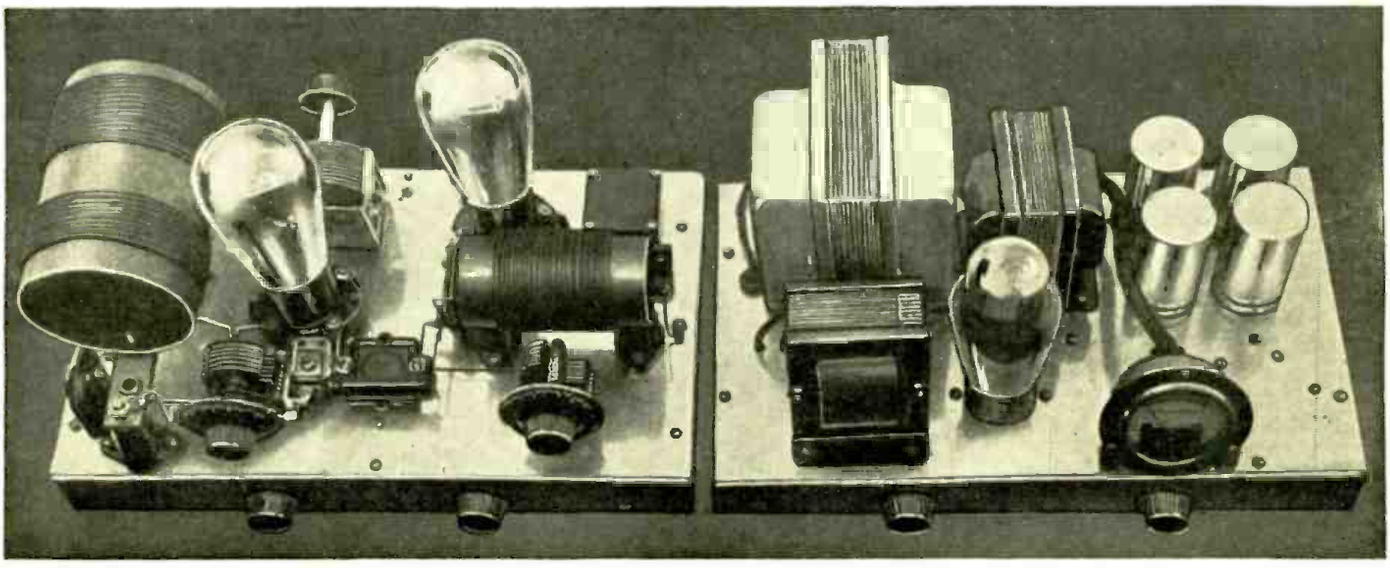
This transmitter presented by Mr. Malsberger has crystal-control and conforms with the Government requirements. When operated in conjunction with an efficient antenna system it is possible to cover long distances with this little set, which is composed entirely of receiving parts.

● MUCH has been written on the design and construction of transmitting equipment during the past year or two but the writer believes that the outfit here described will provide greater efficiency per dollar than any that he has so far tried. It is simple, effective, neat and very economical to build, and will produce nearly 12 watts output to the antenna. Also it is very versatile, having been built in such a way that it is easily possible to add, at a later date, other amplifiers to increase the power output. In addition to these advantages there is still another—due to the simplified construction it is comparatively easy to modulate the final amplifier should it be desired to operate on the 80 meter phone band. Being crystal controlled this transmitter will prove very efficient for that purpose.

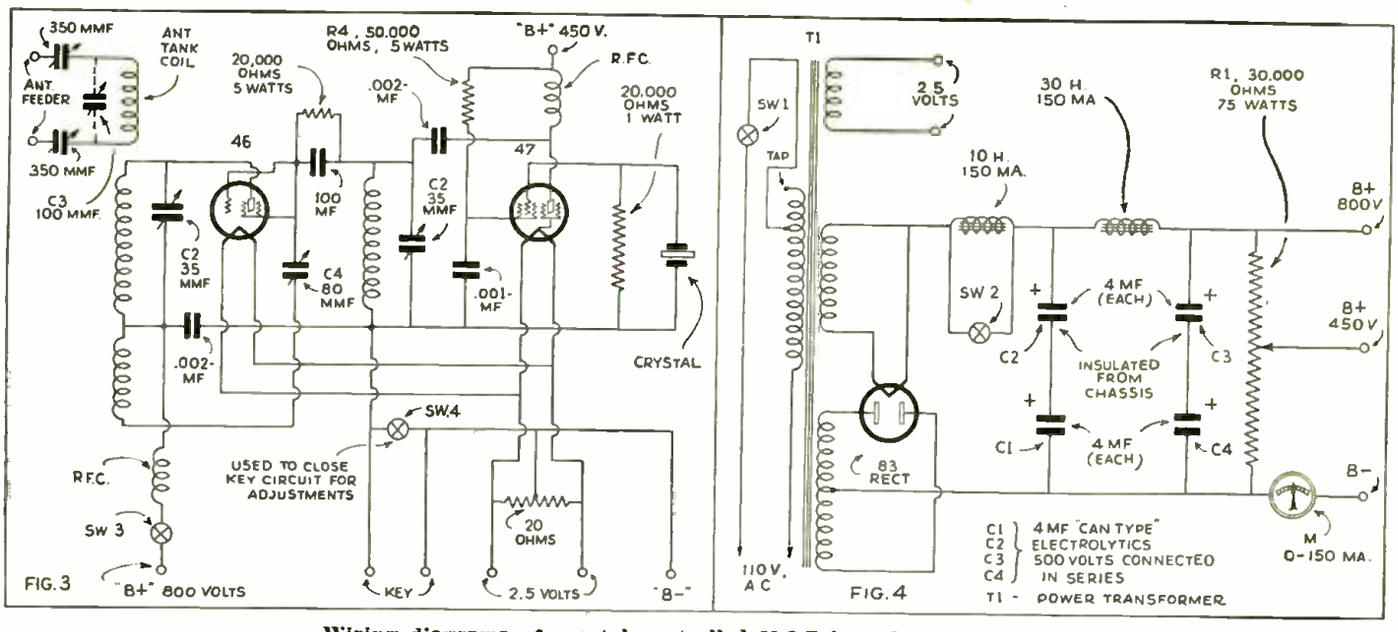
### Layout of Parts

A study of photos 1 and 2 will reveal the utter simplicity of the layout of both units, while the schematic diagram given in figure 3 will show the circuit employed in the transmitter proper. As will be seen the oscillator stage consists of the type 47 tube and is crystal controlled. The oscillator is coupled capacitively directly into the grid circuit of the amplifier stage which consists of the 46 type tube and its associate apparatus.

While it is not necessary to follow the exact layout as given in the photographs the writer has had such surprisingly good results from this system that close adherence to the original is advised. It is true that the aluminum is more difficult to work than the more common bread-board style of mounting, but the efficiency and neatness of the finished product more than compensates for the additional amount of work necessary. As will be noticed the transmitter and the power supply have both



Top view, showing how the various parts are mounted in the Malsberger transmitter.




**Wiring diagrams of crystal controlled M.O.P.A. and power supply.**

been built on sub-panels of the same size, i.e., 7 by 12 inches. The writer has also built a receiver on a similar base and a very efficient and business-like station is the result of this small amount of additional work required.

In figure 1 it will be seen that the oscillator occupies the right-hand half of the transmitter sub-panel. The crystal mounting is placed in the extreme right-hand corner at the rear of the chassis and the socket for the type 247 tube is placed slightly to the left and in front of this mounting. Immediately in front of this tube socket will be found the oscillator plate tank coil and its associate tuning condenser (a seven plate midget type having a maximum value of .000035 mfd.) $C_2$.

Just to the right of this oscillator tank coil is placed the socket for the type 46 amplifier tube, and directly in front of this socket is another midget condenser of the same size as that used in the oscillator tank circuit. This condenser is used to tune the tank circuit of the amplifier tube ($C_2$).

Along the extreme left-hand edge of the sub-panel is placed the amplifier plate coil, and mounted on the same plug-in strip we have the antenna tank coil. Along the rear edge of the chassis and just behind the 46 tube socket will be found ($C_3$) the small 21 plate midget

(*Continued on page* 117)

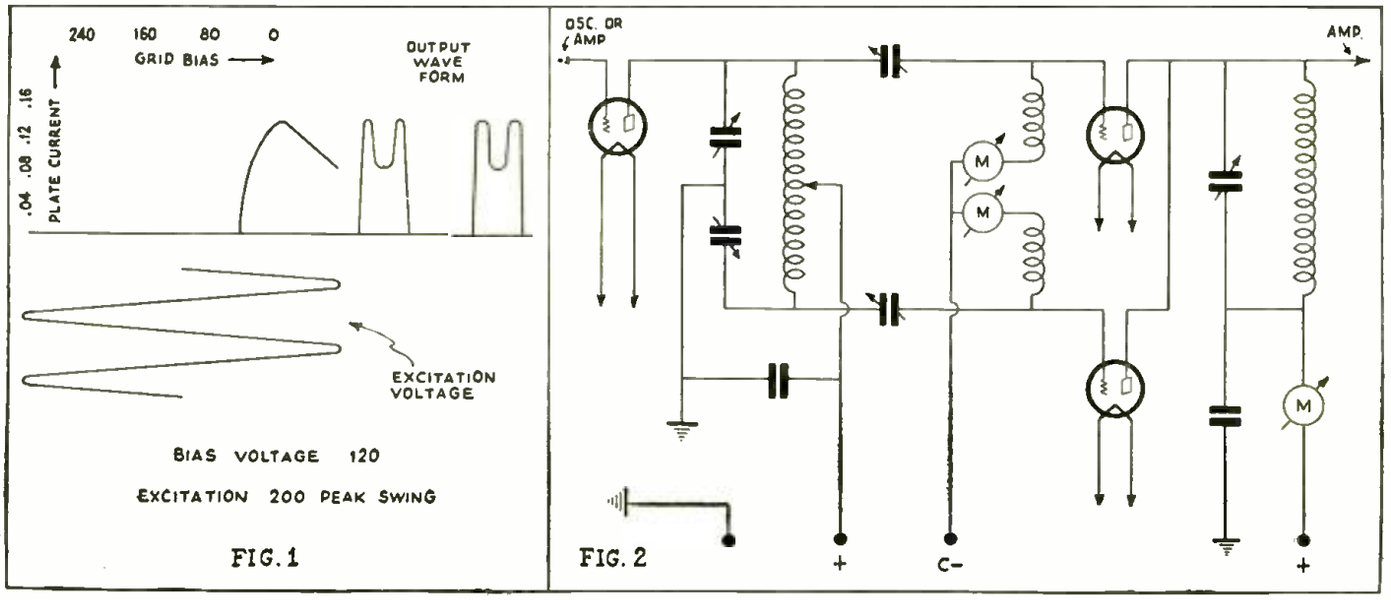
# Frequency Doubling in Theory and Practice

## By Edward W. Sanders W3AKU

● ANYONE operating a crystal-controlled transmitter finds it necessary to use one or more frequency doublers if the set is to use an 80 meter crystal and is to have output on the higher frequencies. The following discourse explains the workings of the doubler.

The main essentials for doubling are high negative grid bias and a large amount of excitation. The latter item may be met successfully by making the driver tube of the same rating as the doubler. This is considered excellent practice. The bias on the doubler must be considerably more than that required for complete cut-off of plate current. Cut-off for triodes may be easily found by dividing the plate voltage by the amplification factor (mu). There must be sufficient excitation so that plate saturation may be obtained. A few words in explanation of saturation may not be amiss at this point. As the excitation voltage increases and the grid is made more positive the plate current increases until after a certain point the plate current will decrease as the exci-

(*Continued on page* 113)



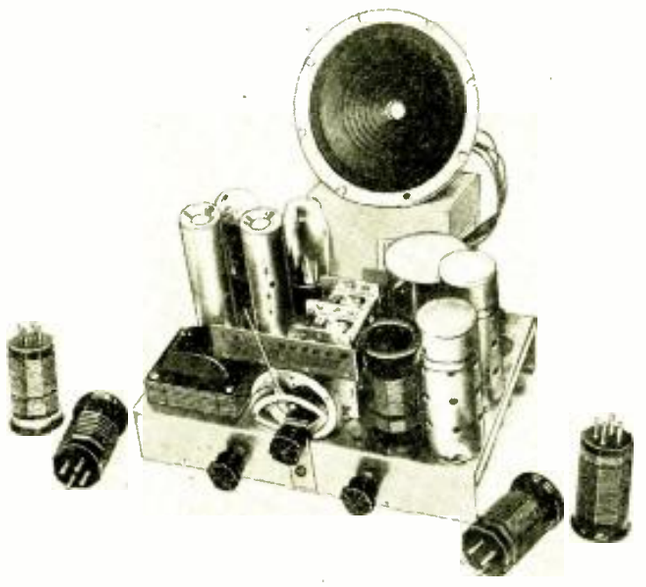

**Curves and diagram of frequency multiplier here described by Mr. Sanders.**

# The "RGH-4" ALL-WAVE Receiver

By ROBERT G. HERZOG, B.S., E.E.

$20.00 PRIZE WINNER

If you are looking for a "hot" short-wave receiver that hands out a "mighty wallop" on only three tubes—then, the "RGH-4" is the set that you have been looking for! It boasts an R.F. stage, a regenerative detector, and a "high-gain" audio stage—and it covers 16 to 550 meters!



Complete "RGH-4" chassis and loud speaker, together with plug-in coils. Boy, what a wallop this set develops! And it uses but four tubes, including the rectifier.

● THE RGH-4 has been designed to please the novice whose desire it is to build a very simple and inexpensive all-wave receiver. With the exception of the speaker and tubes the complete parts for the RGH-4 can be purchased for less than ten dollars. This fact alone, to say nothing of its exceptional performance should make the RGH-4 popular among beginners in the short-wave field.

The RGH-4 circuit is of the regenerative type using a variable-MU R.F. stage, a regenerative detector, feeding a single high-gain audio stage. To add to the simplicity the bias of the first stage may be fixed by grounding the return of the 350 ohm cathode resistor and eliminating the variable one. This will, however, cause the first stage to be operating at maximum sensitivity at all times, affecting the noise-level and selectivity somewhat on local stations. On distant stations it is always operated in this position, hence the control is necessary only where the RGH-4 is used as an all-wave receiver for local broadcasts.

### Plug-In Coils Used

Plug-in coils are used in the RGH-4, two of the same color for each band or five sets (ten coils) for the complete range from 16 to 550 meters. The coils are mounted near the tuning condenser on the chassis. The detector coil is placed under a shield to prevent any stray feed-back to the antenna stage which is unshielded. The detector plate is impedance coupled—necessarily so since the high plate impedance of the 58 detector eliminates the possibility of transformer coupling and the high value of the required load resistor in a theoretical resistance stage would not allow the proper effective voltage on the detector plate. The choke used in the stage is a high impedance one, with ample current carrying capacity.

Because of the high efficiency obtainable from the regenerative detector it is possible to obtain ample loud-speaker volume even on very weak foreign signals with only one stage of audio, so much so that it was found inadvisable to use more than this one stage. The bias for the 2A5 was taken from the speaker tap adding further to the economy and simplicity of the RGH-4.

### Assembling the Set

In assembling the RGH-4 stand all the parts around on the chassis, locating and drilling all the necessary holes that are not already drilled. This accomplished, mount all the parts using two small strips of bakelite for the resistors, as can be seen in the photograph. The one, near the 2A5 carries the 500,000 ohm, the 150.000 ohm and the 15,000 ohm half-watt resistors. The other strip near the detector carries the 4 megohm grid leak, the 100,000 ohm and the 250,000 one-watt resistors. The 350 ohm R.F. bias is covered with a rubber sleeve and its pigtails soldered in place

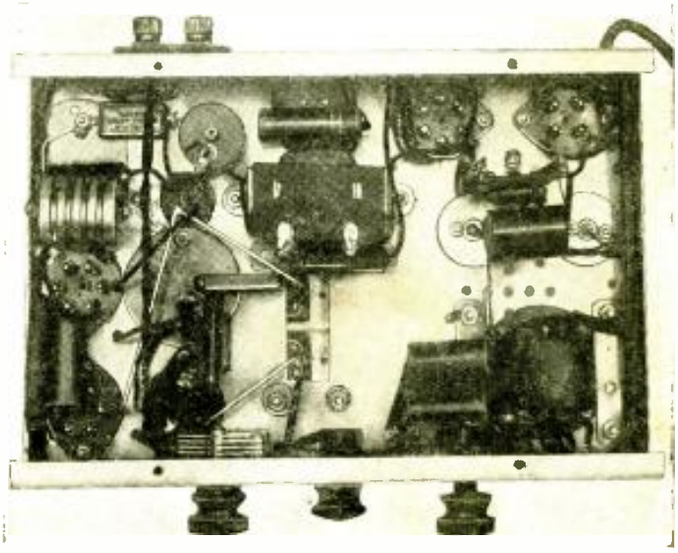
When the parts are all mounted the receiver is ready to be wired. The filament, screen, plate-returns and grid-returns, should be wired with No. 18 solid push-back wire and run around the edges of the chassis. This not only enhances the neatness of the receiver, but also allows the middle of the chassis to be clear for the more important wires and parts. The filament leads are twisted, the ground leads including the tuning condenser pigtails should be connected together as well as to the chassis. The audio stage is wired completely with No. 18 solid push-back wire. All the R.F. and detector grids and plate leads are wired directly from point-to-point with heavy bus bar. The lead to the caps of the R.F. and detector tube should be as short as possible with a No. 18 stranded wire.

Connect the by-pass condensers from point-to-point, the pigtails will serve to hold them in place. Mount the dial, connect the pilot-light to the 2.5 volt winding of the power transformer. Connect the line cord to the power transformer and switch. The RGH-4 should now be ready for testing. Check all connections carefully; make sure no pieces of solder are lodged where they may cause "shorts".

### Testing the Finished Set

After the receiver has been carefully checked, plug in the speaker and tubes; connect the antenna and ground to their posts, plug in the A.C line. You are now ready to tune in stations. Turn on the set and begin. No complicated alignment of the RGH-4 is necessary. When correctly wired it will "play" immediately.

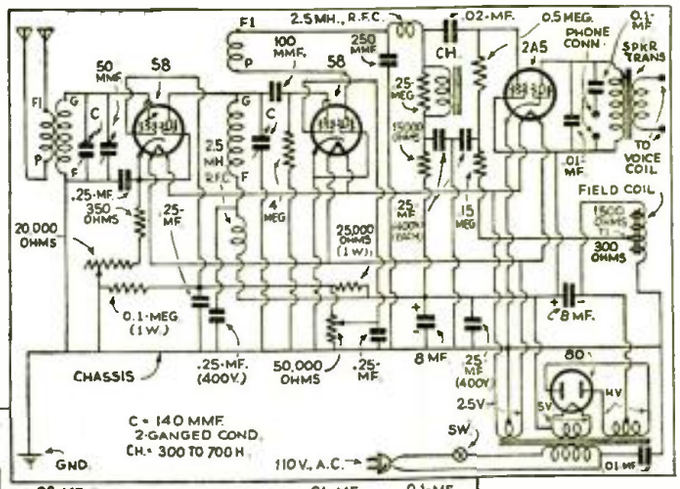
Select any frequency band, and use two coils of like color or "frequency rating". When the tubes are fully heated with

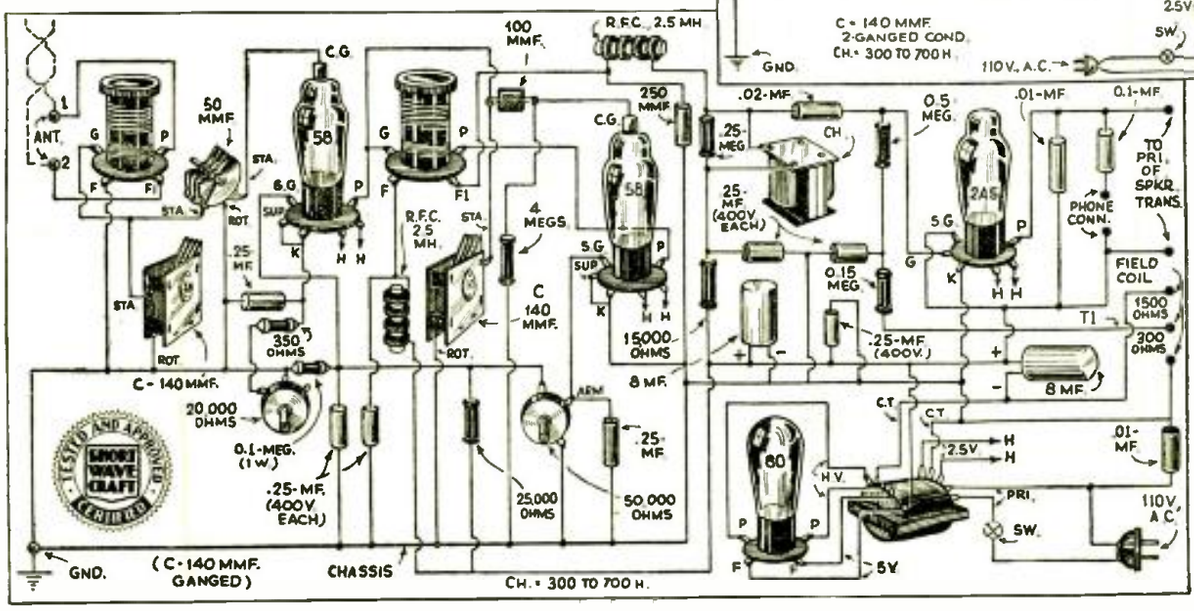


We award the "excellent wiring" Medal this month to Mr. Herzog, for the very neat workmanship exemplified on the "RGH-4".

the bias control of the R.F. stage (if one is used) turned clock-wise as far as it will go, turn the regeneration control clock-wise until a hissing sound is heard in the speaker. Rotate the tuning knob *very* slowly till a slight squeal is heard in the speaker; concentrate on this squeal rotating very slightly backwards and forwards until some signal is distinguishable—reducing somewhat, if necessary on the regeneration control. When a signal is distinguishable it can be brought out clear with the antenna compensating condenser.

Much can be said about tuning, but experience is the best teacher—the more distant a station the more elusive its signal. Yet Germany, France, Rome, Spain, Sweden to say nothing of South America and Canada have been tuned in repeatedly on the RGH-4. So, sandpaper your finger-tips and let's go!




**Above: Schematic wiring diagram of the "RGH-4" All-Wave Receiver here described by Mr. Herzog. The tubes and the circuit worked out by Mr. Herzog result in a very strong signal at the loud speaker. Of course, a sensitive, small-sized speaker is to be preferred for use with any set of this type. Left: Picture wiring diagram of the "RGH-4"—it uses but four tubes, one of which is the rectifier. The "RGH-4" can be built at a reasonable cost.**

## List of Parts for "RGH-4" All-Wave Receiver

### COILS

2 Sets (8 coils) Coils.
2 Bud 30 mh. R.F. Choke Coils.

### CONDENSERS

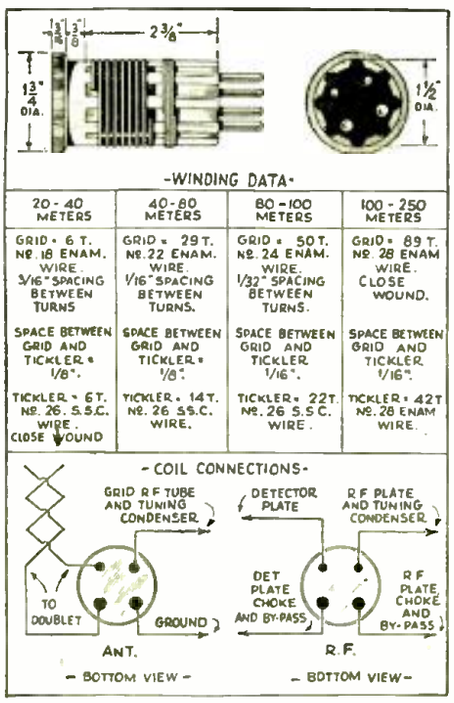
1 .00014 mf. two-gang tuning condenser.
1 .00005 mf. Hammarlund Midget Condenser.
2 8 mfd. 500 v. Electrolytic Condensers.
3 .25 mf. 400 v. Condensers.
4 .25 mf. 200 v. Condensers.
1 .02 mf. 400 v. Condenser.
3 .01 mf. 400 v. Condensers..
1 .0002 mf. Mica Condenser.
1 .0001 mf. Mica Condenser.

### RESISTANCES

1 50,000 ohm Variable Potentiometer with Switch.
1 100,000 ohm 1-watt Carbon Resistor.
1 25,000 ohm 1-watt Carbon Resistor.
1 4 meg. ½-watt Carbon Resistor.
1 500,000 ohm ½-watt Carbon Resistor.
1 250,000 ohm ½-watt Carbon Resistor.
1 150,000 ohm ½-watt Carbon Resistor.
1 15,000 ohm ½-watt Carbon Resistor.
1 350 ohm ½-watt Carbon Resistor.

### TRANSFORMERS

1 Power Transformer. Rating:
1 650 V. 60 Ma. HV Secondary
1 2.5 V. 5 A. Secondary
1 5 V. 2 A. Secondary.
1 110/190 V. Primary
1 300 henry Choke—3 Ma. capacity.
1 "RGH-4" Chassis.




**Coil winding data for the "RGH-4" is given above.**

1 Coil Shield.
2 58 Tube Shields.
5 Wafer Sockets.
1 5-prong Speaker Plug. .
2 4-prong Coil Sockets.
1 Dial-Escutcheon Plate and Light Bracket.
3 Knobs.
3 Binding Posts—Phone Posts.
1 1,800-ohm tapped Speaker, single pentode output.
1 Resistor Mounting Strip.
1 Line Cord and Plug.
1 Roll Birnbach Hook-up Wire No. 18.
1 Solder—Hardware.

Almost any kind of antenna can be used with this receiver as can be seen by glancing at the diagram. The antenna coil connections are left free on each end in order that an antenna having a two-wire feed system can be used. For antennas not having two-wire feed systems the point, P, will be connected to F on the secondary coil which is grounded. With two-wire feed systems, the antenna proper should be kept in the clear in order to derive full benefit from the feeders, which can be either parallel or transposed. In some cases an increase in signal strength can be obtained by inserting a .0005 m.f. variable condenser in series with one of the feeder wires Adjustment of the condenser will then tend to bring the antenna system nearer to resonance with the signal frequency.

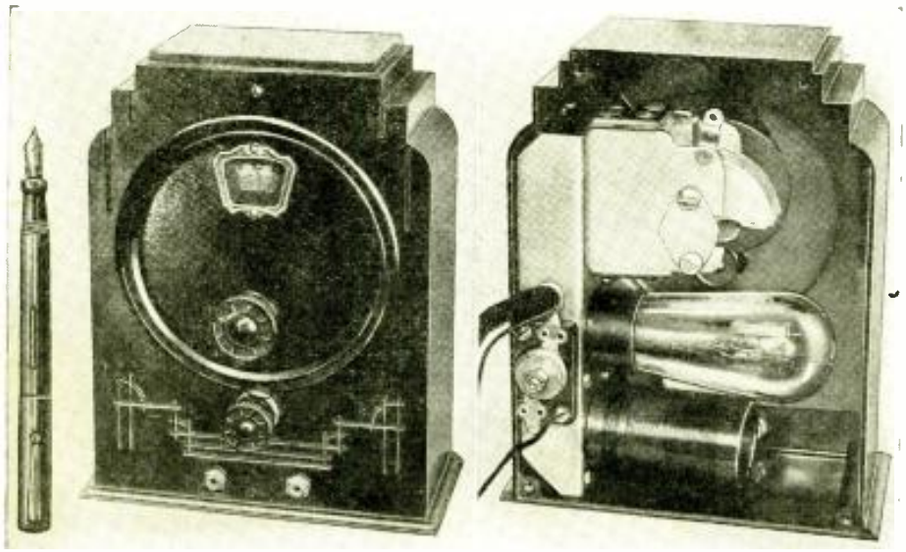
For those wishing to listen on the broadcast band above 250 meters the grid coil should have 122 turns of No. 30 enameled wire wound in a length of 1¾ inches. The tickler will have 32 turns of No. 34 wire, close-wound. Two of the above coils will be necessary.

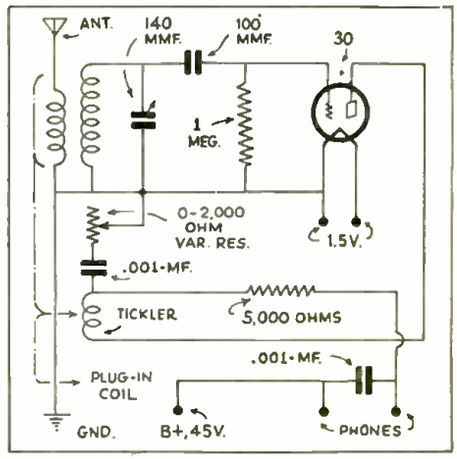
# WHAT'S NEW In Short-Wave Apparatus

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

## A New and Extremely Compact 1-Tube Receiver

**By ALEX G. HELLER***






**Photos at the left and diagram above show extremely compact 1-tube receiver of the very latest type. It is intended for head-phone reception. Its small size is indicated by the fountain pen. No. 164.**

● AFTER all, neat appearance is one of the outstanding factors when it comes to choosing a one-tube short-wave receiver and the Universal Mascot-1, here illustrated and which was recently developed by the I.C.A. engineers is a good example of compact, yet efficient design. The circuit used in this receiver is shown in the accompanying diagram and it is designed for a 30 type tube. One of the features is that not only are the usual four short-wave bands, from 16 to 217 meters, covered by four plug-in coils, but for those desiring it, there is also available an *ultra short-wave* coil covering the band from 9½ to 21 meters. Frequently the owner of a 1-tube set will also want to listen to the regular broadcast channels between 190 and 550 meters and to satisfy this requirement, the manufacturers have also made available at a very nominal cost extra broadcast band plug-in coils, the first coil covering the band between 90 and 310 meters and the second coil, the band between 300 and 550 meters.

A beautiful genuine bakelite case houses the 1-tube set, including the tuning coil and the tube. Phone tip jacks are mounted on the front panel, which is made of metal so as to eliminate any body capacity detuning effects. The parts used in assembling this set are of high quality and it tunes in surprisingly smooth manner. The set is supplied in kit form and can be assembled by the merest tyro—thanks to the clear instructions and diagram furnished with the kit.

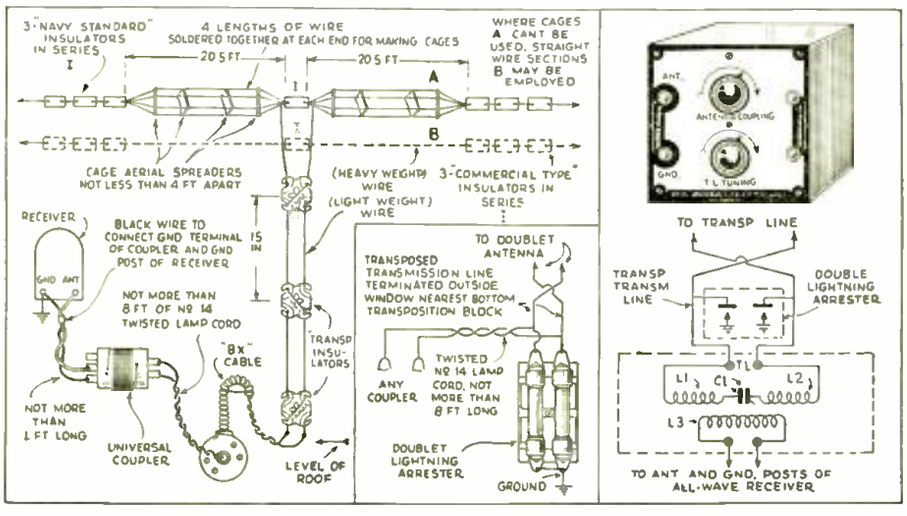
*Insuline Corp. of America.

## Latest Style in Short-Wave Antennas

● THE latest discovery of Arthur H. Lynch and his associated experts in the development of a super-efficient short-wave antenna, is shown in the accompanying illustration and involves the utilization of the Lynch type transposition lead-in, together with cages for the "flat top", the antenna currents being carried from the roof-level down in to the building where the set is located, by means of standard BX cable. Tests have shown that there is no noticeable loss in signal strength, even on wavelengths as short as 16 meters, when BX cable transmission lines as long as 250 feet have been used. Regular BX cable "outlet" boxes can be used, hooking up the flexible twisted lamp cord from the set to the coupler as shown in the diagram. Where the BX cable ends at the roof-level, the end of the cable is turned downward as shown, to prevent water entering it. Where cage-type, flat-top sections cannot be used, single straight wire sections are employed. A lightning arrester of the double-type should be connected to the lower ends of the transposed lead-in in any case. Another one of the illustrations shows the diagram and appearance of the finished Lynch DeLuxe Coupler, recommended for use in joining transposed lead-in feeders to "all-wave" receivers.

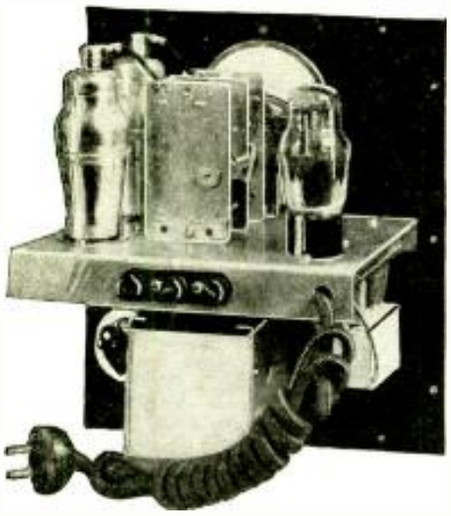
For private home installations it is better to use the transposed line all the way down to a point joint outside the window nearest the radio receiver. For apartment house installation, the transposed line is used between the antenna and the roof level and BX is used from that point to the receiver.

●




**Diagrams show the latest short-wave antenna construction, also lightning arrester connection and special coupler for connecting transposed lead-in to "all-wave" receivers. No. 165.**

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



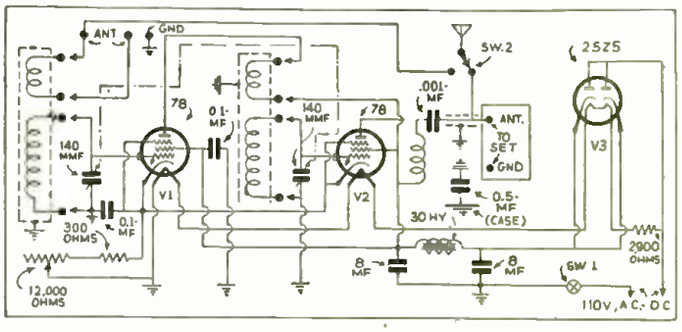
Rear chassis view of the new 2-stage Booster. No. 166.

# New 2-Stage BOOSTER

● ONE of the most interesting and versatile new units, is this Postal Booster. It provides two stages of tuned radio frequency, and can be added to anything from a one-tube receiver to a multi-tube superheterodyne for an increase in selectivity and sensitivity. A glance at the diagram will reveal that it is an A.C.-D.C. affair, using the 25Z5 tube as the rectifier. It has all the modern refinements, such as the *drawer-type* plug-in coils, and a handsomely finished cabinet, together with an airplane type tuning dial. There are no inconvenient or complicated connections to make between the "booster" and the main receiving set. The booster feeds directly into the antenna circuit of the set which it is to be used with, and the 110 volt line cord plugs directly into the usual power outlet connected with the house wiring system. Those experiencing *weak* signals or trouble from "image" interference on a superheterodyne, will find this unit a decided advantage. The signal to noise ratio will also be improved according to the sponsors of the booster. As we have said before, it is not only intended to be used with a superheterodyne receiver, it can be used with an ordinary regenerative detector and amplifier or tuned R.F. (T.R.F.) receiver to increase the sensitivity and selectivity enormously.

In fact, it could even be connected to a 1-tube battery receiver. The input connections are such on the booster that any type of present day short-wave antenna can be connected to it with no changes whatsoever. This unit provides a long sought radio frequency pre-amplifier, and should make many friends.

Above—Front view of the new Postal 2-stage R.F. Booster which can be used ahead of any receiver. Below—Wiring diagram of the Booster.




# The "Unimount-Twinplex"

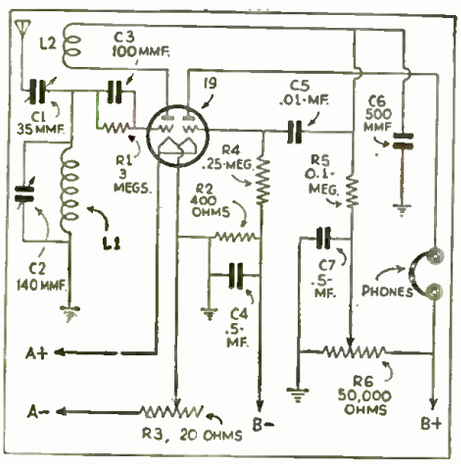
## By N. H. LESSEM *

● A REMARKABLE "2-tube" short-wave receiver built for less than $5.00. *That is the story of the Unimount Twinplex.* The circuit of this little set is by no means new, having been thoroughly described in the March, 1934, issue of this magazine. The writer built the "19" Twinplex by following that article. The results were splendid and so was the price—from the viewpoint of the radio dealer; for the author had spent $15.00 and some odd cents for the component parts.

It occurred to the writer that if this same receiver could be constructed at a price more compatible with "deflated" pocketbooks, literally thousands of short-wave fans would take advantage of its fine performance. So-o-o-o after wading through a maze of almost unintelligible figures and going into 16 brain-storms—the inexpensive *Unimount Twinplex* came into existence—the only *set of its kind in captivity!* The total expenditure was $4.95, not including the tube—quite a difference from the old price. And withal, a considerable number of improvements have been made from the standpoint of design. All component parts have been laid out with a view to *shortest possible leads;* and so religiously has this view been carried out that less than 10 inches—inches, not feet—of hook-up wire has been used in the wiring process!

Talk about R.F. losses, stray coupling, feed-back and other short-wave "headaches"—*this set has none of them.* Even if this set wanted to get out of order of its own volition, it could not possibly do so. All

(*Continued on page* 110)




Above — The "Unimount" Twinplex receiver rolled up a wonderful "log" during many tests. No. 167.

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Note the "single-piece" panel and sub-base used in assembling the "Unimount" Twinplex.

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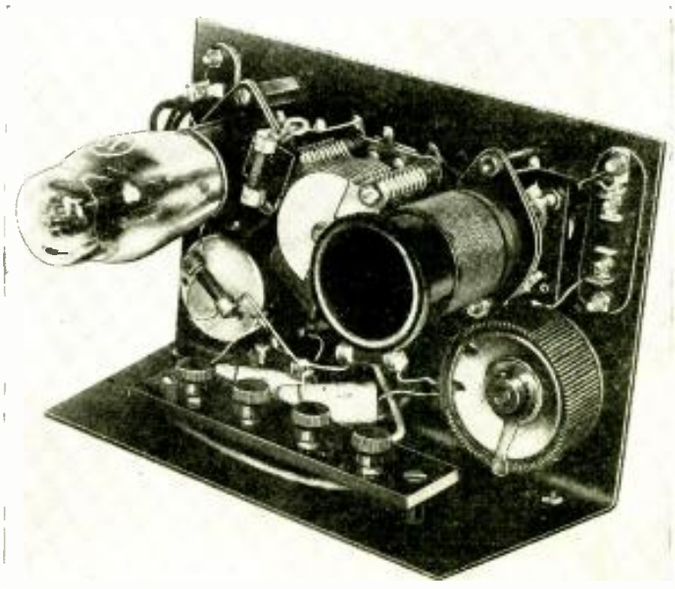
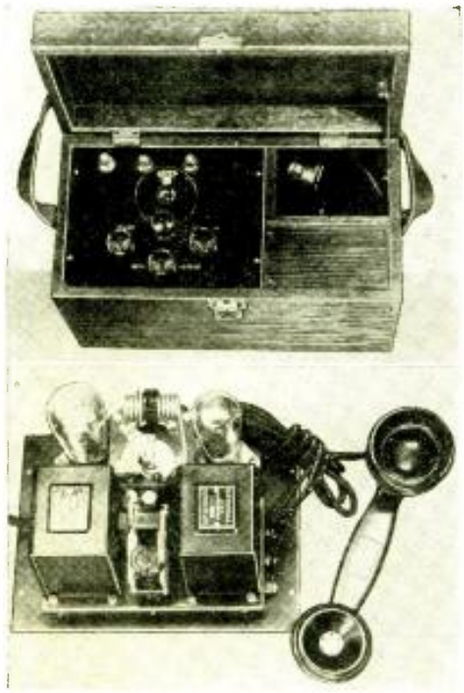


*Chief Radio Engineer, Radio Trading Co.

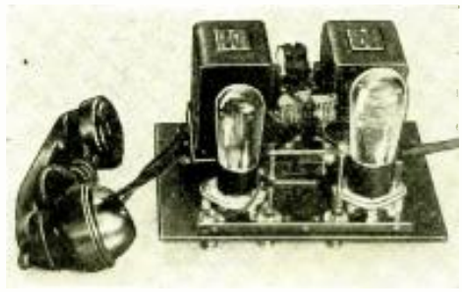
# New National 5-Meter Transceiver

● THE new National Transceiver is a compact, ultra high frequency, piece of apparatus which will permit *two-way* communication over fairly great distances in the 5 meter amateur band. It is intended for dry battery operation, two dry cells being used for the filament supply and "B" batteries for the plate supply. The tubes used are one type 30 and one type 33. A gang switch is used to change from transmitting to receiving. When in the receiving position, the switches arrange the various circuits so that the type 30 is a super-regenerative detector providing its own interruption frequency oscillations, and a type 33 as the pentode audio amplifier. In the transmitting position, the 30 becomes the radio frequency generating oscillator, and the 33 provides the necessary modulation, in order that the voice frequencies may be imposed upon the carrier waves. Glancing at the wiring diagram, the use of the various switches can be easily determined. One switch changes the value of the grid-leak in the type 30 oscillator circuit from 10,000 ohms to 100,000 ohms. The 10,000 ohm unit being used for transmission, while the 100,000 ohm resistor is used when the 30 is used as the super-regenerative detector. The switch that changes the 33 from audio amplifier to modulator connects the output of the detector into the grid circuit of the input transformer for reception. For transmission, the microphone is switched into the input circuit of the 33, the output of the 33 then being connected into the plate circuit of the 30, in order to obtain modulation.

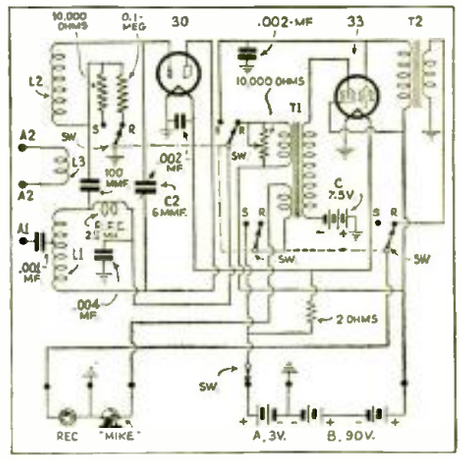
The entire transceiver is housed in a neat case with the various adjustments grouped on the front panel. This should provide an excellent means of experimental communication on the trips the short-wave amateur will be taking during the summer.



Two views of the new National 5-meter Transceiver.

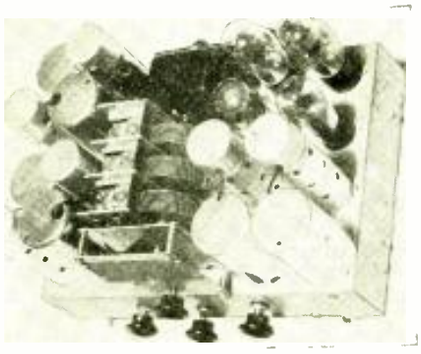


Rear view of the Transceiver chassis. No. 168.




Note the simple connections used in this new 5-meter Transceiver.

# The President Super-Ten



Appearance of the new "President Super-Ten".

The President Super-Ten 10-Tube Chassis represents a very fine piece of workmanship. Each and every set is tested before delivery. No. 169.

● THE President All-Wave Super-Ten receiver here illustrated is the latest set sponsored by the Norden-Hauck Radio Research Company. This 10-tube receiver tunes in all wave lengths in the broadcast and high frequency bands down to 15 meters. Some of the features incorporated in this set are full-range tone-control, 4-range full-vision dial, spot tuning, quiet automatic volume control, no plug-in coils to change, 10 inch dynamic speaker, and—finally, a sensitivity of 1 microvolt, according to the sponsors.

The chassis of this 10-tube superhet is very sturdily built and the parts are very accurately matched to each other, both electrically and mechanically. The tuning is exceptionally smooth, yet sharp, so that "local" stations do not interfere with the tuning in of "distant" ones. The controls are grouped in the center of the receiver, for ease in rapid tuning. The selectivity is less than 10 kc. separation, regardless of local interference. Good reception is obtainable between stations of approximately equal field strength on adjacent channels without distortion. The I.F. frequency employed is 456 kc. The set is carefully shielded throughout, according to the very latest engineering researches.

This set employs 10 tubes in the following line up: Electron coupled oscillator, using 57 tube; Tuned R.F. Stage, using 58 tube; First Detector and two Intermediates, using 58 tubes; Second Detector and Automatic Volume Control, using 55 tube; First Audio Stage using 56 tube, feeding into last Audio Stage, which is Push-Pull, employing two 2A5 tubes; Rectifier uses 80 full-wave tube.

Each one of these receivers is individually tested for day and night range by engineers. This receiver is available for 110 volt 60 or 25 cycles A.C.; or 220 volts, 60 cycles A.C.

**DON'T MISS NEXT ISSUE!**

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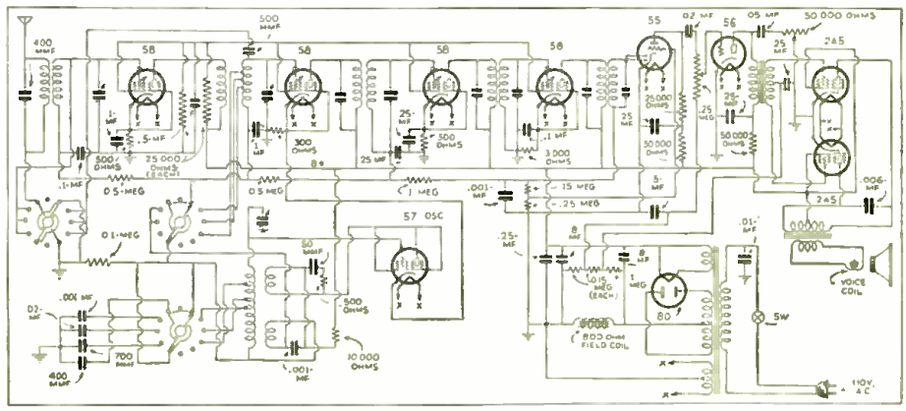
A new 2-Tube "Portable" for operation on 110 vts. A.C. or D.C. (also 6 volt battery) will be described by George W. Shuart, W2AMN.




Hook-up of the newest 10-tube "all-wave" chassis—the "President Super-Ten".

# The MAHCO International THREE

**This thoroughly shielded 3-tube short-wave receiver should make many friends—it employs the latest electron-coupled detector and the power supply is self-contained. It is supplied in kit form.**

**Front view of the "International 3" short-wave receiver No. 172.**

● IT is our purpose to present herewith a three tube short-wave receiver of modern design incorporating every possible desirable feature. The unit is designed with self-contained power supply which employs one type 80 tube as a rectifier. The actual set itself therefore consists of a detector and one stage of audio amplification.

The type 57 tube is used as a detector. This is an extremely sensitive tube, far superior to its predecessor, the 24. This marked sensitivity enables us to get plenty of volume with only one stage of audio amplification. The grid-leak type of detection is used to further increase the sensitivity of the detector stage and make it extremely sensitive to weak signals.

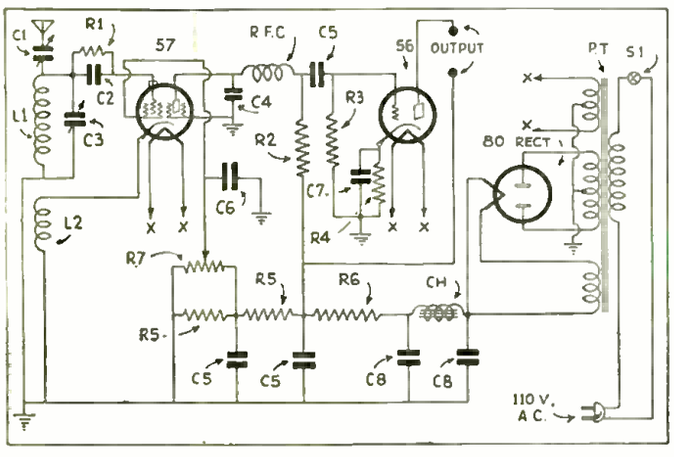
A type 56 tube was chosen as an audio amplifier. This is a high gain tube far superior to its predecessor the type 27. Although a larger tube could have been used to insure speaker volume, it was considered that this refinement would not be economical since it would necessitate the use of an output transformer. It will be found that the volume delivered by the 56 tube will be quite sufficient for speaker operation on many stations. However, it must be kept in mind that the set is designed primarily for headphone operation only.

### Electron-Coupled Detector Used

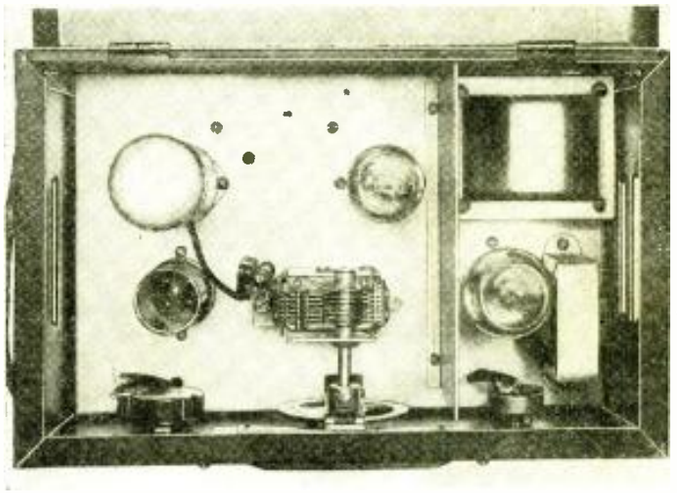
A signal can be no steadier than the detector tube in the set. Therefore, to obtain the utmost of stability, electron coupling is used in place of the usual method using a tickler coil in the plate circuit. In addition to insuring extreme stability, this arrangement also prevents "creeping" which is often blamed on the transmitting station. Especially designed Mahco coils are used. It should be noted that the windings of these units depart from the common "secondary" and "tickler" types. These coils are tuned with a special Mahco short wave condenser.

Various methods of regeneration control have been tried, but when using a screen-grid detector tube, the method of varying the screen voltage is much to be preferred. This method is much smoother than other methods and at the same time keeps detuning effects at a minimum.

The power supply is furnished as a self-contained unit completely shielded from the rest of the set by means of a metal partition. A special Mahco electro-statically shielded power transformer is used to keep stray fields and hum at a minimum. The type 80 rectifier tube, choke and filter condensers are also contained in this power supply section.




**Wiring diagram used in assembling the "International 3".**



**Top view showing tubes, coil, and tuning condenser.**

### Points to Watch in Wiring Set

The following points should be kept in mind when wiring the set. It is extremely important that all R.F. leads be kept as short as possible. This is especially important in the case of the grid lead from top of tube to tuning condenser and from tuning condenser to coil as well as the lead from the cathode of the detector tube to the F lug on the coil socket. It should also be noted that the small antenna condenser is mounted right on the grid lug of the coil socket and the R.F. choke is placed right at the plate of the detector tube. It will be found that all parts are so arranged that the above instructions may be easily and successfully carried out. It is also very important that all A.C. leads be twisted and kept as far as possible from all other leads. All leads shown in the diagram as running to ground should be fastened to the metal chassis at the nearest point.

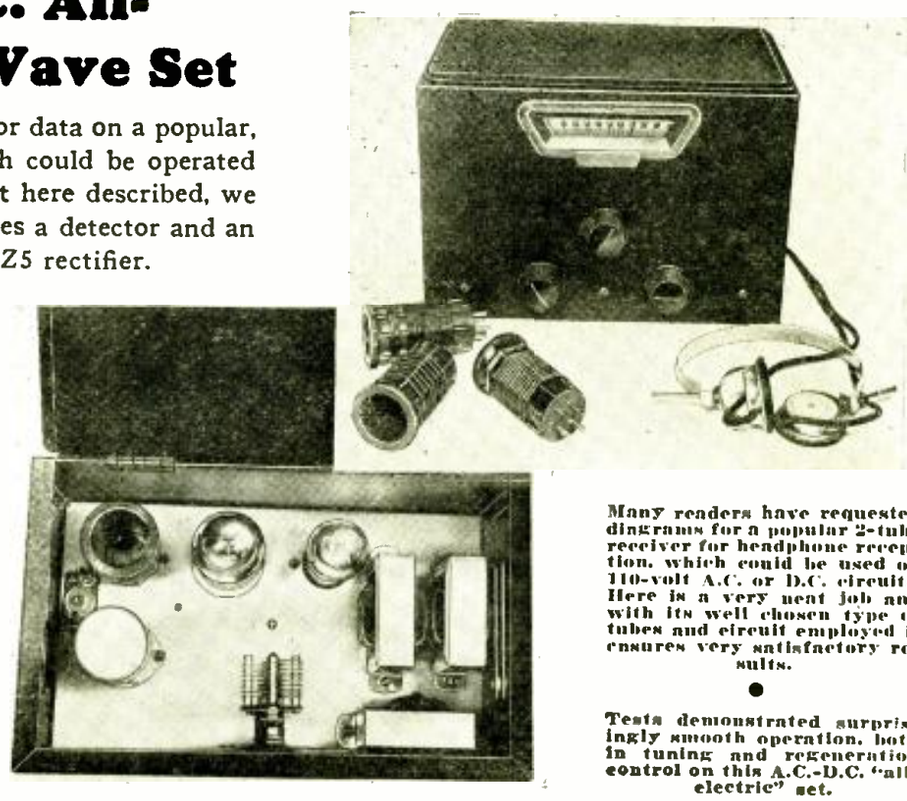
In wiring the set, it is suggested that the power transformer and all filament leads be connected first. The filament terminals of the 57 and 56 tubes should be connected by means of two twisted wires. The 2½ volt filament leads from the power transformer should then be twisted, cut to the right length and fastened to the filament terminals of the 56 tube where the above mentioned twisted pair terminated. (The 2½ volt leads from the transformer are the two thickest wires covered with sleeving.) The 5 volt leads from the transformer should then be twisted and run to the filament terminals of the rectifier tube socket. (The 5 volt leads are the smaller enamcled wires covered with sleeving.) The two high voltage leads should now be run to the other two terminals of the rectifier socket. (These are the black leads.)

The center taps of the 2½ volt and high voltage windings should now be grounded on the metal chassis at some nearby convenient point. All ground connections of this type can be made to soldering lugs fastened to some nearby mounting screw. The only two remaining leads from the transformer (the green color leads) are the primary leads. One of these should be run to one side of the A.C. switch and the other to one side of the A.C. cord

(*Continued on page* 120).

# An A.C. - D.C. All-Electric Short-Wave Set

**There have been frequent demands for data on a popular, small-size, short-wave receiver which could be operated on 110 volts A.C. or D.C. In the set here described, we have the "answer". The set comprises a detector and an A.F. amplifier and uses a 25Z5 rectifier.**



Many readers have requested diagrams for a popular 2-tube receiver for headphone reception, which could be used on 110-volt A.C. or D.C. circuits. Here is a very neat job and with its well chosen type of tubes and circuit employed it ensures very satisfactory results.

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Tests demonstrated surprisingly smooth operation, both in tuning and regeneration control on this A.C.-D.C. "all-electric" set.

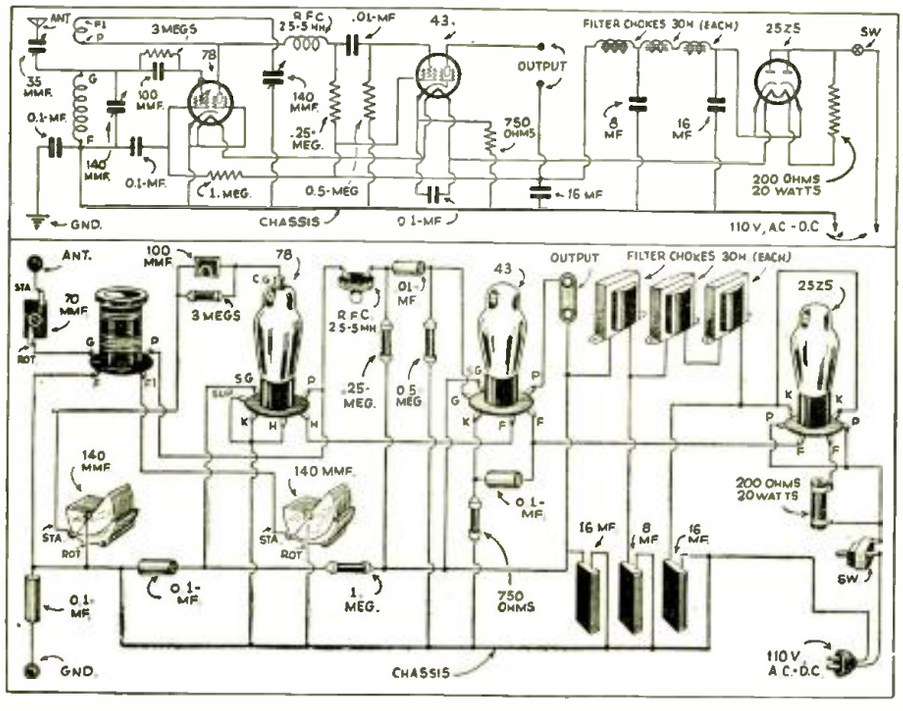
● FOR those wishing to construct a compact, all-electric, short-wave receiver, this A.C.-D.C. short-wave set should meet their requirements. Sets of this type can be built very compactly due to the few parts necessary for the power supply. Of course, the 6.3 volt tubes are necessary. This set uses a 78 regenerative detector which is resistance coupled to a type 43 audio amplifier. In A.C.-D.C. receivers, the maximum plate voltage on tubes is approximately that of the line voltage, which means that the tubes have from 110 to 120 volts. Surprising as it may seem, with this comparatively low plate voltage, this receiver is capable of producing enormous volume on the average short-wave broadcast stations. In fact, there is nearly enough volume to operate a loud speaker.

The power supply uses a 25Z5 in a half-wave rectifier circuit, filtered by two 16 mf. and one 8 mf. electrolytic condensers, together with three choke coils. The choke coils should have fairly high inductances, at least 30 henries each, in order to render the receiver free from hum.

Half-wave rectification is much harder to filter than the average all-wave system used in the A.C. set. The filaments of the 78 and 43 tubes are connected in series with the 25Z5 filament; a 200 ohm, 20 watt resistor is used to reduce the line voltage to a value providing the proper filament voltages for the various tubes. Little need be said regarding the layout of this receiver as the builder will probably follow some of his own particular rules or lay it out to fit a handy chassis or cabinet. Standard plug-in coils are used and are tuned with a .00014 mf. condenser. Regeneration is controlled with a .00014 mf. condenser and, with the screen grid voltage provided by the 1 megohm dropping resistor, allows very smooth regeneration control.

A word of caution: Don't connect the chassis or the negative side of the circuit directly to ground. If a ground connection is used it should he connected through a .01 mf. condenser, which should have a working voltage of at least 300 volts in order that fair margin of safety will be maintained. The antenna to be used with this set can be any single wire affair from 75 to 100 feet in length and mounted well up in the clearing and away from surrounding objects. The 35 mmf. antenna coupling condenser will need an occasional adjustment if the coils are changed.

Tuning the receiver is exactly the same as for many of the sets we have previously described. The most important point to remember is that patience and care are necessary in order to obtain the full benefits of a good receiver.




The diagram many readers have been requesting—a 110-volt A.C. or D.C. Universal Short-Wave Receiver of the 2-tube type.

## LIST OF PARTS

1 Black Crackled Finished, Hinged Shield Can. Try-Mo.
1 Base, Drilled and Punched. Try-Mo.
1 Slow-Motion Vernier Full-Vision Tuning Dial.
1 78 Socket. Na-Ald.
1 43 Socket. Na-Ald.
1 25Z5 Socket. Na-Ald.
1 Coil Socket. Na-Ald.
2 Tube Shields. Hammarlund.
3 Special Filter Chokes. 30 Henry.
1 Special 40 mf. Condenser. (Three Sections—16, 16 and 8 mf.)
1 R.F. Choke. 2.5 to 5 Mh. (Hammarlund).
1 750 ohm Resistor. Lynch.
1 250,000 ohm Resistor. Lynch.
1 500,000 ohm Resistor. Lynch.
1 200 ohm. 20 watt Resistor. Try-Mo.
1 set of 4 pin Plug-in Coils (15-200 meters). (Bruno). (Gen.-Win., I.C.A.
1 .01 mf. Condenser. Polymet.
1 .0001 mf. Fixed Mica Condenser. Polymet.
3 .1 mf. Condensers. Polymet.
1 35 mmf. Antenna Series Condenser.
1 Antenna and Ground Binding Post. I. C. A.
1 Output Binding Post. I.C.A.
1 78 Tube. R.C.A. Radiotron (Arco.).
1 43 Tube. R.C.A. Radiotron. (Arco.).
1 25Z5 Tube. R.C.A. Radiotron. (Arco.).

# "Jiffy-3" Easy to Assemble

BY LEONARD J. VICTOR.

Rear view of the "Jiffy 3" which features "simplified" wiring.

● THERE is an old adage, "The simplest things are often the best." This is particularly true of receivers for short-wave reception. In S-W work the primary essentials are a high degree of sensitivity and extremely low back-ground noise level. These things can be obtained in two ways: either by the use of a large, expensive multi-tube receiver, with suitable means for controlling the sensitivity, or by the use of a simple circuit operated at highest efficiency, and carefully engineered to maintain noise at the lowest possible level.

In designing this set, the engineers have carefully considered every aspect of the situation, and the net result is a receiver which performs remarkably well, and will bring in practically anything on the air when reception conditions are satisfactory.

In the "Jiffy-3" battery supply is as cheap if not cheaper than A.C. operation would be. Operation is highly economical, inasmuch as the set draws an over-all filament current of only .18 ampere. With this slight drain, a pair of 1½ volt "A" cells will last a year or more under normal operation. The "B" drain is only a few milliamperes, and a block of the smallest size "B" batteries should last a year and a half.

The Detector: With the decision made that smooth battery operation would be the most advisable, the type of tube to be used as the detector came under discussion. After much experimental work, and delving into records of previous experience, the two volt screen-grid type 32 tube was decided on. This tube has extremely high gain, and introduces practically no noise in the circuit.

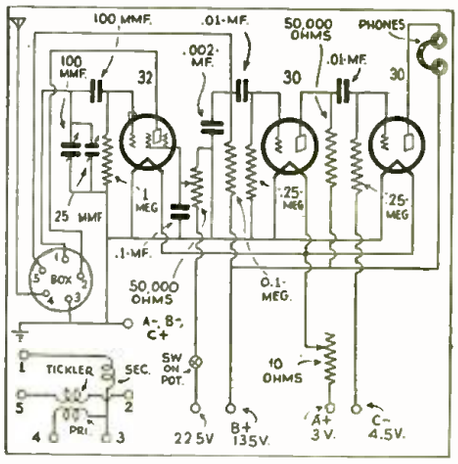
The standard, tried and true regenerative circuit is used, with no tricks or gadgets added to cause trouble and higher noise level. Regeneration is controlled by means of a 50,000 ohm potentiometer in the screen-grid circuit of the detector tube. The voltage applied to the potentiometer is 22½, and this can be varied any where down to zero. Since the 50,000 ohm resistance passes a slight amount of current, a switch is put in series with the battery lead so that the battery circuit may be opened when the set is not in use. This switch is mounted directly on the potentiometer, thus eliminating an extra knob for this control.

Band-Spread: A small variable condenser is wired in parallel with the main tuning control to provide spreading of a small portion of the high frequency spectrum over a hundred degrees of the dial. This feature allows the spreading of an amateur band over most of the dial, so that it is much easier to separate the stations.

Four coils of the plug-in type are used to cover the entire short-wave band from 15 to 200 meters. A primary winding is used so that it may be possible to operate this receiver on any type of antenna.

The audio system used in the "Jiffy-3" consists of two type '30 tubes, resistance coupled. The type '30 is a high gain, two volt filament type triode, with excellent

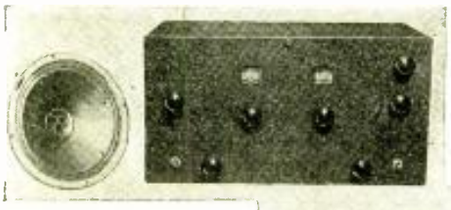
(*Continued on page* 116)



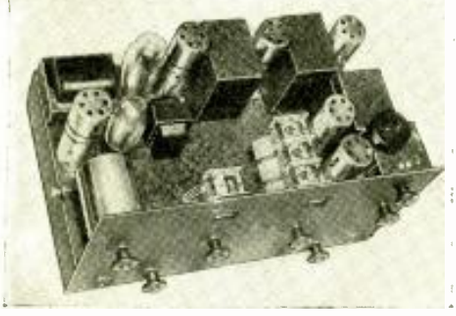

Hook-up of the "Jiffy 3." No. 170

*Consulting technician for Leotone Radio.

# The Silver Amateur Receiver



Left — McMurdo Silver's newest "amateur type" receiver which tunes from 1,550 to 30,000 kilocycles.



Yes, the new Silver amateur type receiver possesses band-spread tuning, so essential in amateur or "ham" reception. Band-spread tuning is available at every point in the range of the receiver.

●AN amateur radio station is no better than its receiver, for there is no profit in pumping out a 10,000 mile signal if one has only a 1000 mile receiver. Likewise, the use of an efficient receiver means the ability to work low powered transmitters over greater distances, and if good receivers were generally employed, lower transmitting powers with lower costs would give even better results than are today had from high transmitter powers when working to inefficient receivers.

A year ago everything was wrong with amateur receivers. The typical r.f. stage, regenerative detector and an audio stage or two left everything to be desired—sensitivity, selectivity and signal to noise ratio. But in the last year the superheterodyne has gained popularity in its simpler forms, with great benefit.

The receiver itself tunes from 1550 to 30,000 kilocycles, covering all five amateur bands that a super may be satisfactorily used on. This it does in three steps on one dial, using three separate sets of r.f., first detector and oscillator coils and separate padding capacities picked up by a six gang, three position switch identical in construction to those used in the Byrd Expedition Voice Communication Receivers—as for that matter are the entire r.f. first detector and oscillator circuits.

## Band-Spread Tuning

Band spread tuning at every point in this range is had by an oscillator vernier condenser on the left hand 6:1 automatic takeup gear drive vernier dial. This band spread is 200 degrees for the 160 and 80 meter bands—40 degrees for the 80 meter phone band alone, 100 degrees for the 20 and 40 meter bands, and nearly 100 degrees for the 10 meter band.

## Tuned R.F. Used

The circuit consists of a '58 tuned r.f. stage having separate antenna primaries for doublet antenna use, a 2A7 electron coupled oscillator and tuned first detector, two '58 air tuned 465 kc. i.f. stages, '56 second or audio detector, '58 electron coupled audio beat oscillator, '59 three watt output pentode and 5Z3 power supply

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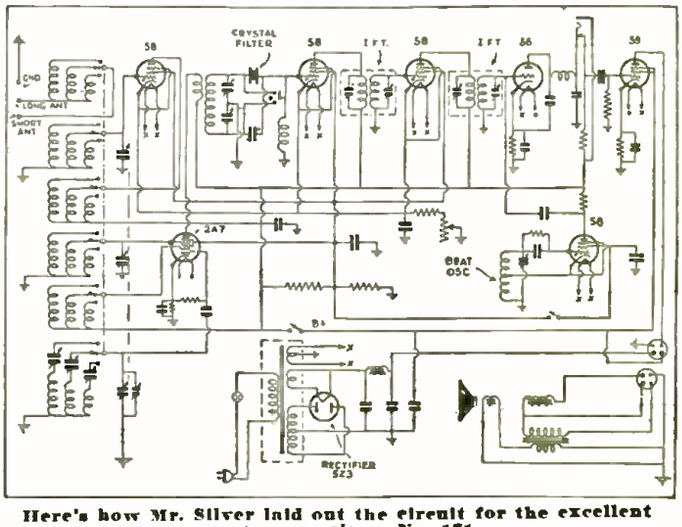
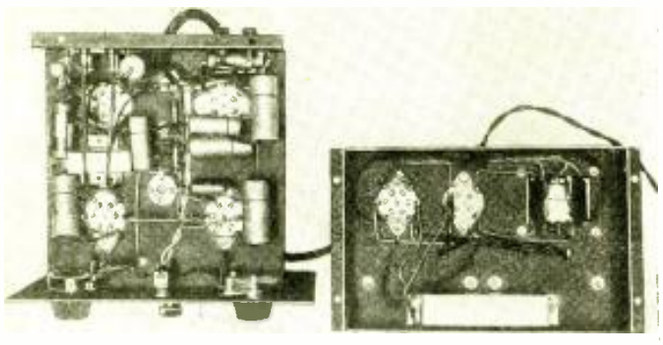



Here's how Mr. Silver laid out the circuit for the excellent amateur receiver, No. 171.



**Above—Three interesting views of the "Trophy Winner"—one of the latest 3-tube A.C. operated short-wave receivers. It provides "band-spread," utilizes new style plug-in coils and has a "hum-less" power supply unit. This set is available in "Kit" form.**

# The TROPHY WINNER . .

## By FRANK LESTER, W2AMJ*

### A Simple, Reliable 3-Tube A.C. Operated Short-Wave Receiver for the "DX" Hound.

● MOST of the simple and low-priced short wave receivers that have been brought out recently for "DX" enthusiasts who want to hear foreign stations are of the battery operated type, and therefore do not particularly appeal to people who have grown accustomed to the convenience, reliability and economy of house current operation. These sets fill a definite need, but radio listeners who have not bothered with batteries for years would much prefer to start in the interesting short-wave "game" with small A.C. sets.

To fulfill this requirement and to get these people exploring the busy short-wave channels, the writer has designed a simple but effective A.C. short-wave receiver that uses the latest tubes in a dependable, hum-free circuit, and that costs very little more than the average battery model complete with all its necessary A, B and C batteries. The powerful A.C. tubes, of the pentode type, provide comfortable loud speaker results on European and South American stations, and, atmospheric conditions permitting, even on Australian and New Zealand stations. With a pair of earphones plugged into the output posts, the listener has practically the entire world at his finger tips.

#### Set Has R.F., Regen. Det. and A.F.

This new receiver, called the Truetest "Trophy Winner," uses a type 58 tube VI as an untuned R.F. amplifier (completely eliminating the annoying "dead spots" common with straight regenerative sets), a type 57 as a regenerative detector, with a regeneration control that does not disturb the "logging" of the dial, and a type 2A5 pentode as the audio amplifier. The entire short-wave region from 15 to 200 meters is covered by a set of four plug-in coils, which are easily and quickly interchanged.

* Engineer, Wholesale Radio Service Co., Inc.

The parts for the receiver proper are mounted on a rigid, electrically welded steel chassis, finished in spot-proof crystalline black and completely drilled and prepared for easy home assembly. The set is available in kit form, and can be assembled and wired in a couple of evenings with the aid of only a screwdriver, pliers and soldering iron.

The front panel measures only 7 x 10 inches, and the set overall is 8½ inches deep. On the front panel are a vernier tuning dial, the 110-volt line switch SW, the regeneration control R5 and condensers C1 or C2, as described later.

All filament, plate and grid current is supplied by a separate power pack, built up on a steel chassis measuring 10¼ x 6 x 1¾ inches and matching the receiver finish. This is a full-grown pack, complete with shielded power transformer, two individual filter choke coils and three sections of filter condenser. No attempt was made to cheapen the power unit by eliminating one filter section, as is done in some sets. It was felt that unless the receiver were absolutely quiet, even with earphones, the people who built it would never really enjoy good short-wave reception. There is enough uncontrollable outside noise without starting the set with a handicap in the form of an inadequate power supply!

#### Receiver and Pack Joined by Cable

Connection between the receiver and the pack is made by

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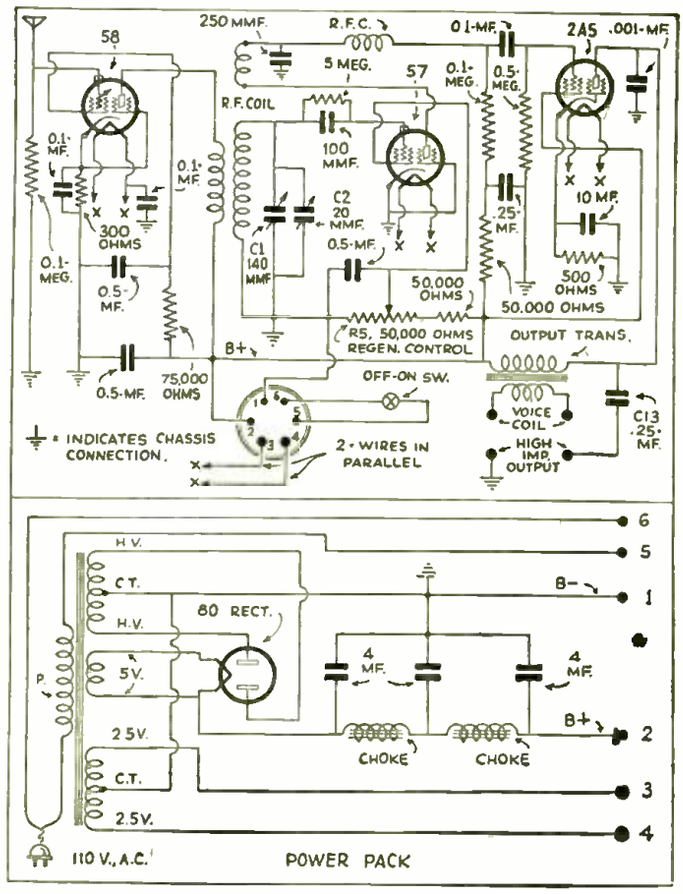



**Schematic diagrams of the "Trophy Winner" 3-tube A.C. receiver, as well as power-supply, are given above.**

# SHORT WAVE STATIONS OF THE WORLD

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

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

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

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.

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

**● WE GO to considerable expense each month to revise this specially compiled list of short-wave stations, and the list is not simply repeated each time, as many readers might assume. In order to aid us in keeping this list as accurate as possible, we will appreciate hearing from short-wave listeners of any omissions or errors in the list as here published.**

## Around-the-Clock Listening Guide

Although short wave reception is notorious for its irregularity and seeming inconsistency (wherein lies its greatest appeal to the sporting listener), it is a good idea to follow a general schedule as far as wavelength in relation to the time of the day is concerned. The observance of a few simple rules will save the short wave fan a lot of otherwise wasted time. (All time given is "Eastern Standard Time"; listeners in zones having daylight saving time must make their own corrections.

**From daybreak to mid-afternoon, and particularly during bright daylight, listen between 13 and 22 meters (21540 to 13000 kc.).**

**To the east of the listener, from about noon to 10:00 p. m., the 20-35 meter will be found very productive. To the west of the listener this same band is best from about midnight until shortly after daybreak. After dark, results above 35 meters are usually much better than during daylight. These general rules hold for any location.**

## Short-Wave Broadcasting, Experimental and Commercial Radiophone Stations

**22370 kc. LSM**
-C- 13.41 meters
BUENOS AIRES, ARGENTINA
Calls Europe, a. m.

**21540 kc. W8XK**
-B- 13.93 meters
WESTINGHOUSE ELECTRIC
PITTSBURGH, PA.
7 a. m.-2 p. m.; relays KDKA

**21470 kc. GSH**
-B- 13.97 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND

**21420 kc. WKK**
-C- 14.01 meters
A. T. & T. CO.
LAWRENCEVILLE, N. J.

**21280 kc. LSM**
14.1 meters
BUENOS AIRES, ARGENTINA
Calls Spain, a. m.

**21160 kc. LSL**
14.18 meters
BUENOS AIRES, ARGENTINA
Calls Spain, a. m.

**21020 kc. LSM**
14.27 meters
BUENOS AIRES, ARGENTINA
Calls N. Y. C., daytime

**20700 kc. LSY**
14.49 meters
BUENOS AIRES, ARGENTINA
Calls Spain and N. Y C. daytime

**20380 kc. GAA**
-C- 14.72 meters
RUGBY, ENGLAND

**19900 kc. LSG**
-C- 15.08 meters
BUENOS AIRES, ARGENTINA
Calls Spain and N. Y C. daytime

**19820 kc. WKN**
-C- 15.14 meters
LAWRENCEVILLE, N. J.

**19650 kc. LSN**
-C- 15.27 meters
BUENOS AIRES, ARGENTINA
Calls N. Y C. daytime

**19600 kc. LSF**
-C- 15.31 meters
BUENOS AIRES, ARGENTINA
Calls Spain and N. Y. C daytime

**19380 kc. WOP**
-C- 15.48 meters
OCEAN GATE, N. J.

**19355 kc. FTM**
-C- 15.50 meters
ST. ASSISE, FRANCE

**19220 kc. WKF**
-C- 15.60 meters
LAWRENCEVILLE, N. J.

**19160 kc. GAP**
-C- 15.66 meters
RUGBY, ENGLAND

**19140 kc. LSM**
-C- 15.67 meters
BUENOS AIRES, ARGENTINA
Calls Spain, a. m.

**18970 kc. GAQ**
-C- 15.81 meters
RUGBY, ENGLAND

**18830 kc. PLE**
-C- 15.93 meters
BANDOENG, JAVA

**18680 kc. GAX**
-X- 16.06 meters
RUGBY, ENGLAND

**18620 kc. GAU**
-C- 16.11 meters
RUGBY, ENGLAND

**18370 kc. PMC**
-C- 16.33 meters
BANDOENG, JAVA

**18345 kc. FZS**
-C- 16.35 meters
Saigon,
INDO-CHINA

**18340 kc. WLA**
-C- 16.36 meters
LAWRENCEVILLE, N. J.

**18310 kc. GAS**
-C- 16.38 meters
RUGBY, ENGLAND

**18240 kc. FRO,FRE**
-C- 16.44 meters
ST. ASSISE, FRANCE

**18200 kc. GAW**
-C- 16.48 meters
RUGBY, ENGLAND

**18115 kc. LSM**
-C- 16.56 meters
BUENOS AIRES, ARGENTINA
Calls Spain, a. m.

**18040 kc. GAB**
-C- 16.63 meters
RUGBY, ENGLAND

**17820 kc. LSN**
-C- 16.84 meters
BUENOS AIRES, ARGENTINA
Calls N. Y. C., daytime

**17810 kc. PCV**
-C- 16.84 meters
KOOTWIJK, HOLLAND

**17780 kc. ★W3XAL**
-B- 16.87 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ, 9 a. m.-3 p. m. every day

**17770 kc. ★GSG**
-B- 16.88 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**17775 kc. ★PHI**
-B- 16.88 meters
HUIZEN, HOLLAND
Mon., Wed., Fri.
7:30-9:30 a. m.
Sat. and Sun. 7:30-10 a. m,

**17760 kc. IAC**
C- 16.89 meters
PIZA, ITALY
6:30-7:30 a. m.

**17310 kc. ★W3XL**
-X- 17.33 meters
NATIONAL BROAD. CO.
BOUND BROOK, N. J.
Relays WJZ Irregularly. 12 noon-4 p. m.

**17120 kc. WOO**
-C- 17.52 meters
A. T. & T. CO.,
OCEAN GATE, N. J.

**17120 kc. WOY**
-C- 17.52 meters
LAWRENCEVILLE, N. J.

**17080 kc. GBC**
-C- 17.56
RUGBY, ENGLAND

**16270 kc. WLK**
-C- 18.44 meters
LAWRENCEVILLE, N. J.

**16270 kc. WOG**
-C- 18.44 meters
OCEAN GATE, N. J.

**16233 kc. FZR**
-C- 18.48 meters
SAIGON, INDO-CHINA

**15880 kc. FTK**
-C- 18.90 meters
ST. ASSISE, FRANCE

**15810 kc. LSL**
-C- 18.98 meters
BUENOS AIRES, ARGENTINA
Calls Brazil and Spain, daytime

**15760 kc. JYT**
-X- 19.04 meters
KEMIKAWA-CHO-CHIBA-KEN, JAPAN
Irregular in late afternoon

**15330 kc. ★W2XAD**
-B- 19.56 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY daily. 2-3 p. m.

**15295 kc. CP5**
-B- 19.61 meters
LA PAZ, BOLIVIA
9:30-10:30 a. m.

**15270 kc. ★W2XE**
-B- 19.65 meters
ATLANTIC BROADCASTING CORP.
Relays WABC daily. 10 a. m.-12 noon

**15250 kc. W1XAL**
-B- 19.67 meters
BOSTON, MASS.

**15243 kc.**
-B- 19.68 m
"RADIO CO
PARIS, F
Service de la
103 Rue de
8-11

(Time given is Eastern Standard Time)

**15210 kc. ★W8XK**
-B- 19.72 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
10 a. m.-4:15 p. m.
Relays KDKA

**15200 kc. ★DJB**
-B- 19.73 meters
ZEESEN, GERMANY
12:35-2 a. m., 6:38-9:45 a. m.

**15140 kc. ★GSF**
-B- 19.81 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**15120 kc. ★HVJ**
-B- 19.83 meters
VATICAN CITY
ROME, ITALY
5:00 to 5:15 a. m., except Sunday and Saturday at 10 a. m.

**15055 kc. WNC**
-C- 19.92 meters
HIALEAH, FLORIDA

**14980 kc. KAY**
-C- 20.03 meters
MANILA, P. I.
Phones Pacific Isles

**14590 kc. WMN**
-C- 20.56 meters
LAWRENCEVILLE, N. J.

**14530 kc. LSN**
-C- 20.65 meters
BUENOS AIRES, ARGENTINA
Calls Ne wYork, afternoons

**12500 kc. LSM**
-C- 20.69 meters
BUENOS AIRES, ARGENTINA
Calls Spain, midday

**14525 kc. XDA**
-C- 20.65 meters
TRANS-NEWS AGENCY
MEXICO CITY

**14470 kc. WMF**
-C- 20.73 meters
LAWRENCEVILLE, N. J.

**14440 kc. GBW**
-C- 20.78 meters
RUGBY, ENGLAND

**13990 kc. GBA**
-C- 21.44 meters
RUGBY, ENGLAND

**13610 kc. JYK**
-C- 22.04 meterss
KEMAKAWA-CHO, CHIBA-KEN, JAPAN
Phones till 11 p. m.

**13585 kc. GBB**
-C- 22.08 meters
RUGBY, ENGLAND

**13390 kc. WMA**
-C- 22.40 meters
LAWRENCEVILLE, N. J.

**13210 kc. WOO**
-C- 22.71 meters
OCEAN GATE, N. J.

**12840 kc. WOY**
-C- 23.36 meters
LAWRENCEVILLE, N. J.

**12840 kc. WOO**
-C- 23.36 meters
OCEAN GATE, N. J.

**12825 kc. ★CNR**
-B, C- 23.39 meters
DIRECTOR GENERAL
Telegraph and Telephone Stations, Rabat, Morocco
Sunday, 7:30-9:00 a. m.

**12800 kc. IAC**
-C- 23.45 meters
PIZA, ITALY
Mornings

**12780 kc. GBC**
-C- 23.47 meters
RUGBY, ENGLAND

**12290 kc. GBU**
-C- 24.41 meters
RUGBY, ENGLAND

**12260 kc. FTN**
-C- 24.47 meters
ST. ASSISE (Paris), FRANCE

**12190 kc. LSN**
-C- 24.61 meters
BUENOS AIRES, ARGENTINA
Calls N. Y. C., late afternoon

**12150 kc. GBS**
-C- 24.69 meters
RUGBY, ENGLAND

**12000 kc. RNE**
-B- 25 meters
MOSCOW, U. S. S. R.
Sat. 10-11 p. m.
Sun. 6-7 a. m., 10-11 a. m.

**11950 kc. KKQ**
-X- 25.10 meters
BOLINAS, CALIF.

**11880 kc. ★FYA**
-B- 25.25 meters
"RADIO COLONIAL"
PARIS, FRANCE
11:15 a. m.-2:15 p. m.-3-6 p. m.

**11870 kc. ★W8XK**
-B- 25.26 meters
WESTINGHOUSE ELECTRIC CO.
PITTSBURGH, PA.
4:30-10:00 p. m.
Relays KDKA

**11865 kc. ★GSE**
-B- 25.28 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**11830 kc. ★W2XE**
-B- 25.36 meters
ATLANTIC BROADCASTING CORP.,
485 MADISON AVE., N. Y. C.
2-4 p. m. Relays WABC

**11810 kc. ★I2RO**
-B- 25.4 meters
ROME, ITALY
Daily 11:15 a. m.-12:15 p. m.
1:15 p. m.-5:30 p. m.

**11790 kc. W1XAL**
-B- 25.45 meters
BOSTON, MASS.
Irregularly in the morning

**11760 kc. ★DJD**
-B- 25.50 meters
ZEESEN, GERMANY
1-4:30 p. m.-9-11:30 p. m.

**11750 kc. ★GSD**
-B- 25.53 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**11720 kc. CJRX**
-B- 25.6 meters
WINNIPEG, CANADA
6-10 p. m. on week days

**11705 kc. ★FYA**
-B- 25.63 meters
"RADIO COLONIAL"
PARIS, FRANCE
3-6 p. m., 6:15-9 p. m.
10 p. m.-12 midnight, Daily

**11680 kc. KIO**
-C- 25.68 meters
KAHUHU, HAWAII

**11340 kc. DAN**
-C- 26.44 meters
NORDEICH, GERMANY

**11181 kc. CT3AQ**
-B- 26.83 meters
FUNCHAL, MADERIA
Tues., Thurs., 5:00-6:30 p. m.
Sunday, 10:30 a. m.-1 p. m.

**10770 kc. GBP**
-C- 27.85 meters
RUGBY, ENGLAND

**10675 kc. WNB**
-C- 28.1 meters
LAWRENCEVILLE, N. J.

**10550 kc. WOK**
-C- 28.44 meters
LAWRENCEVILLE, N. J.

**10530 kc. GBX**
-X- 28.49 meters
RUGBY, ENGLAND

**10520 kc. VLK**
-C- 28.51 meters
SYDNEY, AUSTRALIA

**10410 kc. PDK**
-C- 28.80 meters
KOOTWIJK, HOLLAND
7:30-9:40 a. m.

**10410 kc. KES**
-X- 28.80 meters
BOLINAS, CALIF.

**10350 kc. ★LSX**
-X- 28.98 meters
BUENOS AIRES, ARGENTINA
Broadcasts 3-4, 8-9 p. m.
Irregularly, Relaying LR4
Also tests irregularly 9 p. m.-12 midnight

**10330 kc. ORK**
-C- 29.04 meters
RUYSSELEDE, BELGIUM
From 1 p. m.

**10300 kc. LSL**
-C- 29.13 meters
BUENOS AIRES
Calls New York, evenings

**10250 kc. LSK**
-C- 29.27 meters
BUENOS AIRES, ARGENTINA
Calls Spain, afternoon and evening

**10220 kc. PSH**
-C- 29.35 meters
RIO DE JANIERO, BRAZIL

**10055 kc. ZFB**
-C- 29.84 meters
HAMILTON, BERMUDA

**9950 kc. GCU**
-C- 30.15 meters
RUGBY, ENGLAND

**9890 kc. LSN**
-C- 30.33 meters
BUENOS AIRES
Calls New York, evenings

**9870 kc. WON**
-C- 30.4 meters
LAWRENCEVILLE, N. J.

**9860 kc. ★EAQ**
-B- 30.43 meters
P. O. Box 951
MADRID, SPAIN
Daily except Saturday and Sunday, 5:15-7 p. m.; Saturday, 1-3, 5:15-7:30 p. m.; Sunday, 5:15-7:30 p. m.

**9840 kc. JYS**
-X- 30.49 meters
KEMIKAWA-CHO-CHIBA-KEN, JAPAN
Irregular, 4-7 a. m.

**9800 kc. LSI**
-C- 30.61 meters
BUENOS AIRES, ARGENTINA
Calls N. Y. C., night

**9790 kc. GCW**
-C- 30.64 meters
RUGBY, ENGLAND

**9750 kc. WOF**
-C- 30.77 meters
LAWRENCEVILLE, N. J.

**9710 kc. GCA**
-C- 30.89 meters
RUGBY, ENGLAND

**9675 TI4NRH**
-B- 31 meters
HEREDIA, COSTA RICA

**9600 kc. ★CT1AA**
-B- 31.25 meters
LISBON, PORTUGAL
Tues. and Friday, 4:30-7:00 p. m.

**9600 kc. YV5BMO**
-B- 31.25 meters
MARACAIBO, VENEZUELA
Between 5 and 10 p. m.

**9600 kc. XETE**
-B- 31.25 meters
MEXICO CITY, MEXICO

**9595 kc. ★HBL**
-B- 31.27 meters
LEAGUE OF NATIONS
GENEVA, SWITZERLAND
Saturdays, 5:30-6:15 p. m.

**9590 kc. ★VK2ME**
-B- 31.28 meters
AMALGAMATED WIRELESS, LTD., 47 YORK ST.
SYDNEY, AUSTRALIA
See "When to Listen in" Column

**9590 kc. ★W3XAU**
-B- 31.28 meters
NEWTOWN SQUARE, PA.
Relays WCAU
11 a. m.-5 p. m.

**9585 kc. ★GSC**
-B- 31.29 meters
BRITISH BROAD. CAST.
DAVENTRY, ENGLAND

**9570 kc. ★W1XAZ**
-B- 31.35 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
SPRINGFIELD, MASS.
Relays WBZ, 6 a. m.-12 midnight

**9560 kc. ★DJA**
-B- 31.38 meters
ZEESEN, GERMANY
6:35-9:45 a. m., 5-7:30 p. m.

**9530 kc. ★W2XAF**
-B- 31.48 meters
GENERAL ELECTRIC CO.
SCHENECTADY, N. Y.
Relays WGY, 6:45-10 p. m. and Saturday, 10-11 p. m.

**9510 kc. ★GSB**
-B- 31.55 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**9510 kc. ★VK3ME**
-B- 31.55 meters
AMALGAMATED WIRELESS, Ltd.
G. P. O. Box 1272L.
MELBOURNE, AUSTRALIA
Wed., 5-6:30 a. m.; Saturday, 5:00-7:00 a. m.

**9510 kc. YV3BC**
-B- 31:55 meters
CARACAS, VENEZUELA
Irregularly 10:30 a. m.-1 p. m.

**9330 kc. CGA**
-C- 32.15 meters
DRUMMONDVILLE, CANADA

**9280 kc. GCB**
-C- 32.33 meters
RUGBY, ENGLAND

**9170 kc. WNA**
-C- 32.72 meters
LAWRENCEVILLE, N. J.

**9120 kc. CP5**
-B- 32.88 meters
LA PAZ, BOLIVIA
7:30-10:30 p. m.

**9020 kc. GCS**
-C- 32.26 meters
RUGBY, ENGLAND

**8928 kc. TGX**
-C- 33.50 meters
GUATEMALA CITY, C. A.

**8920 kc. GCX**
-X- 33.63 meters
RUGBY, ENGLAND

**8680 kc. GBC**
-C- 34.56 meters
RUGBY, ENGLAND

**8560 kc. WOO**
-C- 35.05 meters
OCEAN GATE, N. J.

**8560 kc. WOY**
-C- 35.05 meters
LAWRENCEVILLE, N. J.

**8380 kc. IAC**
-C- 35.8 meters
PIZA, ITALY

**8185 kc. ★PSK**
-C- 36.65 meters
RIO DE JANIERO, BRAZIL
6:30-7:30 p. m.
Relays PRA3

**8036 kc. ★CNR**
-B- 37.33 meters
RABAT, MOROCCO
Sunday, 3-5 p. m.

**7901 kc. LSL**
-C- 37.97 meters
BUENOS AIRES, ARGENTINA
Calls Brazil, night

**7880 kc. JYR**
-C- 38.07 meters
KEMIKAWA-CHO-CHIBA-KEN, JAPAN

**7830 kc. PDV**
-C- 38.30 meters
KOOTWIJK, HOLLAND
After 9 a. m.

**7799 kc. ★HBP**
-B- 38.47 meters
LEAGUE OF NATIONS,
GENEVA, SWITZERLAND
5:30-6:15 p. m., Saturday

**7770 kc. PCK**
-C- 38.60 meters
KOOTWIJK, HOLLAND

**7150 kc. HJ4ABB**
-B- 41.6 meters
MANIZALES, COLOMBIA
Various times during evening

**6990 kc. LCL**
-B- 42.92 meters
JELOY, NORWAY
Relays Oslo 11 a. m.-6 p. m.

**6977 kc. EAR110**
-B- 43 meters
MADRID, SPAIN
Tues., Sat., 5:30 p. m.

**6905 kc. GDS**
-C- 43.95 meters
RUGBY, ENGLAND

**6860 kc. KEL**
-C- 43.70 meters
BOLINAS, CALIF.

**6840 kc. CFA**
-C- 43.80 meters
DRUMMONDVILLE, CANADA

**6755 kc. WOA**
-C- 44.41 meters
LAWRENCEVILLE, N. J.

**6666 kc. HC2RL**
-B- 45.00 meters
P. O. BOX 795, GUAYAQUIL, ECUADOR, S. A.
Sunday, 5:45-7:45 p. m.
Tues., 9:15-11:15 p. m.

**6666 kc. F8KR**
-B- 45.00 meters
CONSTANTINE, ALGERIA

**6650 kc. IAC**
-C- 45.1 meters
PIZA, ITALY
Evenings

**6611 kc. RW72**
-B- 45.38 meters
MOSCOW, U. S. S. R.
1-6 p. m.

**6447k c. ★HJ1ABB**
-B- 46.53 meters
BARRANQUILLA, COL., S. A.
11:30 a. m.-1 p. m. and 5-10 p. m. daily
Thurs., 5-11 p. m.

**6425 kc. ★W3XL**
-X- 46.70 meters
NATIONAL BROADCASTING CO.
BOUND BROOK, N. J.
Relays WJZ Irregularly on Friday, 4 p. m.-12 midnight

**6383 kc. HC1DR**
-B- 47.00 meters
QUITO, ECUADOR
8-10 p. m.

**6335 kc. VE9AP**
-B- 47.35 meters
DRUMMONDVILLE, CANADA

**6316 kc. HIZ**
-B- 47.5 meters
SANTO DOMINGO, DOMINICAN REPUBLIC
Daily except Sat. and Sun. 4:40-5:40 p. m.; Sat., 9:40-11:40 p. m.; Sun., 11:40 a. m.-1:40 p. m.

**6276 kc. HI1A**
-B- 47.8 meters
DOMINICAN REP.
Daily 12:10-2:10 p. m.; 4:10-6:10 p. m.; Thurs., 12:10-2:10 p. m.; 7:40-9:40 p. m.

**6275 kc. HJ3ABF**
-B- 47.81 meters
BOGOTA, COLOMBIA
7-11 p. m.

**6150 kc. ★YV3BC**
-B- 48.78 meters
CARACAS, VENEZUELA
Generally 4:00-10:00 p. m.

**6140 kc. ★W8XK**
-B- 48.86 meters
WESTINGHOUSE ELECTRIC & MFG. CO.
PITTSBURGH, PA.
Relays KDKA
4:30 p. m.-midnight

**6130 kc. ZGE**
-B- 48.94 meters
KUALA LUMPUR,
FED. MALAY STATES
Tue. and Fri., 6:40-8:40 a. m.
Sun., 7-9 a. m.

**6122 kc. ZTJ**
-B- 49 meters
JOHANNESBURG, SOUTH AFRICA
Daily except Sat. and Sun., 11:45 p. m.-12:30 a. m., 4-7 a. m., 9 a. m.-3:30 p. m.
Sat., only, 4-7 a. m., 9 a. m.-4:45 p. m.
Sun., only, 11:45 p. m.-12:30 a. m., 8-10:30 a. m. and 12:30-3 p. m.

**6120 kc. ★W2XE**
-B- 49.02 meters
ATLANTIC BROADCASTING CORP.,
485 MADISON AVE., N. Y. C.
Relays WABC, 5-10 p. m.

**6112 kc. ★YV1BC**
-B- 49.08 meters
CARACAS, VENEZUELA
10:30 a. m.-1 p. m.; 5:15-10 p. m.

**6110 kc. ★VE9HX**
-B- 49.10 meters
HALIFAX, NOVA SCOTIA
9:30 a. m.-1 p. m.; 6-12 p. m.

**6110 kc. VUC**
-B- 49.1 meters
CALCUTTA, INDIA
Daily except Sat., 9:30 a. m.-noon; Sat., 11:45 a. m.-3 p. m.

**6100 kc. ★W3XAL**
-B- 49.18 meters
NATIONAL BROADCASTING CO.
BOUND BROOK, N. J.
Relays WJZ
Monday, Wednesday, Saturday, 4 p. m.-12 midnight

**6100 kc. ★W9XF**
-B- 49.18 meters
DOWNERS GROVE, ILL.
Relays WENR, Chicago
Tuesday, Thursday, Friday, 3:30-7:00 p. m.; 8:30 p. m.-1 a. m.
Sunday, 3:30-6 p. m.; 8 p. m.-1 a m.

**6095 kc. ★VE9GW**
-B- 49.22 meters
BOWMANVILLE, ONTARIO, CANADA
Sunday, 10:30 a. m.-7 p. m.;
Monday-Wednesday, 1-10 p. m.;
Thursday, 2-11 p. m.; Friday-Saturday, 6 a. m.-11 p. m.

**6090 kc. VE9BJ**
-B- 49.26 meters
SAINT JOHN, N. B., CAN.
7-8:30 p. m.

**6085 kc. CP5**
-B- 49.3 meters
LAPAZ, BOLIVIA
6:30-7:30 p. m.; 9-11:30 p. m.
Mon., Wed., Fri., 6:30-8 p. m.
9-11:30 p. m., Tues., Thurs., Sat.

**6080 kc. ★W9XAA**
-B- 49.31 meters
CHICAGO FEDERATION OF LABOR
CHICAGO, ILL.
Relays WCFL
Sunday, 10:30 a. m.-8 p. m. and irregularly on week days

**6075 kc. OXY**
-B- 49.4 meters
SKAMLEBOAEK, DENMARK
Irregular, 1-6 p. m.

**6072 kc. OER2**
-X- 49.41 meters
VIENNA, AUSTRIA
Tues. and Thurs., 8:30 a. m.-4 p. m.

**6070 kc. ★YV5BMO**
-B- 49.42 meters
MARACAIBO, VENEZUELA
Tests between 5 and 10 p. m.

**6070 kc. VE9CS**
-B- 49.42 meters
VANCOUVER, B. C., CANADA
Fri., 12:30-1:45 a. m.; Sun., 12 noon-12 midnight

**6065 kc. HIX**
-B- 49.46 meters
SANTO DOMINGO, DOMINICAN REPUBLIC
Tues. and Fri., 8-10 p. m.; Sun., 7:45-10:40 a. m., 3-5 p. m.
Sat., 10:40-11:40 p. m.

**6060 kc. ★W8XAL**
-B- 49.50 meters
CROSLEY RADIO CORP.
CINCINNATI, OHIO
Relays WLW Irregularly

**6060 kc. VQ7LO**
-B- 49.50 meters
IMPERIAL AND INTERNATIONAL COMMUNICATIONS, Ltd.
NAIROBI, KENYA, AFRICA
Mon., Wed., Fri., 5:45-6:15 a. m., 11 a. m.-2 p. m.
Tues., 3-4 a. m., 11 a. m.-2 p. m., Thurs. 8-9 a. m., 11 a. m.-2 p. m., Sat., 11 a. m.-3 p. m., Sun., 10:50 a. m.-2 p. m.

**6060 kc. PK1WK**
-B- 49.5 meters
BANDOENG, JAVA
Daily exc. Fri., 5:30-6 a. m.

**6060 kc. W3XAU**
-B- 49.50 meters
NEWTOWN SQUARE, PA.
Relays WCAU, Philadelphia
7 p. m.-12 midnight Irregular

**6050 kc. ★GSA**
-B- 49.58 meters
BRITISH BROAD. CORP.
DAVENTRY, ENGLAND
See "When to Listen in" Column

**6040 kc. W1XAL**
-B- 49.67 meters
BOSTON, MASS.
Very irregular in early evening

**6040 kc. W4XB**
-B- 49.67 meters
MIAMI, FLORIDA
Relays WIOD, Sat. evenings

**6020 kc. ★DJC**
-B- 49.83 meters
ZEESEN, GERMANY
1-4:30 p. m.; 9-11:30 p. m.

**6012 kc. ZHI**
-B- 49.9 meters
RADIO SERVICE CO.,
20 ORCHARD RD.,
SINGAPORE, MALAYA
Mon., Wed., Thurs., 5:40-8:10 a. m.; Sat. 10:40 p. m.-1:10 a.m.

**6010 kc. COC**
-B- 49.92 meters
P. O. Box 98
HAVANA, CUBA
4-8 p. m., and irregularly

**6005 kc. VE9DN**
-B-
CANADIAN MARCONI CO.
DRUMMONDVILLE, QUEBEC
Sat., 11:30 p. m.

**6000 kc. EAJ25**
-B- 50 meters
BARCELONA RADIO CLUB,
BARCELONA, SPAIN
3:30-4:30 p. m., Saturday

**6000 kc. RW59**
-B- 50 meters
MOSCOW, U. S. S. R.
4-6 p. m., daily

**6000 kc.**
-B- 50 meters
RADIO TANANARIVE,
MADAGASCAR
Sun., 2:30-4 a. m.
Daily except Sun. and Mon. 3-3:45 a. m.

**5970 kc. HVJ**
-B- 50.26 meters
VATICAN CITY (ROME)
2-2:15 p. m., daily. Sun., 5-5:30 a. m.

**5930 kc. HJ4ABE**
-B- 50.6 meters
MEDELLIN, COLOMBIA
Mon., 7-11 p. m.; Tues., Thurs., Sat., 6:30-8:00 p. m.; Wed. and Fri., 7:30-11:00 p. m.

**5853 kc. WOB**
-C- 50.25 meters
LAWRENCEVILLE, N. J.

**5714 kc. HCK**
-B- 52.5 meters
QUITO, ECUADOR, S. A.

**5170 kc. PMY**
-C- 58.00 meters
BANDOENG, JAVA

**5145 kc. OKIMPT**
-X- 58.31 meters
PRAGUE, CZECHOSLOVAKIA

**5077 kc. WCN**
-C- 59.08 meters
LAWRENCEVILLE, N. J.

**5025 kc. ZFA**
-C- 59.7 meters
HAMILTON, BERMUDA

**4975 kc. GBC**
-C- 60.30 meters
RUGBY, ENGLAND

**4820 kc. G6RX-GDW**
-C- 62.24 meters
RUGBY, ENGLAND
Tests irregularly 8-11 p. m.

**4752 kc. WOO**
-C- 63.1 meters
OCEAN GATE, N. J.

**4752 kc. WOY**
-C- 63.1 meters
LAWRENCEVILLE, N. J.

**4320 kc. ★G6RX-GDB**
-C- 69.44 meters
RUGBY, ENGLAND
Tests, 8-11 p. m.

**4273 kc. RW15**
-B- 70.20 meters
KHABAROVSK, SIBERIA, U. S. S. R.
Daily, 3-9 a. m.

**4272 kc. WOO**
-C- 70.22 meters
OCEAN GATE, N. J.

**4272 kc. WOY**
-C- 70.22 meters
LAWRENCEVILLE, N. J.

**4109 kc. HCJB**
-B- 73 meters
QUITO, ECUADOR
7:30-9:45 p. m., except Monday

**4098 kc. WND**
-C- 73.21 meters
HIALEAH, FLORIDA

*(The Airport Station List is Omitted This Month As It Is Being Completely Checked and Revised.—EDITOR.)*

# POLICE RADIO ALARM STATIONS

| | | |
|---|---|---|
| KGHG | Las Vegas, Nev. | 2474 kc. |
| KGHK | Palo Alto, Cal. | 1674 kc. |
| KGHO | Des Moines, Iowa | 1682 kc. |
| KGHZ | Little Rock, Ark. | 2406 kc. |
| KGJX | Pasadena, Cal. | 1712 kc. |
| KGLX | Albuquerque, N. M. | 2414 kc. |
| KGOZ | Cedar Rapids, Iowa | 2466 kc. |
| KGPA | Seattle, Wash. | 2414 kc. |
| KGPB | Minneapolis, Minn. | 2430 kc. |
| KGPC | St. Louis, Mo. | 1706 kc. |
| KGPD | San Francisco, Cal. | 1674 kc. |
| KGPE | Kansas City, Mo. | 2422 kc. |
| KGPG | Vallejo, Cal. | 2422 kc. |
| KGPH | Oklahoma City, Okla. | 2450 kc. |
| KGPI | Omaha, Neb. | 2466 kc. |
| KGPJ | Beaumont, Tex. | 1712 kc. |
| KGPK | Sioux City, Iowa | 2466 kc. |
| KGPL | Los Angeles, Cal. | 1712 kc. |
| KGPM | San Jose, Cal. | 1674 kc. |
| KGPN | Davenport, Iowa | 2466 kc. |
| KGPO | Tulsa, Okla. | 2450 kc. |
| KGPP | Portland, Ore. | 2442 kc. |
| KGPQ | Honolulu, T. H. | 2450 kc. |
| KGPS | Bakersfield, Cal. | 2414 kc. |
| KGPW | Salt Lake City, Utah | 2406 kc. |
| KGPX | Denver, Colo. | 2442 kc. |
| KGPY | Baton Rouge, La. | 1574 kc. |
| KGPZ | Wichita, Kans. | 2450 kc. |
| KGZA | Fresno, Calif. | 2414 kc. |
| KGZB | Houston, Tex. | 1712 kc. |
| KGZC | Topeka, Kans. | 2422 kc. |
| KGZD | San Diego, Cal. | 2490 kc. |
| KGZE | San Antonio, Tex. | 1658 kc. |
| KGZF | Chanute, Kans. | 2450 kc. |
| KGZG | Des Moines, Iowa | 2466 kc. |
| KGZH | Klamath Falls, Ore. | 2382 kc. |
| KGZI | Wichita Falls, Tex. | 2458 kc. |
| KGZJ | Phoenix, Ariz. | 2430 kc. |

(*Continued on page* 102)

# 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*

## Our Readers Discuss "No Code Test Below 5 Meters"

### Why the "Code Test" for 5 Meters?

*Editor*, SHORT WAVE CRAFT:

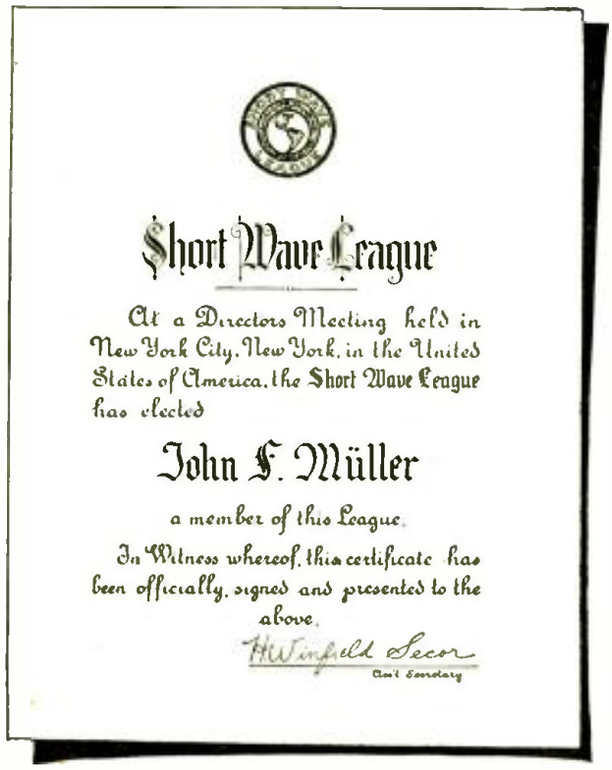
● I HAVE been reading SHORT WAVE CRAFT for about three years, that is, approximately; and I still think it is among the first, if not the best on the market, as far as radio goes.

These guys arguing against a "codeless" exam. are getting in my hair so that I'll give vent to my feelings here. Sticking to the present "exams." is like believing in the future of the horse, in fact, there isn't any future in it! Where would television be (as far as it has gotten) if code was still in use? If radio-telephony wasn't in use, where would the present day *broadcasting* stations, both short and long, be?

I do believe, however, that most anybody can learn the code, for I once had a speed of about three words a minute. I consider code an obsolete method of communication. I think the government should do almost the same as they did back in 1912, when they turned the short-wave band over to the "hams." They obtained some surprising results then and it is likely to happen again.

So, if the code is abolished below five meters, the commission would do something to aid the development of radio.

Yours 'till they do,
J. B. FELL,
Hutchinson, Kansas.




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

### He Thinks "No Code" on 5 Meters OK.

*Editor*, SHORT WAVE CRAFT:

For several months I have been reading with much interest the argument which is now in progress over the "Code-less" ticket on five meters. I wish to say now that I am in favor of abolishing the "code exam." on five meters. According to a few "hams" that have obtained their tickets you absolutely have to know code before you have enough sense to hook up a one-tube set. They are the selfish ones, not the ones that want to play around in the five-meter band; they think that they have done something wonderful just because they have learned the code. I'll admit that knowing the code is nothing short of wonderful, but for some of the "hams" to refer to the would-be ham as being a "Jelly-Fish Nit-Wit" just because he wants to experiment in the five-meter band, is showing a very poor kind of sportsmanship and is exactly opposite to the generally accepted spirit that is usually shown in the realm of short-wave radio leagues, etc. I have many friends in Nashville that are licensed "hams" and some that are not, and *believe you me, most of the ones that have no license know more about getting the correct signal on the air, than the ones that have passed the exams.*

Another thing, I believe that if the F.R.C. (Federal Radio Commission) were to let "hams" get on the air on five meters, without knowing code that they would live up to their end of the agreement and not venture out of their bounds. I believe they would be just that much appreciative. I listen in every night to the amateurs and to date I suppose most of them have their tickets via the "code exam," and believe me I have heard some on the air that should not even be allowed to "listen-in." their signals are so rotten. I know the code and know enough about radio to be able to tell the difference between a "good" and "bad" signal.

My advice to the would-be amateur, however, is to learn the code, because they will be able to get a lot more fun out of short-wave radio; then too there may be an S.O.S. on the air and if there should be, they should be shut down and give the full benefit of the air to the station transmitting the distress call. If they didn't know the code they wouldn't know what it was all about.

So if this argument must continue, please for the sake of some one that may become discouraged, don't call them such outlandish names as some of the "Hams" have called them. After all they are the stock that must replace the ones that are bound to pass into oblivion some day.

JAS. O. REECE,
1000 Petway Ave., Nashville, Tenn.

## 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.**

### "Pioneer Radioman" Strong for "Code Test"

*Editor*, SHORT WAVE CRAFT:

Your magazine is very fine. I am interested in the controversy over "Codeless License" vs. "Code". I read with interest the letter from Mitchell Barrett in the March issue. As one of the "Pioneer Radiomen" of this country dating back to 1897, I feel that I am qualified to answer him or any other radioman. A good radioman should know every sound coming from a horn or a pair of receivers. Otherwise he isn't a "Radioman." Do you realize that *every schoolboy in Japan knows the code!* Do you know that in 1917 the Army and Navy depended on the amateur radiomen for "Operators." I have a boy of eight and one eleven that know the code. You say you do not wish to learn any fool code. There are only twenty-six letters in the alphabet. I am willing to gamble you don't even know the alphabet. The Code is the basis of all

(*Continued on page* 127)

# SHORT WAVE QUESTION BOX

EDITED BY

GEORGE W. SHUART, W2AMN

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

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

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

## REGARDING COIL DATA

J. A. Rummell, Oak Park, Ill.

(Q) Please publish the coil data for coils to be used with a .0001 mf. (100 mmf.) variable condenser; these coils to be wound on a 1¼" 4-prong form.

(A) In nearly every issue of SHORT WAVE CRAFT there has appeared coil data using 1¼" form to cover a range from 15 to 200 meters. We believe that if you will consult the copies you have on hand you will find the information you desire.

## DUAL WAVE RECEIVER

Robert S. Blake, Los Angeles, Calif.

(Q) I am contemplating the construction of the *Dual Wave Receiver* which is illustrated and described in the May, 1933, issue. Please explain the reason and function of the wire which is shown in the illustration on page 11, as being connected to the front panel and, it would seem, to the condensers, C5 and C6. So far as I can make out the wire is not indicated in the two diagrams on page 12.

(A) In the *Dual Wave Receiver*, C1 and C2 are the small windings which are wrapped around the wires leading to the antenna binding post mounted on the central shield of the receiver.

## 220 TO 110 VOLT A.C.

Cyril Volney, St. Lucia, B. W. I.

(Q) I have a 110 volt A.C. receiver. Kindly inform me how it would be possible for me to run this receiver from a 220 volt A.C. power line.

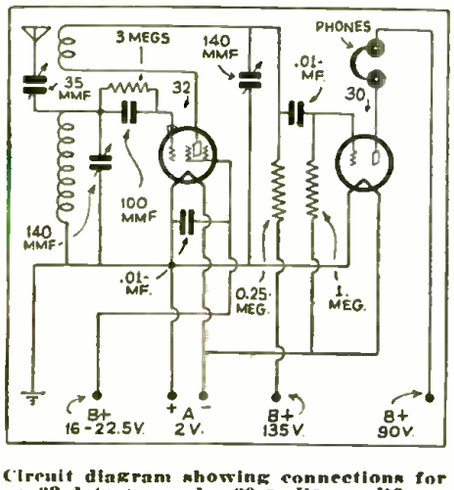
(A) It will be necessary for you to procure a 220 to 110 volt step-down transformer of which there are plenty reasonably priced on the market today. This will reduce your 220 to 110 volts and you will be able to operate your receiver with no changes in the set.

## 2-TUBE BATTERY RECEIVER

Paul Bennett, Penn.

(Q) Will you please publish a diagram of a 2-tube receiver using a type 32 as a regenerative detector and a type 30 as the audio amplifier?

(A) The diagram shown on this page uses a 32 regenerative detector, resistance coupled to a type 30 audio amplifier. The set makes use of the dry cells for the filament supply. Two dry cells connected in series with a 10 or 20 ohm rheostat furnish the filament voltage.



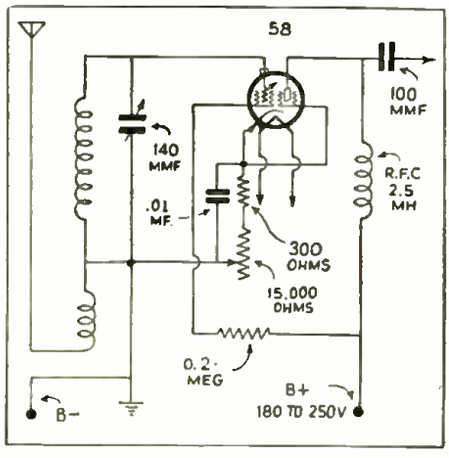

**Circuit diagram showing connections for a 32 detector and a 30 audio amplifier.**

## ADDING TRF AMPLIFIER

Albert License, Bellows Falls, Vt.

(Q) Kindly publish the circuit for one stage of tuned radio frequency amplifier to be added to my present receiver with as few changes as possible in my set.

(A) We are pleased to print your diagram of the connections for a 58 tuned R.F. amplifier which can be added to any receiver. It is not necessary to make any changes in your present set. The output of the TRF amplifier is connected to the antenna post on the receiver.




**Circuit for a 58 as a tuned R.F. pre-amplifier.**

## B ELIMINATOR MARKINGS

M. C. Davison, Tonawanda, N. Y.

(Q) I have a B eliminator which has six terminals and is marked as follows: B negative, positive detector, first amplifier, second amplifier and two power amplifier terminals. There are two variable resistors, one to control the detector voltage and one to control the first and second amplifier voltages. Would you please tell me the approximate voltage of these terminals and how it could be connected to a short-wave set.

(A) The B negative, of course, is evident by the marking on the panel. The plus detector terminal should be connected to a point on the receiver requiring from 22 to 45 volts. This voltage will be regulated with its associated variable resistor marked detector voltage control. The first amplifier terminal and its variable resistor will furnish from 45 to about 67½ volts. The second amplifier, 90 volts, and the power amplifier terminals 135. The above voltages are approximate and, of course, apply to most B eliminators of this type. It will be necessary to make adjustments with the variable resistors in order to obtain proper results from your receiver if you have no voltmeter available.

## SHUNT FEED

S. Saniuk, Danbury, Conn.

(Q) What is shunt plate feed and how does it work?

(A) Shunt plate feed means that the plate voltage to the tube is fed directly to the plate through a radio frequency choke coil and the power is taken from the tube through a condenser. In series feed the plate voltage would be conducted through the plate tuning circuit to the plate of the tube.

(Q) How does the absorption frequency work?

(A) Absorption frequency meters consist of a coil and condenser combination which are tuned to the frequency of the transmitter. The coil should be coupled loosely to the output circuit of the transmitter and as the frequency meter is brought into resonance with a transmitter trequency it will draw energy from the transmitter causing a slight increase in plate current of the output tube. The point of maximum deflection is where the two are in resonance. A radio frequency ammeter can also be incorporated in the frequency meter and resonance be determined by the deflection on the R.F. meter.

## 2-TUBE DOERLE A.C.

Frank Lee, Dalhart, Texas.

(Q) Will you please advise me which would be the best—a 2-tube A.C. Doerle with a 47 audio amplifier or a 3-tube A.C. Doerle.

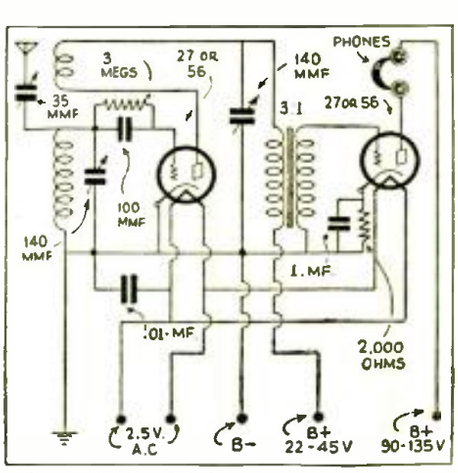
(A) The 2-tube Doerle with a 47 pentode in addition to the 56 amplifier should give greater speaker volume than the 3-tube Doerle without the pentode. The 3-tube set with the pentode added, making 4 tubes, would be an ideal receiver for loudspeaker operation.

## 2-TUBE RECEIVER

A. Abrams, New York City.

(Q) I would be very much obliged if you would publish a diagram of a 2-tube short-wave set using two 227 tubes. I wish to use one stage of transformer coupled audio.

(A) We are printing a circuit on this page which uses two 227 tubes, one is a regenerative detector and one is a transformer coupled audio amplifier. 2½ volts, A.C. are necessary for the filament supply. Either B batteries or a power pack can be used to furnish the plate voltage.




**Above is the 2-tube circuit diagram requested by Mr. Abrams.**

# Short Wave Stations of the World

(*Continued from page 99*)

## POLICE RADIO ALARM STATIONS

| | | |
|---|---|---|
| KGZL | Shreveport, La. | 1712 kc. |
| KGZM | El Paso, Tex. | 2414 kc. |
| KGZN | Tacoma, Wash. | 2414 kc. |
| KGZO | Santa Barbara, Cal. | 2414 kc. |
| KGZP | Coffeyville, Kans. | 2450 kc. |
| KGZQ | Waco, Tex. | 1712 kc. |
| KGZR | Salem, Ore. | 2442 kc. |
| KGZS | McAlester, Okla. | 2458 kc. |
| KGZT | Santa Cruz, Cal. | 1674 kc. |
| KGZU | Lincoln, Neb. | 2490 kc. |
| KGZW | Lubbock, Tex. | 2458 kc. |
| KGZX | Albuquerque, N. Mex. | 2414 kc. |
| KSW | Berkeley, Cal. | 1658 kc. |
| KVP | Dallas, Tex. | 1712 kc. |
| UYR | Montreal, Can. | 1712 kc. |
| WCK | Belle Island, Mich. | 2414 kc. |
| WEY | Boston, Mass. | 1558 kc. |
| WKDT | Detroit, Mich. | 1558 kc. |
| WKDU | Cincinnati, Ohio | 1706 kc. |
| WMDZ | Indianapolis, Ind. | 2442 kc. |
| WMJ | Buffalo, N. Y. | 2422 kc. |
| WMO | Highland Park, Mich. | 2414 kc. |
| WMP | Tulare, Cal. | 2414 kc. |
| WPDA | Framingham, Mass. | 1666 kc. |
| WPDB | Chicago, Ill. | 1712 kc. |
| WPDC | Chicago, Ill. | 1712 kc. |
| WPDD | Chicago, Ill. | 1712 kc. |
| WPDE | Louisville, Ky. | 2442 kc. |
| WPDF | Flint, Mich. | 2466 kc. |
| WPDG | Youngstown, Ohio | 2458 kc. |
| WPDH | Richmond, Ind. | 2442 kc. |
| WPDI | Columbus, Ohio | 2430 kc. |
| WPDK | Milwaukee, Wis. | 2450 kc. |
| WPDL | Lansing, Mich. | 2442 kc. |
| WPDM | Dayton, Ohio | 2430 kc. |
| WPDN | Auburn, N. Y. | 2382 kc. |
| WPDO | Akron, Ohio | 2458 kc. |
| WPDP | Philadelphia, Pa. | 2474 kc. |
| WPDR | Rochester, N. Y. | 2382 kc. |
| WPDS | St. Paul, Minn. | 2430 kc. |
| WPDT | Kokomo, Ind. | 2490 kc. |
| WPDU | Pittsburgh, Pa. | 1712 kc. |
| WPDV | Charlotte, N. C. | 2458 kc. |
| WPDW | Washington, D. C. | 2422 kc. |
| WPDX | Detroit, Mich. | 2414 kc. |
| WPDY | Atlanta, Ga. | 2414 kc. |
| WPDZ | Fort Wayne, Ind. | 2490 kc. |
| WPEA | Syracuse, N. Y. | 2382 kc. |
| WPEB | Grand Rapids, Mich. | 2442 kc. |
| WPEC | Memphis, Tenn. | 2466 kc. |
| WPED | Arlington, Mass. | 1712 kc. |
| WPEE | New York, N. Y. | 2450 kc. |
| WPEF | New York, N. Y. | 2450 kc. |
| WPEG | New York, N. Y. | 2450 kc. |
| WPEH | Somerville, Mass. | 1712 kc. |
| WPEI | E. Providence, R. I. | 1712 kc. |
| WPEK | New Orleans, La. | 2430 kc. |
| WPEL | Middleboro, Mass. | 1666 kc. |
| WPEM | Woonsocket, R. I. | 2466 kc. |
| WPEP | Arlington, Mass. | 1712 kc. |
| WPES | Saginaw, Mich. | 2442 kc. |
| WPET | Lexington, Ky. | 1706 kc. |
| WPEW | Northampton, Mass. | 1666 kc. |
| WPFA | Newton, Mass. | 1712 kc. |
| WPFC | Muskegon, Mich. | 2442 kc. |
| WPFD | Highland Park, Ill. | 2430 kc. |
| WPFE | Reading, Pa. | 2442 kc. |
| WPFG | Jacksonville, Fla. | 2442 kc. |
| WPFH | Baltimore, Md. | 2414 kc. |
| WPFI | Columbus, Ga. | 2414 kc. |
| WPFJ | Hammond, Ind. | 1712 kc. |
| WPFK | Hackensack, N. J. | 2430 kc. |
| WPFL | Gary, Ind. | 2470 kc. |
| WPFM | Birmingham, Ala. | 2382 kc. |
| YPFN | Fairhaven, Mass. | 1712 kc. |
| WPFO | Knoxville, Tenn. | 2474 kc. |
| WPFP | Clarksburgh, W. Va. | 2490 kc. |
| WPFQ | Swathmore, Pa. | 2474 kc. |
| WPFR | Johnson City, Tenn. | 2470 kc. |
| WPFU | Portland, Me. | 2422 kc. |
| WPFV | Pawtucket, R. I. | 2466 kc. |
| WPFX | Palm Beach, Fla. | 2442 kc. |
| WPFZ | Miami, Fla. | 2442 kc. |
| WPGA | Bay City, Mich. | 2466 kc. |
| WPGB | Port Huron, Mich. | 2466 kc. |
| WPGC | S. Schenectady, N. Y. | 1658 kc. |
| WPGD | Rockford, Ill. | 2458 kc. |
| WPGF | Providence, R. I. | 1712 kc. |
| WPGG | Findlay, Ohio | 1682 kc. |
| WPGH | Albany, N. Y. | 2414 kc. |
| WPGI | Portsmouth, Ohio | 2430 kc. |
| WPGJ | Utica, N. Y. | 2414 kc. |
| WPGK | Cranston, R. I. | 2466 kc. |
| WPGL | Binghampton, N. Y. | 2442 kc. |
| WPGN | South Bend, Ind. | 2490 kc. |
| WPGO | Huntington, N. Y. | 2490 kc. |
| WPGS | Mineola, N. Y. | 2490 kc. |
| WRDH | Cleveland, Ohio | 2458 kc. |
| WRDR | Grosse Pt. Village, Mich. | 2414 kc. |
| WRDQ | Toledo, Ohio | 2474 kc. |
| WRDS | E. Lansing, Mich. | 1666 kc. |

## TELEVISION Stations

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

## N.B.C. Broadcasts From "Pick-up" on Wheels

(*Continued from page 73*)

power of 150 watts, three times the strength of the old mobile transmitter, and a range of up to 100 miles. This makes it possible for the broadcasting company to originate special broadcasts at practically any point in the United States, since there are few places not within 100 miles of a wire line where a "pick-up" could be made for the networks.

## 24 Hours of Broadcasting in a Single Hour

(*Continued from page 73*)

the world during the complete 24 hours of the day. At the time of the broadcast, Friday at 6 P.M. in Schenectady, the times: 7 P.M.—Buenos Aires; 8 P.M.—Rio de Janeiro; 9 P.M.—Azores; 10 P.M.—Iceland; 11 P.M.—London; 12 P.M.—Berlin. SATURDAY—NEXT DAY: 1 A.M.—Petrograd; 2 A.M.—Aden, Arabia; 3 A.M.—Khiva, Turkestan; 4 A.M.—Bombay; 5 A.M.—Calcutta; 6 A.M.—Singapore; 7 A.M.—Shanghai; 8 A.M.—Tokio; 9 A.M.—Sydney, Australia; 10 A.M.—New Caledonia Islands; 11 A.M.—Little America. FRIDAY—SAME DAY: 12 Noon—Honolulu; 1 P.M.—Tahiti; 2 P.M.—Juneau, Alaska; 3 P.M.—San Francisco; 4 P.M.—Mexico City; 5 P.M.—Chicago.

This broadcast was also received in all seasons of the year, so that it was quite fitting that "Believe-It-or-Not" Ripley, world-famous cartoonist, who has visited some 161 different countries in his travels, was selected as the spokesman for this epochal broadcast. His speech was arranged in several parts, each pertaining to "believe-it-or-nots" of a particular race, and immediately after he had spoken, his words were translated into the native language of that country and broadcast. Among the races addressed were the German, French, Russian, Scandinavian, Spanish, Portuguese, Chinese and Japanese. Listeners were asked to write the station, stating the time of day they heard the program and how well it was understood.

This is the first time a broadcast such as this was ever tried by W2XAD and W2XAF. Its two short-wave transmitters have been heard in almost every country at different times on different programs, but this was the first time an attempt has been made to reach all countries with a single broadcast, not relayed by any foreign stations. W2XAF, operating on 31.48 meters, or 9,530 kilocycles, is used for evening broadcasts, and W2XAD, operating on 19.56 meters, or 15,330 kilocycles, is used for daytime broadcasts.

## Health From Short Waves

(*Continued from page 71*)

tween two discs and placing the organ or part of the body to be treated in the interval.

### Deep Heating Effects Secured

The most striking effect thus induced in the patient's body is a rise of temperature reaching to considerable depth. While being due to Joule heat, this is fundamentally different in production and distribution from heat effects by either direct current or diathermy, the high-frequency resistance (which controls the ultra-short wave heating effect) decreasing as the frequency is rising, i.e., as the wavelength is growing shorter. A maximum heat effect is, in a given tissue of the human body, produced in the event of this "capacitative" resistance just equalling the ohmic resistance. In fact, the wavelength should, in order to result in a maximum heat effect, bear a certain ratio to the conductivity and dielectric constant of the tissue. In human tissues this ratio is such that wavelengths between 2 and 20 meters will result in maximum heat effects, which in part accounts for the specific action of ultra-short waves upon human (and for the matter of it—animal) tissues.

### Each Layer Responds to Different Frequency

Inasmuch as there are everywhere in the body small differences of ionization and dielectric constant, the ultra-short wave field can be made to act upon certain particles differently from their action upon other, adjacent, particles. This selectivity becomes the more marked as the waves grow shorter. Because of existing differences in structure the skin, fat, muscles, bones, etc., can be submitted to special effects, limited to the cells under treatment. In fact, each layer will most readily respond to a given wavelength, by tuning to which the action of ultra-short waves can be confined to the layers actually to be treated. The special shape of electrodes enables their effects not only to be dosed but at the same time to be extended to the deeper organs of the body.

### Bacteria Destroyed

However, the heating of tissues is not by any means the only effect of ultra-short waves. Most bacteria under the action of these waves, will indeed be killed at a temperature variable from one species to the other, but in any case far below the temperature otherwise fatal to them. A temperature of 37 degrees C., i.e., approximately equalling the normal blood temperature, is in most cases sufficient to kill them. However, these effects are likewise of variable efficiency, according to the wavelength used.

As the temperature is rising the destruction of bacteria occurs more and more rapidly; now, as most centers of disease, under the action of very short waves, are heated more strongly than surrounding regions, the healing process thus becomes accelerated. The treatment also gives rise to a lively migration of white blood-cells (leucocytes) towards the affected regions, thus activating even further the attempted cure. The results obtained by Dr. Schliephake in connection with the treatment of furuncles are surprising, a perfect cure having been obtained within 4-5 days in all of the 150 cases recently dealt with.

A resorption (re-absorption) of even considerable masses of pus is noted in connection with the treatment, e.g., of pulmonary abscesses and empyemas of the pleura., all 25 cases so far treated by Dr. Schliephake having been cured most rapidly and completely, while these affections otherwise show a particularly high mortality.

Chronic rheumatism is likewise cured rapidly by an application of ultra-short waves, which enable not only the seat, but the original focus, of the malady to be acted upon. Patients very often are found to be freed from their pain by the very first application, though the definite cure may entail a treatment lasting one or two weeks.

### Paralysis and Tuberculosis

Since the ultra short wave treatment enables the blood temperature to be raised considerably, thus inducing what might be termed an *artificial fever*, it was thought that diseases such as *general paralysis* might thus be cured and the results of recent tests fully bear out this assumption.

Many cases of tuberculosis have yielded to treatment and some tests seem to point as an aid in cancer treatment.

## Silver Receiver

(*Continued from page 95*)

rectifier. The set is entirely A.C. operated, absolutely humless on phones or speaker, and has its own special matched 8" Jensen dynamic speaker.

Its sensitivity is below 1.0 microvolts absolute—actually about ½ microvolt absolute, its selectivity without crystal 22 kc. wide 10,000 times down, or absolute 10 kc. as it is generally called. With crystal filter its selectivity is 50 *cycles*, not kilocycles.

The 5B receiver, though sold without crystal, is designed and built for the crystal filter, and even though sold without crystal, each and every set is built with the entire crystal circuit in it. Thus it requires merely the plugging in of a 465 kc. crystal and realignment of four i.f. trimmers to the exact crystal frequency to provide the full measure of benefit in sensitivity, selectivity and noise reduction.

## The Victor Easy-Tune 2-Tube Band-Spreader

(*Continued from page 76*)

which simply consists of four resistors, and two condensers, is mounted right on the socket of the 6-prong audio tube.

### Construction

As with most sets, the builder has lots of leeway in the layout he, or she, may choose. The only important considerations to be taken into account are that the leads in the detector tube, coil, and condenser section of the set be as short as possible, and that the set be firmly built throughout.

### Parts

The statement, *use nothing but the best of parts*, cannot be repeated too often. Isolantite sockets on the detector coil and tube socket do really make a difference, even though there is a price differential of a few cents between them and bakelite, or composition. Likewise a good make of mica by-pass condenser in R.F. circuit will not lose R.F. as we have found some shoddy apparatus doing in the past.

### Operation

When the set is done, check it over carefully. This may save you "beaucoup" dollars in burnt-out tubes and dead batteries. If you are sure the set is o.k., connect the filament source. With 2 volts from a storage battery, such as we used, no resistance is necessary. However, if two 1½ volt dry cells are used, put a 20 or 30 ohm rheostat in series with the A— lead. If the filaments light with the A supply on, it's o.k. to connect the B batteries. Plug in a coil and connect the antenna, and the set's all ready to go hunting for DX. There are no "trick gadgets" on this job, so no trouble should be encountered in getting it "perking". It does all that the original Electrodyne did, with the added feature of loudspeaker volume on most stations.

### Parts List for 2-Tube Band-Spreader

1 Special set of coils; see table.
1 Special R.F. 2.5 mh. choke, (Hammarlund; I. C. A.)
1 100 mmf. var. condenser, Hammarlund; I. C. A.)
1 25 mmf. var. condenser. (Hammarlund; I. C. A.)
2 100 mmf. fixed condensers, I. C. A. (Polymet) (Choose nearest size).
1 .005 mf. fixed condenser, I. C. A. (Polymet).
1 35 mmf. antenna trimmer, (Hammarlund; I. C. A.)
2 .01 mf. bypass condensers, Polymet.
1 .001 mf. bypass condenser, Polymet.
1 0.5 mf. bypass condenser, Polymet.
1 2 meg. grid-leak, Lynch.
2 0.1 meg. resistors, Lynch. (I. R. C.)
2 0.5 meg. resistors, Lynch. (I. R. C.)
1 50,000 ohm variable resistor, Acratest. (I. C. A.)
1 4-prong wafer socket, Na-Ald.
1 6-prong wafer socket, Na-Ald.
1 4-prong Isolantite socket (Hammarlund; I. C. A.)
1 dial.

### Coils Wound on Tube Bases

The coils are wound on four-prong tube-bases, with number 30 d.c.c. wire. The following is the number of turns for the various bands:

| Band | Grid to Fil. | Fil. to Ground |
|---|---|---|
| 80m. | 20 t. | 1½ t. |
| 40m. | 12 t. | 1½ t. |
| 20m. | 3 t. | 1¼ t. |

A little juggling with the tickler section of the coil, that is, moving it up and down on the tube base, may be necessary to get the set oscillating properly over the entire band with the particular antenna used. After the coils are correct, coat them with collodion or Duco, so that they will hold their characteristics.

## He Likes Underground Aerials

(*Continued from page* 84)

we find HJ1ABB very good on the underground and *scarcely audible on the overhead* (45.5 meters and an increase of power in Dec.). HC2RL is the same way on 47 meters and YV3BC is about the same on both the overhead and underground, with the exception of sharpness of tuning which is noticeable on all bands with the underground.

On the next step GSA can be heard on the overhead but due to heterodyning of other stations it is quite impossible to understand a thing that is said, but on the *underground* everything is as clear as the strongest local; also the same thing is true of DJC, with the exception of the interference. The underground cuts off a lot of the atmospherics on the49 meter band.

As for the construction it is very simple. All that is necessary is a trench and some rubber-covered wire. My aerial is only buried about 2 feet but I think it would be advisable to go deeper; to about 4 feet or so. Personally I intend to lay one about 2 or 3 times as long and 5 feet or so deep. Of course the ends have to be well insulated. I put a piece of rubber tube over them and after bending it back and taping it I dipped the whole end in tar.

To sum it all up, I think that with a little more digging both in length and depth the *underground* is better than the overhead type. And you don't have to be afraid of the aerial falling or breaking.

On the *underground* I have "logged" and received "veri's" from DJB, GSA, FYA, TI4NRH, VK2ME, HJ1ABB, YV3BC, YV1BC, Radio Nations, I2RO, EAQ.

BERNARD HORNE,
1608 Francis Street, Jackson, Mich.

## Our Sets "The Berries"

(*Continued from page* 85)

I will be very glad to hear from any one that will write to me. I will exchange "shack" photos with them and will answer all letters that I get as fast as I can.

Your "booster,"
CECIL HINKLEY,
26 Louisa St.,
Binghamton, N. Y.

(*Glad to hear that our sets and descriptions of them have proven satisfactory. The 3-tube sets seem to be pretty popular and we note your "old faithful"" has the lucky number—3 tubes.—Editor.*)

## W6DJI Has C.W., Phone and Everything!

(*Continued from page* 85)

If there are any readers who would like to ask questions about my station, I will be pleased to answer any and all letters.

JOHN WENDT, W6DJI,
624 Hearst Ave.,
San Francisco, Calif.

(*Great work, John, and you better start now collecting stamps to handle that mail you're sure to get. Our compliments to you for nicely arranged station—looks clean and business-like.—Editor.*)

## CORRECTION IN ADV.

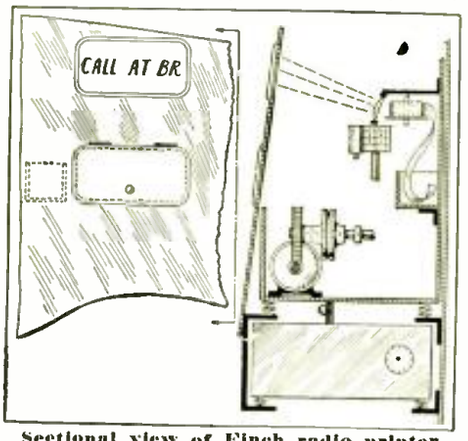
In the May advertisement of the National Radio Distributing Company, 412 Communipaw Avenue, Jersey City, N. J., an error appeared in the advertisement of -4.65 kit; the correction is for the 4-plug-in coils which should read 10 to 200 meters, whereas it appeared 10 to 20 meters. Another error appeared where the "y" was detached from "ready to use."

# Hand-Length Waves to Operate Teletype

(*Continued from page* 72)

transmitted, due to the circuit arrangement of the transmitter system. The automatic beacon signals are transmitted directionally, while the weather information and other broadcasts are transmitted non-directionally. The teletype aboard the vehicle is operated by the transmission of Baudot code signals—or code signals similar to the Baudot—while the beacon station has a pair of directional transmitting antennae, electromagnetically switched into connection with associated transmitters, or disconnected therefrom under remote control, and replaced by a non-directional transmitting antenna. The complete automatic printing telegraph transmitting apparatus is so arranged that the transmitter includes connections for independently controlling each of the transmitting systems on the directional radiating systems, and disconnecting these systems to connect the non-directional radiating system to one of the transmitters for the transmission of printer signals when the beacon signals are interrupted. The stations along a given route are in constant operation, normally transmitting directionally the beacon signals, and being interrupted periodically for the non-directional transmission of the weather reports for each route converging onto that station.

The directional teletype signals transmitted comprise characters selected from the Baudot code so that the impulses on the directional antennae combine to form




**Sectional view of Finch radio printer, also its appearance installed on auto cowl panel.**

impulses of a new character. For example, the letter "A" is transmitted on one directional antennae while the letter "N" is transmitted on the other, both on the same radio channel, and both transmitted in the same interval. The directional antennae are disposed at a selected angle and operate to radiate maximum signals in predetermined zones. A vehicle traveling in the zone in which the code impulses representing the letter "A" are transmitted will record the letter "A" on its teletype, while a vehicle traveling in the "N" zone will have that letter recorded on its automatic printer. However, if the impulses for the letters "A" and "N" are in such relation that they synchronize properly, and the receiving teletype responds equally to the A and the N transmissions, the character resulting from the combined impulses is the letter "K".* Therefore, the pilot must so guide his vehicle as to be within this intermediate zone to receive the letter "K". Any departure from this zone will result in the recording of either A or N as the case may be. When non-directional transmission is made, the broadcast is under control of the printer keyboard, bringing into action the corresponding bars on the teletype receiver printing apparatus. The guiding and communicating features of this system are completely automatic, and the changes of directional to non-directional broadcasting are subject to remote control from the beacon station.

* These letters are indicated by light and dark printed dots, not in regular code.

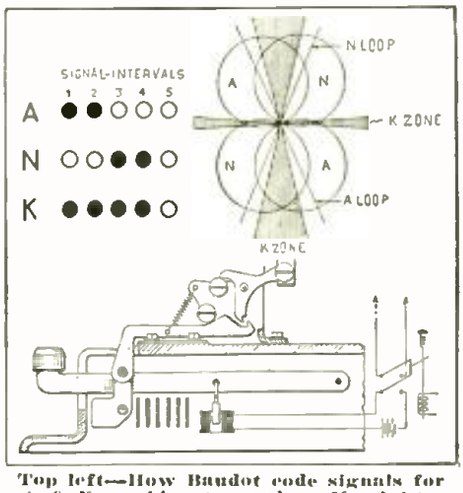
This system of navigation also permits the taking of bearings of the position of an aircraft with respect to one or more transmitters when the station is transmitting non-directionally. That is, the receiver may respond by the printing of characters on the maximum signal. This gives a direct indication of the bearing of the transmitter by printing the name or signals of the station at the receiving teletype, except at the minimum position of the loop receiver. The position of the receiver may then be determined by the customary triangulation methods. The timing of the teletype lends itself to any means of direction finding in which the time element is involved.

### The Finch System

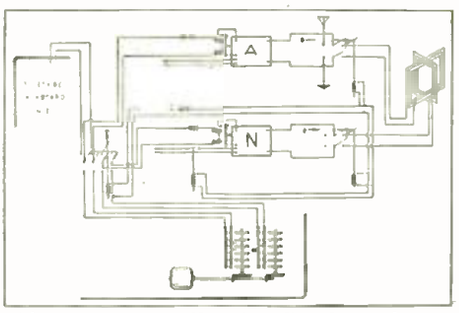
The second invention is the work of William G. H. Finch.

The objectives of the Finch telegraph printer system are to provide a radio motivated printing telegraph system operating a mobile printer, using a two-unit code for direct operation, thus eliminating substantially intermediary selecting apparatus. Synchronization is obtained in response to each impulse of the code, this code comprising long and short impulses. Since these mobile receivers are subjected to jarrings and usages foreign to stationary receivers, the Finch device has novel mountings and support for the receiving apparatus, while the printer characters are made quickly and readily visible. The apparatus is designed, through a simplified coding arrangement, to maintain the telegraph code in secret, and at the same time to provide a printer in which the characters can be easily interchanged to respond to different codes.

This invention presupposes a central station—commercial or governmental—giving radio service to subscribers of mobile telegraph printers mounted on mobile vehicles. In the case of police cars, the permanent record of the received message avoids any misunderstanding or loss because of temporary absence from the car. It also insures greater secrecy.




**Top left—How Baudot code signals for A & N combine to produce K; right—Angular relation of loops for A, N and K impulses. Lower—Keyboard at beacon transmitter, with radio telegraph printer.**




**Circuit for coordination Baudot printer signals on separate radio beacon paths by means of a transmitter control unit.**

This system of communication consists of a code transmitting device, a receiving device, a receiver controlled relay for repeating the received code combinations of impulses to the selecting and recording system, a controlling device responsive to the long and short impulses of the received code, and a printing mechanism selectively actuated to progressively print upon a movable tape a letter or character corresponding to the transmitted code combination of long and short electrical impulses designated to represent that character. The transmitting device, adapted to transmit long and short electrical impulses, may be operated manually, photoelectrically or mechanically as desired. The code transmitted comprises a synchronizing impulse followed by a two-unit code combination. The receiving printer apparatus comprises a plurality of disc-shaped type wheels, secured on a type wheel shaft, and each disc carrying a number of individual embossed characters to be printed. This type wheel construction is selectively operated by a two-unit code, each unit consisting of a combination of long and short impulses. A distributor directly controlled by each unit counts the impulses for synchronizing, and at the proper impulse, switches the oncoming signals in synchronism therewith to select the type-wheel disc, and then the character on the disc.

Means are provided, in order to secure secrecy, to interchange the position of the characters, for in radio communication, it is often desirable to send messages in code form. Heretofore, this has been done by sending the original message in code, so that the printed message received is a copy of the transmitted coded message. In the Finch system, the message is sent in its decoded form, but the teletype apparatus receives and prints the message in the coded form, by means of a rearrangement of the type discs. Thus, in the printing of message instead of printing the cha represented by the transmitted i another character is printed, whi form, represents the original cha

## A D.C. Battery-Operated S-W Converter

(*Continued from page 77*)

the oscillator. It would then be necessary to couple the antenna through a small trimmer condenser directly to the grid of the detector. Some sort of control would then be needed to control the amount of "feed-back" in order to keep the detector from oscillating. The best method would be to use a 100,000 ohm variable resistor in series with the plate voltage supply of the detector. Introducing feed-back in the first detector is highly recommended, if the builder wishes to go to the trouble. On broadcast receivers that are not so sensitive and do not function well with a converter, the above is a very worth-while improvement.

### Tuning and Padding Condensers

The chassis is a ready-made affair and has three socket holes in it. It was formerly used for a two-tube battery short-wave receiver. Two of the holes are used for the coil sockets and the other for the tube. The tuning condensers consist of a two-gang 140 mmf. midget variable, for tuning the two grid coils. It is necessary to use a small *padding condenser* connected across the first detector grid coil, in order to lower the detector frequency to the amount of the intermediate below the oscillator. The value of this condenser should be at least 50 mmf. This padding condenser also serves as the trimming condenser and needs a slight adjustment from time to time in order to keep the two tuned circuits "tracking", as they are tuned over quite a wide range of frequencies.

For best results it was found that the oscillator should have 45 volts on the plate. It will work with 22.5 but with slightly decreased efficiency. The detector voltage should be 22.5 in all cases unless regeneration is used, where of course it will have to be adjusted for proper results.

A 2.5 to 5 millihenry radio frequency choke is needed to feed the detector plate voltage to the tube, in order that the coupling condenser connecting the converter to the broadcast receiver can be attached directly to the plate. The diagram clearly shows the values of the different parts and the photographs give a good indication as to the layout used.

### Adjusting the "BC" Receiver

When connected to the broadcast receiver it is important to set the BC receiver to the frequency at which it is the most sensitive. This point is usually indicated by a pronounced rushing sound in the "BC" set. That is, with the volume control full on, the "BC" set will produce a high-pitched rushing sound and plenty of background noise on either the high or low frequency end of the "BC" band. It is at this setting that the "BC" set should be adjusted before the converter is attached.

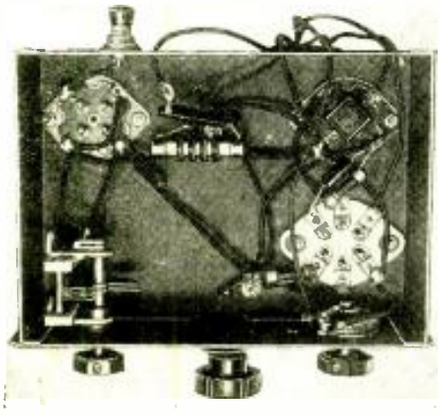
After the converter has been wired and connected to the "BC" receiver according to the diagram, turn the volume control full on and adjust the small padding condenser on the converter to a point where there is an indication of background noise pickup. Then tune the two-gang condenser until a station is heard. It is best to start off with the 100 to 200 meter coil as there are almost always police stations or 160 meter amateur phone signals to be heard. After the knack of tuning has been acquired other coils can be tried and the various American and foreign short-wave stations tuned in.

The antenna used on the converter can be the same one that is used for the "BC" set, provided that it is high and in the clear; one about 90 to 100 feet is to be

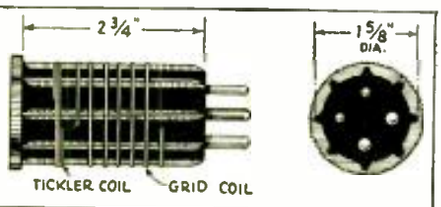
preferred. As a parting shot let us again remind the reader that any old worn out broadcast receiver will not be "worth a hoot" with any S-W converter. Make sure before you build it, that the "BC" set is a sensitive and more or less up-to-date affair.

### Parts List—D.C. Converter

1 metal chassis. Blan.
1 2-gang 140 mmf. var. condenser. National (Hammarlund).
2 4-prong wafer sockets. Na-Ald.
1 6-prong wafer socket. Na-Ald.
1 50 mmf. var. condenser. National (Hammarlund).
1 20 ohm rheostat.
2 .0001 mf. mica condensers.
1 .00025 mf. mica condenser.
1 2.5 to 5 mh. R.F. choke. National. (Hammarlund).
1 dial. National "B".
1 2 meg. gridleak. Lynch.
1 20,000 ohm gridleak. Lynch.
1 19 tube R.C.A. Radiotron (Arco.).



**Bottom view of the D.C. converter.**




RANGE OF COILS 16 - 220 METERS

-GRID COILS-

| | | |
|---|---|---|
| No.1 | 7 TURNS | No. 18 ENAM. WIRE SPACED OVER 1 1/2" |
| No.2 | 13 TURNS | No. 18 ENAM. WIRE SPACED OVER 1 5/8" |
| No.3 | 22 TURNS | No. 20 ENAM. WIRE SPACED OVER 1 5/8" |
| No.4 | 45 TURNS | No. 28 ENAM. WIRE SPACED OVER 1 1/2" |

-TICKLER COIL-

| | | |
|---|---|---|
| No. 1 | 6 TURNS | No. 28 ENAM. WIRE CLOSE WOUND. |
| No 2 | 9 TURNS | No. 28 ENAM. WIRE CLOSE WOUND. |
| No.3 | 12 TURNS | No. 28 ENAM. WIRE CLOSE WOUND. |
| No 4 | 20 TURNS | No. 28 ENAM. WIRE CLOSE WOUND. |

SPACE BETWEEN GRID AND TICKLER COILS 1/8"

**Bruno coil data.**

### When You Write to Us Please Note the Following

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

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

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

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

## When Holland Broadcasts Via PHI

(*Continued from page 70*)

1. Brisk, light music.
2. Artistic interpretations of selections by great composers.
3. Talks (a) on parts of the mother-country;
(b) on important events in Europe;
(c) on sport, literature and other subjects.

Example:

## The "Unimount" Twinplex

(*Continued from page 91*)

component parts, tube, plug-in coil, condenser, regeneration control—everything—has been mounted on the front panel and in ideal relationship to one another. The panel itself has been simplified to such a degree that it requires but one right angle-bend; and this only to keep it in an up-right position.

The elimination of long leads with their attendant stray coupling and body capacity effects has increased the sensitivity of the set enormously. On its initial test the set has received CFH, Rio de Janiero; WVR, Atlanta, Ga.; XDA, Mexico; G2WM, Leicester, England, and amateurs in 36 different states. The writer can safely say, without fear of contradiction, that the operation of this modified "Twinplex" surpasses even that of the original one.

It is hardly necessary to go into the constructional details as the diagram and photographs printed herewith are self-explanatory. If this set could only speak it would give the "merry ha ha" to all other short-wave sets in its class. So-o-o-o—you short-wave "fans" who have waited for a low-priced set—*here is your chance.*

## A Universal Power-Pack and Amplifier

(*Continued from page 79*)

the 47 tube is used. By the use of the resistors R2 and R3 to the grid, of the capacities shown, the bias voltage will be 1/7 the voltage drop across the speaker field R1, which in most cases will be correct if a 2,500 ohm speaker field is used. A condenser of .002, C5, is used as a tone control and interference eliminator; this capacity is about correct for a type 47 tube. It helps cut off the highs but does not bring out the lows to any great extent; its main purpose is to help cut out interference. By the use of the phone jack a head set can be used and by hooking it as shown in the diagram if a head set is plugged in the speaker will be cut out, but the bias voltage of the 47 will still be on the tube; this is very necessary on this type of tube as cutting off the bias voltage with plate voltage on will greatly harm the tube.

Two binding posts are shown in the diagram, one for connecting to separate ground and another for input from the set. This extra input connection to the binding post was found very useful when using a battery set or one with its own power supply in which case the five-prong socket connection is not used. In the diagram an input connection is also shown on the five-prong socket and when using a set which derives its power and filament supply from the pack this connection can be included in the connections from the set.

Taken all the way around this power pack and amplifier will be a great help to any experimenter as it saves the trouble of building or changing this part of the set every time a new tuning unit is built or rebuilt.

## The Trophy Winner

(*Continued from page 96*)

means of a flexible cable attached to the former and terminating in a plug that matches a socket on the pack's chassis. This flexible arrangement allows the use of the power unit for other receivers or purposes, and will be greatly appreciated by the set owner who later gets bitten by the experimental bug and starts playing with circuits.

The cable has six connections; two for filament current, two for plate current, and two for the 110 volt circuit. The on-off switch for power pack is located right on the front panel of the receiver. Actually, there are eight wires in the cable, but four of them are paired to form the equivalent of two heavy conductors, for the filament current.

### Band-Spread Is Available

A novel feature is the manner of mounting the tuning condensers so as to permit either continuous *band-spreading* or *regular tuning* coverage. Two tuning condensers are used: C1, of .00014 mf. capacity, and C2, of .00002 mf. If *band-spreading* is desired (and this is very convenient), the smaller condenser, C2, is mounted in the center of the panel and controlled by the vernier dial. The other condenser is placed in the lower left corner of the panel, and acts as a "tank" condenser. The latter is set roughly to any particular frequency range and the main tuning then accomplished with the vernier dial. For general coverage, C1 is mounted behind the dial and C2 in the left corner; C2 then acts as a "trimmer" on C1, being useful mainly on the longer waves, that is, from about 75 meters up to 200. The owner of the set can try either combination, the change taking only about five minutes. Some people like band spreading, others don't.

An output transformer, T1, is included in the receiver. This has a low impedance secondary for direct connection to the voice coil of a small dynamic loud speaker, which may conveniently be of the permanent magnet type. A special speaker with built-in field supply is available. Earphones or a magnetic speaker are connected to another pair of output posts, the primary of the output transformer in this case acting as a choke coil. The blocking condenser, C13, keeps the high plate voltage of the 2A5 out of the phone or speaker windings.

### Plug-In Coils Have 3 Windings

The plug-in coils used with this receiver are of the three-winding type. The primary is interwound with the secondary but altogether insulated from it; thus there is no possibility of damage to the detector tube or circuit caused by the high plate voltage of the R.F. tube. Regeneration is controlled by the potentiometer R5, which is smooth and quiet. The type 57 tube is an excellent detector, and slides in and out of oscillation with that gratifying ease so essential to successful short-wave tuning.

There is nothing tricky to the operation of the "Trophy Winner". The set will work with any ordinary short aerial and ground, and may even be hooked to the same antenna used with the family broadcast receiver. Only two controls are used at a time—the vernier dial and the regeneration knob. The presence of a station is quickly indicated by a whistle, which disappears as the regeneration control is backed down carefully.

The four plug-in coils supplied with the receiver split the short-wave bands into convenient quarters. The first coil tunes from 15 to 36 meters, and is most useful during the morning and afternoon. On it will be found the European 25 meter stations, which come through with good strength until sundown. The second coil covers 34-65 meters, and takes in the very active 49 meter night time channel, which is alive with European, African, Central and South American and Canadian programs. The third coil takes in 62-115 meters, and will



**HAVE YOU READ THE ATTRACTIVE "HAM" ADS ON PAGE 115.**

bring in hundreds of amateur stations on 75 meters. The fourth and largest coil, 110-200 meters, is popularly called the police coil because it covers the police radio alarm stations.

### Parts for "Trophy Winner" Receiver

Set of three winding plug-in coils, 14-200 meters. Trutest.
8 mh. R.F. Trutest choke coils.
.00014 mf. variable condenser.
.00002 mf. variable condenser.
.0001 mf. grid condenser.
.00025 mf. condenser.
C6, C7—1 mf. Trutest condenser.
C9—.5 mf. Trutest condenser.
.25 mf. Trutest condenser.
10 mf. Trutest condenser.
.001 mf. condenser.
.25 mf. Trutest condenser.
.5 mf. Trutest condenser.
100,000 ohms Trutest resistor.
300 ohm Trutest resistor.
75,000 ohm resistor.
5 megohm Trutest grid-leak.
50,000 ohm potentiometer.
50,000 ohm Trutest resistor.
100,000 ohm Trutest resistor.
50,000 ohm Trutest resistor.
500,000 ohm Trutest resistor.
500 ohm Trutest resistor.
110 volt line switch.
Trutest output transformer.
Type 56 Lafayette tube.
Type 57 Lafayette tube.
Type 2A5 Lafayette tube.

Mechanical parts include: Welded steel chassis, black crystalline finish; four six-prong Eby sockets for the tubes and the plug-in coils; vernier dial for the tuning condenser; double binding post strip; two tip jack strips; eight-wire cable and six prong plug; and all necessary hardware, wire and solder for connections, etc.

**TABLE NA-ALD "3"-WINDING COIL DATA**
**6 pin base for use with .00014 mf. (140 mmf.) tuning condenser**

| Band W. L. | Primary | Secondary | Tickler | Dis. bet. Tick. & Sec. |
|---|---|---|---|---|
| 10-20 meters | 4T. No. 32 S.S.C.* Interwound with sec. turns (tickler end). | 5T. No. 26 S.S.C. wound 3/16" pitch bet. turns. | 5T. No. 32 S.S.C. | 3/32" |
| 20-40 | 8T. No. 32 S.S.C. Interwound with sec. turns. | 11T. No. 26 S.S.C. wound 3/32" pitch bet. turns. | 7T. No. 32 S.S.C. | 3 16" |
| 40-80 | 15T. No. 32 S.S.C. Interwound with sec. turns. | 23T. No. 26 S.S.C. wound 5/64" pitch bet. turns. | 8T. No. 30 S.S.C. | 3/32" |
| 80-200 | 31T. No. 32 S.S.C. Interwound with sec. turns. | 50T. No 30 S.S.C. wound 1/32" pitch bet. turns. | 16T. No. 30 S.S.C. | 5/32" |

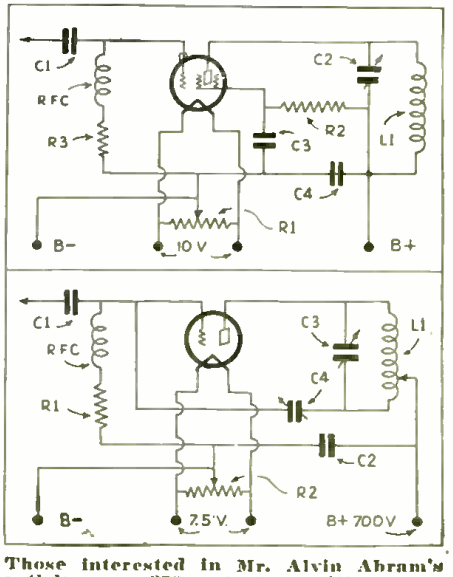
*Tickler coil wound at bottom or pin end of 1¼" dia. form. Prim. Turns interwound at lower end of Sec. (nearest tickler).

### Parts for "Trophy Winner" Power Pack

1 Power transformer. Trutest.
2 T4—Filter chokes. Trutest.
1 Three-section electrolytic filter condenser. Trutest.
1 Type 80 tube. Lafayette.

Also: Welded steel chassis, black crystalline finish; four-prong socket for V4 and six-prong socket for connector plug; necessary hardware, etc.

## CORRECTION.




**Those interested in Mr. Alvin Abram's article on a 250-watt transmitter, page 661, March issue, will most probably have noted that the center tap connection to the filament resistors, R1 and R2, figures 3 and 4, were not completed. They are shown correctly in the diagrams herewith.**

# Frequency Doubling in Therapy and Practice

(Continued from page 87)

tation increases. It will be seen in Fig. 1 that as the excitation increases the plate current increases, dips, rises and then falls to zero. The plate current has changed twice in the same time period required for one change of excitation voltage. The frequency of the output is therefore twice that of the input. This is all shown in Fig. 1. Incidentally, the plate current as shown by the graph has what is known as a "square" wave shape.

If the doubler is inductively coupled to the driver stage the tuned grid circuit of the doubler should resonate at the same frequency as the plate circuit of the driver tube. In other words, doubling takes place in the plate circuit, as shown above, and not in the grid circuit. The output circuit of the doubler, as well as the exciting stages, should be of high impedance. The ratio of inductance to capacity should be high in order to gain the highest efficiency and maximum power output. This calls for large coils and small condensers. The harmonic component of the fundamental output will also be increased, thus greatly helping the doubler in its performance.

### Triode Doublers

When using a triode as a doubler it should preferably be a tube of the high-mu type. A tube with a low amplification factor has the ability to handle large amounts of excitation voltage without appreciable distortion. That is why the power tubes in your broadcast receiver are of the low-mu type. In addition, the low-mu tubes would require an extremely large amount of negative grid bias to operate with any degree of efficiency as a doubler. The type '10 with its mu of 8 is a good frequency doubler. If we have 500 volts on the plate of our '10 we can easily find the cut-off bias as being 500 divided by 8 (the mu) which gives u a quotient of 62.5. Complete cut-off of plate current will therefore take place with a negative grid bias voltage of 62.5. A better tube than the type '10 is its cousin the 841. This tube takes the same plate and filament voltages as the '10 but has a much larger amplification factor. The 841 has a mu of 30 and cut-off is found to be only 16.6 volts when used at the same voltages as shown above. The 841 is the much better doubler of the two.

### Neutralizing Doublers

With neutralization of the doubler circuit we can expect better circuit stability than when not neutralized. This is one reason why commercial short-wave transmitters use screen-grid tubes in such profusion. When the doubler is neutralized its plate current will fall to almost the same low value as when using it as a straight amplifier.

The new high-mu Class B amplifier tubes make good frequency doublers. These tubes have almost complete cut-off of plate current at zero grid voltage. The advantage of using one of these tubes as a doubler is obvious. A 20,000 ohm resistor in the grid circuit will provide all the bias necessary for efficient doubling. If capacity coupling is used between the driver and the doubler the condenser should be connected directly to the plate end of the driver tank coil and excitation controlled by varying the capacity of the coupling condenser. It is easily possible to give tubes such as the 46 and 59 too much excitation. If such is the case the grid will overheat, emit electrons, and the plate current will creep badly, eventually resulting in the ruination of the tube.

## Screen-Grid Doublers

The screen-grid tube is a very good doubler. Since it is internally neutralized operation will be very stable. It would be well to note, at this point, that cut-off bias for a screen-grid tube cannot be determined by the same formula used for triodes. When using the screen-grid it is best to consult the plate current versus grid voltage curve for the type tube to be used. Such curves are found in the technical bulletins on the various types and are obtained by writing the manufacturer.

Doublers cannot be operated in a push-pull arrangement. This is because in a push-pull circuit there is cancellation of the second harmonic. Such a circuit will work well at the third harmonic (as a tripler).

A peculiar doubling arrangement is shown in Fig. 2. It will be noted that the grids are fed in push-pull while the output circuits of the tubes are connected in parallel. The input may be from a push-pull stage or the plate voltage may be fed in through the center of the driver tank coil, thus raising both ends above ground and 180 degrees out of phase. Maximum output with this circuit should be obtained at the second harmonic. This circuit, utilizing the type UX860 screen-grid 75 watt tube, is found in several commercial transmitters, one of them being the 1-KW. High Frequency Transmitter, RCA Model ET-3656. Such a circuit is not to be recommended at frequencies higher than 14 megacycles. This would produce a large shunt capacity and make tuning of the doubler difficult. To really obtain maximum results from this circuit there should be a milliammeter in each grid lead as shown in the diagram. The excitation is then adjusted until each meter reads the same amount of rectified grid current. Care should be taken to see that the grid chokes do not resonate with the tank circuit, otherwise the circuit will operate somewhat in the manner of a TNT oscillator. In fact, several years ago the author used such a circuit with a pair of '10 tubes at 14 megacycles with very good results.

For maximum efficiency a doubler should never operate directly into the antenna. In the case of an '03A or tube of larger power fair results could be obtained in this manner but the use of a '10 or smaller tube is to be discouraged.

To those of you who contemplate using, or, are already using phone: The doubler cannot be operated as a Class C modulated amplifier. The plate dissipation of a doubler is higher than that of a normal Class C amplifier and, on the modulation peaks, the tube would run extremely hot. This, together with the bias voltage on the doubler, which is not the same as that required for Class C operation, and the low plate resistance of the doubler would result in terrific distortion. This applies to grid and screen as well as plate modulation be it Class A or B.

If one keeps the following high lights of this paper in mind he should have no cause for trouble with a doubler:

1. Use a high-mu tube.
2. Use large coils and small condensers.
3. Have plenty of grid bias. About 2.5 times the cut-off value.
4. Plenty of excitation is necessary.
5. If an eliminator is used for the bias supply be certain that there is sufficient filtering action. Poorly filtered bias supply can produce as bad a signal as improper plate supply.

## CORRECTION

Question Box, page 36, May issue: The short wave adapter plug should have read "bottom view," with the letters "P" and "K" reversed.

## R. F. Booster Stage

(*Continued from page 79*)

from the coil bases, rotor or condensers and etc., are made with No. 14 multiple strand wire and returned to a common point. The sub-panel was then *bonded* every four inches with the same wire. This was done to offer as low a resistance to R.F. current returns to ground, as possible. For example—it is readily seen that if a coil is wound with No. 14 wire, some of the advantages gained by the use of such wire are lost, if the return to ground is made with No. 20 gauge wire., *no matter how short that wire may be.* In the rest of the circuits No. 20 solid hook-up wire was used, with the exception of the grid circuits, in which the same wire was used as for grounding.

The variable resistor, R1—used to bias the stages is unnecessary, but may be used at times to advantage to control volume. If any *interlocking* of circuits should cause oscillation of the R.F. stages, separate biasing resistors and condensers may be used. This was not found necessary in the unit described here.

The manner in which the R.F. unit is coupled to the receiver is shown in diagrams No. 1 and No. 2. The *ground return* of the antenna coil of the National set was disconnected from *ground* and connected to the *plate returns* of the detector and R.F. stage. The plate of the R.F. unit was then connected to the antenna post of the National set, completing the circuit. It is highly desirable that this lead be *shielded*, and to do this with the least possible loss it should be done in the following manner. Slip a piece of rubber tubing, ¾ inch outside diameter, over the lead, that is the exposed part that is outside of the cabinets. Then slip over this a braided shield and ground both ends to the cabinets; this also connects the additional R.F. stage to the negative potential of the power supply. The units should be grounded to each other at other points also and a large wire run to ground.

In the unit constructed by the author, a separate filament transformer was used, more as a matter of convenience than necessity. In the power-pack of the National 45 there is a 2½ volt filament winding that is not utilized. This may be used if desired, and it was used in the single R.F. unit. Filament leads and winding are left out of the diagrams shown here for simplicity and because they are conventional.

In the *antenna input* of the units it will be seen that the connections are represented for a *doublet antenna*. For use with the usual aerial one of these terminals may be grounded, of course.

### Coil Considerations

The National coils are constructed with *three windings*, namely: the antenna or plate coupling winding; one regeneration or trimming coil; and one grid coil winding. The manner in which these windings are utilized depends upon the circuits in which they are used.

In the construction of both units coil (L1) was used in conjunction with a .00005 mf. condenser (variable) to form a *tank circuit*. This is the same in which National uses it and serves to compensate for the detuning effect of the antenna on the first stage.

In the diagram of the *two-stage unit* the small condenser, C3, is represented as a variable. This is used to balance the circuits so that the tuning condensers will be *tracking*, at the same angle, *and once set need not be touched again.* The circuit L1, C1, has a tendency to increase the inductance of the grid coil to which it is coupled. Assuming that you are using National coils, then it is essential that L3 be utilized to keep the inductive values the same in the two circuits. Of course, one turn could be removed from the grid coil of stage No. 1, but that is neither necessary nor advisable.

This is the way to balance the two circuits. Take a small compression-type mica condenser, such as is used in neutralizing receivers, and connect it across L3, setting it at its minimum capacity. Then tune in a

signal on the 16 to 25 meter coils with the tuning condensers turned out as far as possible. They should have been previously set at the same angle. Then increase the capacity of C3, meantime rocking the condensers back and forth to keep them in tune with the signal. A spot will be found where the signal is loudest and then the circuits will be in balance. Care should be taken that C1 is set at its minimum capacity when following the above procedure, otherwise it will not compensate for the antenna detuning effect over the entire band.

The two R.F. chokes used and shown in the diagram of the two stage job are *short-wave chokes*. If chokes designed for *short waves* are not available it is better to leave them out rather than substitute with one that might cause a "dead-spot" somewhere in the band.

The *signal-to-noise* ratio is *greatly increased* by the addition of the R.F. stages, contrary to popular belief.

### Doublet Used

The antenna used most extensively by Mr. Johnson was a *doublet*, 19 feet 9 inches on each side of the center where the transposition blocks tie in. The height of the aerial is about 48 feet. 400 ohm resistors were used in the transposition leads to make the antenna less selective to one frequency, and to compensate for any unbalanced condition in the doublet legs and antenna proper. While the above described aerial is by all laws a 25 meter antenna, Mr. Johnson asserts that it is the best *all-wave* antenna that he has ever used.

No. 12 enameled solid copper wire was found to give the best results, both for aerial and transposed lead-in.

Since doublet antennas are directional sidewise, Mr. Johnson placed his N.W. to S.E. for best results.

## The "Jiffy-3"

(*Continued from page 95*)

characteristics, and makes one of the most quiet audio amplifiers available. Sufficient output is obtained to work a loudspeaker on many foreign stations. Most amateurs and "DX" hunters usually prefer earphones, however, due to their greater sensitivity, and it is with the use of phones that the value of careful engineering for low background noise will be fully appreciated.

Results: Frequently the signals, particularly EAQ, Madrid, and GSA, Daventry, were strong enough to put on the loud speaker!

### Parts List—"Jiffy-3"

1—.0001 mf. tuning condenser, with knob.
1—.000025 mf. bandspread condenser with knob.
1—.0001 mf. grid cond.
1—.002 mf. by-pass cond.
1—.1 mf. by-pass cond.
2—.01 mf. stopping cond.
1—1 meg. resistor.
1—100,000 ohm plate resistor.
1—50,000 ohm plate resistor.
2—250,000 ohm grid-leaks.
1—10 ohm rheostat, with knob.
1—50,000 ohm potentiometer, with knob and switch.
1—set of coils (broadcast also available).
5-prong coil socket.
Grid clip.
Output posts.
Battery cable.
Moulded subpanel chassis.
Aluminum panel.

| | Sec. | Pri. | Tickler |
|---|---|---|---|
| | 8½T | 6½T | 15T |
| 20 Meters | No. 20 D.C. 16T | No. 30 E 6T | No. 30 E 15T |
| 40 Meters | No. 26 D.S. 24T | No. 30 E 5T | No. 30 E 16T |
| 80 Meters | No. 20 D.C. 62T | No. 30 E 9T | No. 30 E 24T |
| 160 Meters | No. 26 D.S. | No. 30 E | No. 30 E |

# Transmitter and Power-Pack For Less Than $30.

(*Continued from page 87*)

condenser which is used to tune the antenna tank coil for parallel tuning of that circuit. The illustrations should be self-explanatory, and no difficulty should be experienced in the construction of either the power supply or the transmitter itself.

It will be noticed that the center tap filament resistor is placed directly on the socket of the 47 oscillator, and that most of the by-pass condensers, grid bias resistors, etc., have been mounted on top of the sub-panel as this allows for simpler wiring and shorter leads. The only parts that have been placed below the sub-panel are the two radio frequency chokes, two by-pass condensers and the 5-watt resistor R4 which is used to drop the voltage for the oscillator screen-grid.

Use the best crystal that is obtainable in the grid circuit of this 47 tube. It is foolish to try to economize on this important item. Where the outfit is to be used only on the 3,500 kc. band any good crystal that will oscillate within that band is usable, but if the set is to be used on the 7,000 kc. band the natural frequency of the crystal must be between 3,500 and 3,650 kc., so as to keep within the 7,000 to 7,300 kc. limits of that band when doubling.

It will be noted that both of the tank circuits are of the "Low-C" types. There is, perhaps, a good excuse for using "High-C" circuits in self-excited oscillator circuits but for crystal controlled circuits a definite loss occurs when the tuning condensers exceed a value of .00005 microfarads. A maximum value of .0001 is allowable in this position, but better practice would be to limit the capacity value to about .000035 mfd. and increase the number of turns on the coil itself. Remember that "High-C" circuits are used to eliminate harmonics in the tank circuits and in this transmitter we intend to use the harmonics, at least the second, when we run the amplifier as a doubler for 7,000 kc. operation. Harmonics can be suppressed by other means, such as taking care that the grid of the amplifier tube is not driven too hard, etc.

### Construction of Coils

Now for the coil winding data. Regular hook-up wire, of the push-back type, was used for all of the coils except the 3,500 kc. amplifier plate tank coil. The coils size being 1¾ inch diameter in all cases. On the oscillator tank 30 turns will be necessary with no spacing between turns. That is the main reason for using this wire—the insulation will supply all of the spacing necessary and there is little, if any, loss of efficiency. The antenna tank coil consists of 20 turns of the same wire and is also close wound. For the 7,000 kc. coil used in the amplifier plate circuit when doubling to that frequency it was found necessary to use approximately 16 turns of the push-back wire close wound.

The 3,500 kc. amplifier plate coil offered slightly more difficulties in its construction. It will be noted that neutralization must be used here, and the writer has arranged the coil mounting in a manner that makes extra connections for this neutralizing winding unnecessary. Three tip jacks have been installed on this coil. One is the connection to the plate end of the coil windings. The second, or center jack is used to connect the other end of the tuned windings to the B plus high voltage just exactly as in the case of the 7,000 kc. coil. The third, and last, of the pin jacks couples the neutralizing turns through a small 80 mmfd. condenser to the grids of this tube. In this way the tube capacities are balanced out by adjusting the capacity of the

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small aligning condenser until there is no longer any energy in the amplifier plate tank with the plate voltage turned off. Of this more will be said later. The coil itself consists of 38 turns of number 22 E wire, close wound, and the neutralizing turns number 16, making a total of 54 turns of number 22 E wire on this form.

That completes all of the data on the coil windings, but the writer would like to make one more suggestion, and that is—there exists a slight disadvantage in the manner that he has employed in coupling the antenna coil to the output of the amplifier. As can be seen on the photographs the antenna tank is wound directly on the same coil form as is the plate coil. Hence once these two coils have been wound there is no provision for varying the coupling between them. A better method would be to have the two windings on separate forms as plug in only the amplifier plate coil when changing bands. Meanwhile having the antenna coil mounted in such a way that it can be moved at an angle with respect to the axis of this plate coil. In this way the coupling can be altered at will. The advantages of this system will be self-apparent when the transmitter is in use. However—the builder can use his own judgment in deciding which method to use here.

### Tuning Up

Now for tuning the transmitter. First throw Sw1 to the "On" position, and see that Sw3 is "Off". Hold the key down and adjust C1 until the milliammeter on the power pack reads approximately 25 to 30 MA, or to the lowest reading that can be had on this meter. At this point a Neon bulb will glow brightly when held to the plate end of the oscillator tank coil. Now, place the 7,000 kc. plug-in coil into its holder, and throw Sw3 "On", and adjust C2 until the milliammeter again drops to the lowest point. This time to about 50 MA. Here again the Neon bulb will glow brightly when held upon the plate end of the amplifier tank coil.

Now the antenna condenser is tuned until the milliammeter shows the highest reading, and it is well to alternately adjust the condenser C2 until an average reading of 75 or 80 milliamperes is obtained on the meter.

The outfit is now tuned to the 7,000 kc. band and is ready for operation. A check with the Neon bulb will show whether or not there is any radio frequency current in the feeders. A dim glow will be seen as the neon is slid along each of the feeders.

The same procedure for tuning the oscillator tank circuit is used for 80 meter operation, but to tune and neutralize the amplifier stage it is necessary to have the oscillator stage runing normal—turn off Sw3 and adjust the small aligning condenser (C4) until the Neon bulb shows very little or no glow when held upon the plate end of the amplifier tank coil. When this has been accomplished throw Sw3 to "On" position, making sure that the antenna circuit is not tuned to resonance, and adjust C2 for the lowest dip of the milliammeter just as done formerly. Now plug in the antenna tank coil, or couple it to the amplifier tank, and adjust this condenser (C3) until the meter shows a strong increase in current. Always adjust C2 for the lowest dip on the meter and C3 for the greatest increase in current. After this has been accomplished it is advisable to again adjust C3 until the milliammeter shows a 15 per cent reduction in current, as this method of tuning seems to give a purer and steadier note. We are now ready to operate on the 80 meter band—and so—73's OM—many pleasant QSO's, K.

## The MAHCO International Three

(*Continued from page* 93)

The one side of the .1 mf. coupling condenser is run to the grid terminal of the 56 tube. (This is the isolated terminal.) A .25 meg. resistor is also run from this grid terminal to chassis. The plate terminal (1st lug left of filament) is run to one of the output terminals. A 2,000 resistor is run from the cathode terminal of this tube (1st terminal to right of filaments) to chassis. This is shunted by the .5 mfd. by-pass condenser.

The voltage-dividing resistors should now be arranged as shown in the diagram, with the .1 mf. by-pass condensers properly connected and the leads from the detector plate impedance unit, audio tube plate and regeneration control potentiometer run to the indicated points. (Looking at back of potentiometer right hand terminal goes to chassis and left hand one to voltage dividing resistor.)

The small antenna condenser should be adjusted to have quite low capacity (plates widely spaced—screw to left). This will permit smooth operation without dead spots. Finer adjustment can be made for best results with each particular antenna. A large antenna should be used with lower antenna condenser capacity for highest efficiency. Another important factor is a good ground. This is essential for stable operation and to minimize hum. The regeneration control should be operated at a point where the detector tube is just on the verge of oscillation. This can be determined by a slight click or thud followed by a slight hissing sound.

### List of Parts Used—"International 3"

S1—A.C. Switch.
T—Special Mahco "Electro-Statically Shielded" Power Transformer.
R.F.C.—2.5 Millihenry R.F. Choke.
C1—35 mmf. Antenna Condenser.
C2—.0001 mf. Grid Condenser.
C3—.00014 mf. Special Mahco Shielded Tuning Condenser.
C4—.00015 mf. By-pass Condenser.
C5—.1 mf. Tubular Condenser.
C6—.02 mf. By-pass Condenser, Tubular.
C7—.5 mf. Tubular By-pass Condenser.
C8—Double 8 mf. Electrolytic Filter Condenser.
R1—1 megohm Grid-Leak.
R2—.25 megohm Resistor.
R3—.25 megohm Resistor.
R4—2,000 ohm one watt Resistor.
R5—10,000 ohm one watt Resistor.
R6—5,000 ohm one watt Resistor.
R7—50,000 ohm Regeneration Control Potentiometer.

(The coil data on page 80 may be used.)

## Fourth Trophy Winner

(*Continued from page* 83)

KEE—39; 1-16-34; Bolinas, Cal., U. S. A.; 9-9:30 P.M.
KKZ—22; 2-10-34; Bolinas, Cal., U. S. A.; 4:45-5:15 P.M.
KKZ—44; 2-14-34 Bolinas, Cal., U. S. A.; 9-10 P.M.
HJ5ABD—46; 2-14-34; Columbia, S. A.; 7:50-10:15 P.M.
RV59—50; 1-30-34; Moscow, U. S. S. R.; 6-7 P.M.
LSN—20.6; 1-22-34; Buenos Aires, Argentina, S. A.; 10:45-10:49 A.M.
KOO—20; 1-22-34; Cal., U. S. A.; 4:05-4:15 P.M.
2RO—25.4; 2-10-34; Rome, Italy; 3:45-4:20 P.M.
PRA3 (PSK)—36.65; 1-15-34; Rio de Janeiro, Brazil; 7-7:30 P.M.
VE9GW—49.17; 1-15-34; Bowmanville, Ont., Canada; 6:15-6:45 P.M.

W9XF—49.15; 1-15-34; Chicago, U. S. A.; Evenings.

WNC—20; 1-22-34; N. J., U. S. A.; 9:45-9:50 A.M.

GBW—21; 2-10-34; Rugby, England; 10:18-10:29.

W2XE—19.6; 1-29-34; New York, U. S. A.; 1 P.M.

VK2ME—31.28; 1-28-34; Sydney, Australia; 1-3 A.M.

VK3ME—31.5; 1-24-34; Melbourne, Australia; 6-6:30 A.M.

FYA—25.16; 1-17-34; Pontoise, France; 11:35-12:10 P.M.

FYA—19.6; 1-22-34; Pontoise, France; 8:45-10:50 A.M.

FYA—25.6; 1-23-34; Pontoise, France; 4:05-4:15 P.M.

HC2RL—45; 1-17-34; Ecuador, S. A.; 9:15-11:15 P.M.

HJ1ABB—46.5; 1-17-34; Barranquilla, Colombia, S. A.; 8-10 P.M.

YV1BC—49; 1-18-34; Caracas, Venezuela, S. A.; Evenings.

EAR58—41.6; 1-22-34; Tenerffe, Canary Islands; 5-6 P.M.

VE9DR—49.8; 1-22-34; Quebec, Canada; 7:30-8 P.M.

CNR—37.3; 1-20-34; Morocco, Africa; 5:45-6:15 P.M.

W4XB—49.7; 1-24-34; Miami, Fla., U. S. A.; 4-5 P.M.

W1XAL—49.7; 1-25-34; Boston, Mass., U. S. A.; 6:15-7 P.M.

HJA3—46; 1-26-34; Baranquilla, Colombia, S. A.; 5:45-5:55 P.M.

CP4—36.9; 1-27-34; La Paz, Bolivia, S.A.; 1:02-1:30 A.M.

CP5—49.8; 1-27-34; La Paz, Bolivia, S. A.; 12:45-1:02 A.M.

TGX—50.2; 1-27-34; Guatemala, Guatemala; 5:25-5:50 A.M.

WES—32; 1-27-34; N. J., U. S. A.; 4:18-4:23 P.M.

## Trophy Contest Entry Rules

● THE rules for entries in the SHORT WAVE SCOUT *Trophy Contest* have been amended and only 50 per cent of your list of stations submitted need be verified. If, for example, you send in a list of 100 stations with 50 verification cards, you will receive credit for the other 50 per cent or 100 stations total. The trophy will be awarded to the SHORT WAVE SCOUT who has logged the *greatest number* of short-wave stations during any 30 day period; (he must have at least 50 per cent veris) this period need not be for the immediate month preceding the closing date. The complete list of rules appeared in the last issue of this magazine.

In the event of a tie between two or more contestants, each logging the same number of stations (each accompanied by the required 50 per cent veris), the judges will award a similar trophy to each contestant so tying. Each list of stations heard and submitted in the contest must be sworn to before a Notary Public and testify to the fact that the list of stations heard were "logged" over a given 30 day period, that reception was verified and that the contestant personally listened to the station announcements as given in the list.

Only commercial "phone" stations should be entered in your list, no "amateur" transmitters or "commercial code" stations. This contest will close every month on the first day of the month, by which time all entries must be in the editors' hands in New York City. Entries received after this date will be held over for the next month's contest. The next contest will close in New York City, June 1.

The judges of the contest will be the editors of SHORT WAVE CRAFT, and their findings will be final. Trophy awards will be made every month, at which time the trophy will be sent to the winner. Names of the contesting SCOUTS not winning a trophy will be listed in *Honorable Mention* each month. From this contest are excluded all employees and their families of SHORT WAVE CRAFT magazine. Address all entries to SHORT WAVE SCOUT AWARD, 98 Park Place, New York City.

# DOERLE WORLD-WIDE RECEIVERS

## *Official Doerle Receivers*

Never in the history of short waves has there been produced short-wave receivers which have taken the entire country by storm as much as the now famous Doerle receivers. Mr. Doerle described his first receiver, the 2-tube 12,500-mile receiver, in the December-January, 1932, issue of Short Wave Craft. And you must have seen the many letters published in that magazine, lauding this receiver to the skies, and for a good reason! It is a low-priced receiver, yet pulls in short-wave stations from all over the world—REGULARLY—in practically any location—not only in this country but anywhere. Thousands of experimenters have built their own and have obtained miraculous results.

Subsequently the 3-tube Signal Gripper was brought out with equal success; and to top it all, we have electrified both of these receivers so that now they are available either in 2-volt battery models or electrified A.C. models.

We list below two of the most popular Doerle receivers, namely, the 2-tube 12,500-Mile Battery Model and the 3-tube Electrified Signal Gripper.

Despite the remarkable performance of these two receivers, our technical staff felt that they could obtain even better results with slight modification of the circuit. This is especially true of the 3-tube Signal Gripper listed below. Here, full advantage is taken of the latest type triple-grid tubes, such as the 57 and 58, which are ideally suited for short-wave work. The increase in sensitivity and selectivity of these receivers, due to these modifications, is tremendous; yet, despite all, we have not raised the prices of these instruments to you.

### ONLY FIRST CLASS PARTS USED

It may be possible to buy the parts of the completed sets at a lower price elsewhere. We admit this at once. But if you will look over our parts list you will find that only first class material is used. We have done away with all losses. **There is no "hand capacity." IN THESE TWO SETS ONLY THE BEST CONDENSERS—AND THAT MEANS HAMMARLUND—ARE USED.** We could have produced the sets for considerably less if we used inferior parts (some Doerle imitators do this), but we refrained from doing so because then we could not guarantee results, as we now do. The sets are low in price, yet the quality is excellent considering the low price. Thus, for instance, we use Kurz Kasch vernier dials, because we find them excellent for the purpose. Our chasses are made of heavy-gauge metal, beautifully finished in black crystalline. These panels do away with "hand capacity." The four plug-in coils are of genuine molded bakelite for low losses. In short, despite the exceedingly low price, we have given you quality. You will be pleased not only with their business-like appearance but with their exceptional performance as well.

**Only by making these sets in quantities can we afford to sell them at the extremely low prices quoted.**

Note the testimonials printed on this page. They alone can give you the true story of the excellent performance of these fine receivers.

The 2-tube 12,500-Mile Set is for 2-volt operation. Although it is designed for earphone reception, many local stations will come in with such volume that a loud speaker may be used. This receiver requires two type 30 tubes, two 45-volt "B" batteries, and two No. 6 dry cells for operation. The 3-tube A.C. Signal Gripper requires one 56, one 57 and one 58 tubes for operation; instead of batteries, it requires a power pack. Any good, well-filtered pack delivering 2½ volts for the filaments, 250 volts for the plates and 22½ volts for screens will work very nicely. This receiver is a great deal more powerful than the 2-tuber and will bring in a good many more stations on the loud speaker.

### WHAT DOERLE FANS SAY

I received the 3-tube Doerle receiver and the set sure is a wonder. In just two weeks time I have received the following stations: KEE, HS1ABB, W1XB, PIII, W1XAZ, W3IA, W8XK, W2XE, W9XF, DJB, GSE, YV1BC, KNRA, XETE, VE9JR, W8XAL, GSB, PSK, W3XL, W3XAU, EAQ, G6RX, W2XAD, HJ1ABB, VE3GW, GOA, FYA, WNC, HJB, YV3BC, LSX, KKQ, HC2RL. I think this is very good as the street car line is two blocks west and the L.C. electric railroad is about 150 ft. east of here. You may, if you wish, use this letter in whole or part in advertising your Doerles. **Mr. Glenn L. Thompson, 3612 Lake Park Ave., Chicago, Ill.**

**THIS IS GOING SOME!**

Today is my third day for working the Doerle set and to date I have received over fifty stations. Some of the more distant ones I shall list. From my home in Maplewood, N. J., I received the following: WVR, Atlanta, Ga.; WGK, Ohio; W9HHM, 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.

That's not a bad record for three days on a two-tube job, is it? I will answer any questions concerning the Doerle set. **Mr. Jack Prior, 9 Mosswood Terrace, Maplewood, N. J.**

## 2-TUBE 12,500 MILE BATTERY SET

**$8.70**

This receiver is exactly as illustrated. Size of panel is 9" x 6¼", base 9" x 6½". **List of material used:** 2—Hammarlund .00014 mf. condensers; 1—20 ohm rheostat; 1—high quality audio transformer; 2—Kurz Kasch vernier dials; 3—bakelite low-loss sockets; 1—miniature antenna condenser; 1—.0001 mf. mica condenser; 1—5 megohm grid leak; 2—phone-tip jacks; 1—Ant-Gnd. assembly; 1—set of 4 bakelite plug-in coils; 1—set of hardware, hook-up wire, etc., and complete constructional details and diagrams. Shipping weight, 5 lbs.

**No. 2141—2-Tube 12,500-Mile Short-Wave Doerle Battery Receiver.** In Kit Form, with All Parts Specified Above But Not Wired; Including Blueprint Connections and Instructions, less tubes. Can be assembled in 1 hour. YOUR PRICE.. **$8.70**

**No. 2140—2-Tube 12,500 Mile Short-Wave Doerle Battery Receiver,** Completely Wired and Tested, Less Tubes. YOUR PRICE..... **9.90**

**No. 2142—Accessories Only Including** 2 Six-Months Guaranteed R.C.A. Licensed 230 Tubes; 1 Set of Standard Matched Headphones; 2 No. 6 Dry Cells; 2 Standard 45-Volt "B" Batteries. Shipping weight, 22 lbs. YOUR PRICE..... **4.36**

## 3-TUBE A.C. SIGNAL GRIPPER

**$13.75**

This receiver is exactly as illustrated. The panel measures 10½" x 7¼"; base, 10½" x 8". **List of material used:** 3—Hammarlund .00014 mf. tuning condensers; 2—Kurz Kasch vernier dials; 2—bakelite knobs; 1—volume control potentiometer; 2—tube shields; 1—Ant-Gnd. strip" 1—tip-jack strip; 3—6-prong wafer sockets; 1—special R.F. choke; miscellaneous high quality resistors and fixed condensers; 1—5-prong wafer socket; 1—4-prong wafer socket; 2—screen grid clips; 1 set of hardware, hook-up wire, etc., complete instructions and diagrams for constructing the set. Shipping weight, 7 lbs.

**No. 2178—Electrified 3-Tube Doerle Signal Gripper,** In Kit Form, with All Parts as Specified Above But Not Wired; Including Blueprint Connections and Instructions. Less Tubes. Can be assembled in 1 hour. YOUR PRICE..... **$13.75**

**No. 2177—Electrified 3-Tube Doerle Signal Gripper.** Completely Wired and Tested; Less Tubes. YOUR PRICE ..... **15.20**

**No. 2179—Complete Set of Tubes;** 1—58; 1—57; and 1—56. Special Short-Wave Hum-Free A.C. Power Pack Including 280 tube. YOUR PRICE ..... **9.80**

OFFICIAL DOERLE SHORT-WAVE RECEIVER MANUFACTURED BY Radio Trading Co., New York

**YOUR PROTECTION**

### GUARANTEE

We guarantee and warrant that all material furnished in the two sets described in this advertisement, whether they be complete sets or in the kit form, is first class in every respect; that the complete sets have been tested before shipping and that we will stand back of these sets and kits in every way. We will replace any parts, with the exception of accidentally blown out tubes, within three months, if parts are returned to us within that time.

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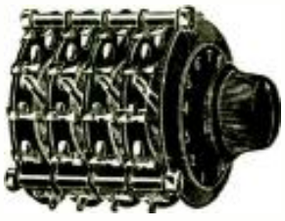
## Improved S-W Coil Switch

● THE accompanying illustration shows a new short-wave coil switch which is available in practically any number of gangs. The illustration shows a 4-gang unit, very popular for switching coils to tune in the different bands. Superior springs and insulation are outstanding features; the switch is single-hole mount and comes complete with numbered dial and knob.

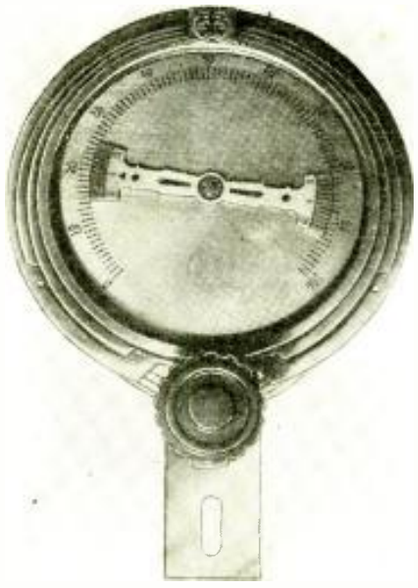


**Newest style short-wave coil switch of superior design; it is available in any number of gangs. Mfr's name on request. (No. 173)**

## A Micro-Vernier Dial

● AN entirely new and unique vernier dial, especially intended for use by amateurs, experimenters, small instrument manufacturers and special set builders is being introduced this month to the general market.

The dial has many new features as described below: 1. Reads accurately to .1 of 1 division at any point on the scale. 2. Has a double-edged vernier pointer in order to counter-check readings. 3. Spreads a 180 degree condenser over 270 degrees on the dial. 4. Has absolutely no back-lash. 5. Provision is made for mounting condensers directly on the dial. 6. Metal scale and pointer prevent any inaccuracy in readings due to shrinkage of the scales. 7. Dial ratio is 7½ to 1. 8. Dial is furnished with a suitable escutcheon. (When writing for manufacturer's name and address, send stamped envelope and mention No. 174.)



**Latest Micro-Vernier dial.**

**DON'T FORGET!!**

**The Editors are "hungry" for some "new" 1- and 2-tube Receiver Circuits! If you've got a "new" circuit—rush it to us. If we publish it, we'll pay for it.**

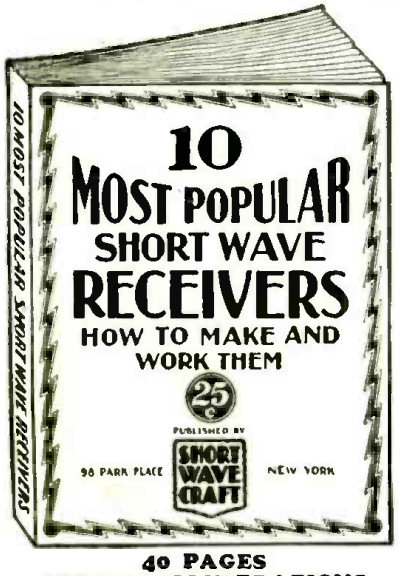
# The 4 ESSENTIAL SHORT WAVE BOOKS

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

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

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

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




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

**CONTENTS**

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

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

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**25c**

### The Short Wave Beginner's Book

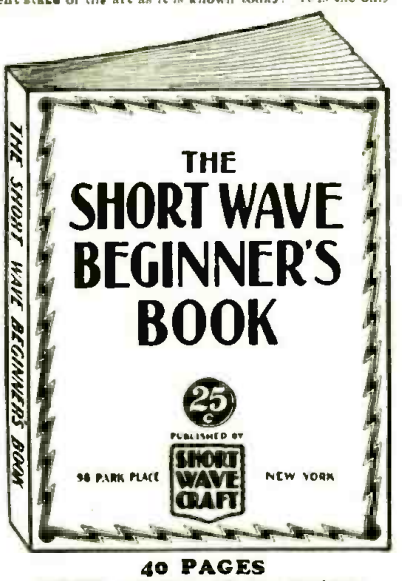
Here is a book that will solve your short wave problems—leading you in easy stages from the simplest fundamentals to the present stage of the art as it is known today. It is the only low-priced reference book on short waves for the beginner.

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

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

**Partial List of Contents**

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

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### How to Build and Operate Short Wave Receivers

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

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

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

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

**Over 150 Illustrations**
**72 Pages 7x10 Inches**

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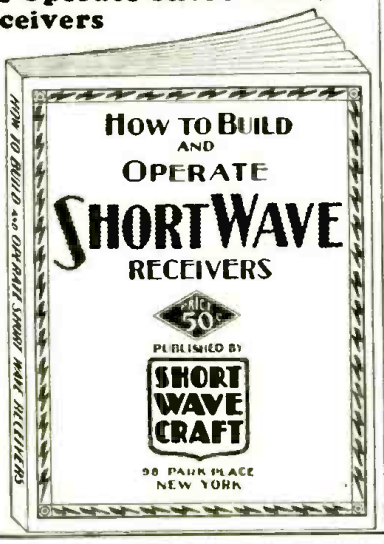
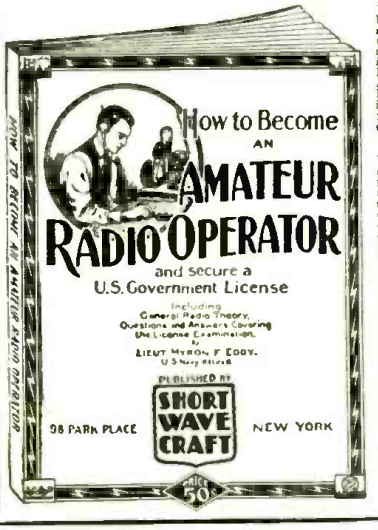



### How to Become an Amateur Radio Operator




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

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

**Partial List of Contents**

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

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

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# When to Listen In

By M. HARVEY GERNSBACK

### Correction

Due to a typographical error there were 2 mistakes in last month's column. Under the heading Daventry, in the last 2 lines the correct line should have been: 6-8 P.M. on GSC, and either GSA or GSD. The line May 12th, 11:30 P.M.-1:30 A.M. should have been up with the first Daventry schedule. The corrected line reads: 12:15-1:15 A.M. (After May 12th 11:30 P.M.-1:30 A.M.) on GSB and GSD.

In the yearly schedule of VK2ME the last 2 lines, beginning Wednesday—and the next line Saturday—should not have appeared at all. They have no connection with the schedule of VK2ME.

### Daylight Saving Time

About the end of April Daylight Saving Time went into effect in many cities in the U. S., Canada and in several European countries. In some instances schedules have been changed and these changes were incorporated in this month's station list where the changes were known in time. The station list and the times in this column will continue on Eastern Standard Time so that those living in districts using daylight time will have to *add one hour* to the time schedules printed here in order to secure Eastern Daylight time. Those living in other time zones (Central or Pacific, etc.) where Daylight Saving will be observed will not only have to correct for their local time but also for Daylight Saving. Those living in districts remaining on standard time will, of course, continue as they have in the past.

### Daventry

Effective April 22 the Daventry schedules underwent almost complete revision, coincident with the adoption of Daylight Saving or "Summer Time" as it is called in England. The revised schedules follow. Transmission 1 (after May 12th) 11:30 P.M.-1:30 A.M. on GSD and GSB; Transmission 2, 6-8:30 A.M. (6:30-8:30 A.M. on Sundays) on GSC and GSF; Transmission 3, 8:45-10:45 A.M. on GSF, and either GSC or GSE, 10:45 A.M.-12:45 P.M. on GSE and either GSB or GSF; Transmission 4, 1-4 P.M. on GSD and GSB; 4-5:30 P.M. (4-4:30 P.M. on Sunday) on GSB and either GSD or GSA; Transmission 5, 6:00-8:00 P.M. on GSC or GSB and also on GSD. These new timings remain in effect until October 6th, with the exception of Transmission 1, which is altered from month to month. Letters to these stations should be addressed to the British Broadcasting Co., Broadcasting House, London, W.1, England.

### Berlin

The German S-W stations are now operating on revised schedule also, as follows: 12:30-2 A.M. on DJB; beamed at Asia; 6:35-9:45 A.M. on DJB, beamed to North America and also on DJA, beamed to Asia; 12:50-4:30 P.M. on DJD and DJC, beamed to South Africa; 5-7:30 P.M. on DJA, beamed to South America; and from 9-11:30 P.M. on DJC and DJD, beamed to North America. DIQ, 10,290 kc. at Konigs Wusterhausen, Germany, is also added to the other stations and broadcasts the same program irregularly. Also DJE, 17,760 kc. The address of the stations is: German Short Wave Station, Broadcasting House, Berlin, Germany.

### T14NRH

NRH at Heredia, Costa Rica, on 9,675 kc. will soon be back on the air according to Mr. Marin, owner, operator and announcer par excellence. The station suspended operations while Mr. Marin went to Granada, Nicaragua to direct the installation of the new station YNCRG at that place. YNCRG should now be on the air on about 6,712 kc. or 44.7 met.

### EAQ

EAQ at Madrid, Spain, on 9,860 kc. (This is the frequency they actually broadcast on,

(*Continued on page* 127)

## • Index to Advertisers •



(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

# When to Listen In

(*Continued from page* 125)

despite the fact that they announce over the air and print on their verification cards 10,000 kc., 30 met.) now broadcasts daily except Saturday and Sunday from 5:15-7 P.M. On Saturday they broadcast from 1-3 P.M. and 5:15-7:30 P.M.; on Sunday from 5:15-7:30 P.M.

### Canada

VE9JR at Winnipeg is supposed to be on daily from 6-12 P.M. and on Sunday afternoon. It was heard here recently at about 8 P.M. This is the first time it had been heard since last fall. The Canadian Radio Commission has taken it over and it is reported by several correspondents that it now uses its old call of CJRX which was dropped about three years ago.

### Rome

I2RO has recently made a great improvement in the transmitting apparatus it uses. It now comes in as loudly and clearly as the other foreign "Locals". It is on generally from 11:30 A.M.-12:30 P.M. and from 1:15 to about 5 or 6 P.M., varying from day to day. It is also reported irregularly in the early morning.

### Sydney

The May and June schedule for VK2ME is: May, 1-3 A.M., 5-9 A.M., 10:30 A.M.-12:30 P.M. June, 12 Midnight 2 A.M., 5-9 A.M., 11:30 A.M.-1:30 P.M. Sundays only.

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**Address your entries to:**

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**SHORT WAVE CRAFT,**
**98 Park Place,**
**New York City.**

# S-W League

(*Continued from page* 100)

Amateur Radio and always will be, in my estimation. I am in favor of code and not a lot of "gas bag" artists.
HARRY R. CHETHAM.
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Somerville Police Radio Broadcast Station.
Somerville, Mass.